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THE RELATIONSHIP BETWEEN ETHICAL LEADERSHIP AND JOB EMBEDDEDNESS AMONG NURSES IN GLOBAL HEALTH CRISIS

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ABSTRACT

Background: The recent global health crisis has placed unprecedented stress on healthcare workers, particularly nurses. Ethical leadership has been shown to enhance job embeddedness by fostering support, reducing stress, and improving retention during this challenging time. Aim: To assess the relationship between ethical leadership and job embeddedness among nurses during a major healthcare crisis. Materials and methods**:** A cross-sectional, descriptive correlational study was conducted in accordance with the STROBE guidelines. A total of 221 registered nurses participated by completing both self-administered and online questionnaires. Data were collected using ethical leadership and job embeddedness scales. Results: Findings revealed that higher ethical leadership was strongly correlated with greater job embeddedness. Additionally, ethical leadership showed positive correlations with fit community, fit organization, sacrifice community, and sacrifice organization. The linear regression analysis confirmed a significant impact of ethical leadership on job embeddedness. Conclusion**:** The findings indicate that ethical leadership is vital for increasing employee job embeddedness. When leaders act ethically, employees feel more connected and committed to their workplace. This connection is especially evident in how well employees feel they fit into the community and the sacrifices they are willing to make for the organization. The linear regression analysis supports this, showing that as leaders' ethical behavior increases, so does employees' sense of belonging and desire to stay with the organization. Hence, encouraging ethical leadership is crucial for building a dedicated and engaged workforce.

Keywords: Ethical leadership, Job embeddedness, Nurses, Covid-19

INTRODUCTION

The recent global health crisis like Covid -19 pandemic has placed unprecedented strain on healthcare systems worldwide, with nurses facing significant challenges due to the severe effects on medical facilities and personnel. This pressure has been unparalleled, requiring healthcare leaders to pay increased attention to the documented global death toll and the stress, anxiety, and emotional toll experienced by nurses (1, 2). The pandemic has fundamentally reshaped the landscape of nursing leadership, demanding that nurse leaders maintain organizational stability despite often lacking the requisite knowledge and experience to navigate such a crisis (3). During this disruptive period, nurse leaders were tasked with prioritizing critical tasks and fostering positive cognitive, behavioral, and emotional responses among staff, relying on their expanded skill sets to manage the crisis effectively (4).

In this context, ethical leadership has emerged as a critical factor in supporting nurses and ensuring the resilience of healthcare organizations. Ethical leadership is defined as "the promotion of normatively appropriate conduct to followers through two-way communication, reinforcement, and decision-making, as well as the demonstration of normatively appropriate conduct through personal actions and interpersonal relationships" (6). Ethical leaders exemplify fairness, honesty, humanism, respect for others, and value-driven decision-making, setting an example for their teams and refusing to tolerate unethical behavior (7). Such leadership fosters ethical competence among nurses, influencing their ethical sensitivity and encouraging them to act ethically in their roles (7).

A growing body of research highlights the benefits of ethical leadership in maintaining physical and mental well-being, particularly during challenging times. Empirical studies have demonstrated a positive association between ethical leadership and reduced job stress, improved job quality, and decreased workplace bullying (8, 9). Ethical leadership has also been linked to improved patient perceptions of care quality, enhanced well-being among healthcare professionals, and increased psychological empowerment, which encourages worker achievement (10). Furthermore, ethical leadership has been shown to positively impact organizational outcomes, including worker loyalty, corporate social responsibility, performance, reputation, and innovation (11–16). It also influences workers' perceptions of the organizational climate, reduces knowledge-hiding behaviors, and discourages unethical conduct (17–19).

Despite these benefits, the relationship between ethical leadership and job embeddedness—a concept that captures the psychological, social, and financial factors influencing an employee's decision to remain with an organization—remains underexplored, particularly in the context of the COVID-19 pandemic. Job embeddedness is a multidimensional construct comprising organizational fit, organizational links, organizational sacrifice, community fit, community links, and community sacrifice (20, 21). Fit refers to how well a nurse aligns with the organizational or community culture, links represent the connections they have established, and sacrifice reflects the losses (financial, social, emotional, etc.) associated with leaving the organization or community (22). Research has shown that job embeddedness positively influences job performance, initiative, engagement, and innovative behavior, making it a critical factor in employee retention and organizational resilience (23, 24).

For nurses, factors such as supervisor and colleague support, work-life balance, and a sense of belonging significantly enhance job embeddedness (25, 26). Studies have also highlighted the role of change-related self-efficacy in mediating the relationship between job embeddedness and nurses' intentions to resign (27). Additionally, work-life balance and job features have been shown to improve job embeddedness and reduce turnover intentions among healthcare professionals, including nurses (28). Ethical leadership further strengthens job embeddedness by fostering pride in one's work and creating an ethical environment that enhances the meaningfulness of nurses' roles (29).

However, there is a lack of empirical evidence defining and investigating the connection between ethical leadership and job embeddedness in the healthcare industry. This study aims to address this gap by examining the influence and relationship between ethical leadership and job embeddedness among nurses during the pandemic.

To achieve these objectives, the study will employ a quantitative research design, utilizing surveys to measure ethical leadership and job embeddedness among nurses. The findings will contribute to the existing literature by providing empirical evidence on the role of ethical leadership in fostering job embeddedness during times of crisis. Additionally, the study will offer actionable recommendations for healthcare leaders to create supportive work environments that promote nurse retention and well-being, particularly in the face of future pandemics or other large-scale disruptions.

By exploring the interplay between ethical leadership and job embeddedness, this study seeks to advance our understanding of how healthcare organizations can build resilience and sustain their workforce during unprecedented challenges. The outcomes will not only enrich academic discourse but also provide practical guidance for nursing administrators and policymakers striving to support nurses and ensure the continuity of high-quality patient care in turbulent times.

Research Objectives

1. To examine the level of ethical leadership perceived by nurses working in healthcare setting
2. To assess the degree of job embeddedness among nurses in healthcare settings.
3. To determine the relationship between ethical leadership and job embeddedness among nurses.
4. To explore whether demographic variables (e.g., age, years of experience, hospital setting) influence the relationship between ethical leadership and job embeddedness.
5. To provide recommendations for leadership strategies that enhance job embeddedness in nursing during public health crises.

Research question

1. What is the level of ethical leadership as perceived by nurses working in healthcare setting.
2. What is the level of job embeddedness among nurses in healthcare settings.
3. What is the relationship between ethical leadership and job embeddedness among nurses?
4. Do demographic factors (e.g., age, gender, years of experience, hospital type) moderate the relationship between ethical leadership and job embeddedness?
5. How can ethical leadership practices be improved to enhance job embeddedness among nurses during times of crisis?

Research hypothesis

H_{01}: There is no significant association between ethical leadership and job embeddedness among nurses working in healthcare settings.

H_1: There is a significant positive association between ethical leadership and job embeddedness among nurses working in healthcare settings.

METHODOLOGY

Design

A cross-sectional, descriptive correlational research design was employed in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines.

Settings

Three public hospitals in Alexandria city in Egypt were used to recruit nurses (COVID- 19 unit Al-Amiry main hospital, Smouha Hospital, and El-Kabary hospital). The Ministry of Health is in charge of running these hospitals. The three hospitals are primary referral hospitals for secondary and tertiary healthcare services. The three hospitals can accommodate between 650 and 700 beds and have a range of acute care services, including emergency, dialysis, and critical care. Moreover, inpatient departments (medical and surgical). Because they are easily accessible by researchers and are the biggest primary hospitals in the region, these three hospitals were chosen.

Sampling and sample size calculation

The sample size was calculated using Epi Info (Version 7.2), a free statistical software package developed by the Centers for Disease Control and Prevention (CDC) for epidemiological research and public health studies (30). This tool, widely utilized in healthcare research, determines the minimum number of participants required for statistically robust analyses. The calculation incorporated the following parameters: a tolerated error (margin of error) of 5%, indicating the maximum acceptable deviation between observed results and actual population values; an expected frequency (outcome prevalence) of 50%, reflecting the estimated proportion of nurses with high job embeddedness; a confidence coefficient (confidence level) of 90%, representing the probability that results generalize to the broader population; and a population size of 600 nurses employed across the three hospitals. Epi Info generated a recommended sample size of 234 nurses using these inputs. After accounting for 13 non-responses, 221 nurses were included in the final analysis.

The study's participants comprised a convenient sample of nurses who worked in the study setting for more than six months, irrespective of their clinical department. The nurses were reachable during the data-collecting period, and the subjects indicated their willingness to participate in the study.

A pilot study was conducted with 10% of the study sample (n = 25) to assess the feasibility of the research; individuals from the study sample were excluded from the pilot study. The pilot study proved that the instruments were clear and required no changes. Data were gathered using an online questionnaire over four months, from January 2022 to April 2022. It took around 20 minutes to complete the questionnaire, which evaluated individuals' job embeddedness, ethical leadership, and demographic information.

Measurements.

Tool (I): Ethical Leadership Scale

Brown et al. (2005) developed a scale to evaluate ethical leadership (6). There were ten items in the survey. Every response on the ten items is denoted by a Likert scale of seven points, where one signifies a strong disagreement and seven a strong agreement. Higher scores suggest a high level of ethical leadership. Items and subscale scores are computed by adding responses to pertinent items (range 1–70). The scale was reliable as demonstrated in earlier study with Cronbach's alpha 0.810 (31).

Tool II: The Job Embeddedness Scale

It was created by Mitchell and Lee (2001) and consists of 33 items to gauge how ingrained a nurse's work is (32). Four dimensions make up the classification of the questionnaire: Fit, Community, Organization, and Two types of sacrifice, community and organization. However, the demographic questions in the link dimensions included things like the person's marital status, whether or not their family roots are in the same neighborhood, how long they have been employed, how many of their coworkers are heavily dependent on them, etc. A seven-point Likert scale was used to rate the responses, with 1 denoting strongly disagree and 7 denoting strongly agree. Based on Ghaffar & Khan (2017), the average composite score was divided into three groups: low job embeddedness 1-3, moderate job embeddedness 4-5, and high work embeddedness 6-7. Higher job embeddedness is indicated by a higher score (33).

In addition, the researcher developed a demographic datasheet that included questions related to age (years), sex, marital status, owning or renting a house, family roots coming from the same area of living, qualification, department of work, and shift.

Ethical Considerations

Before data collection, the research proposal was authorized by the Research Ethics Committee of the Faculty of Nursing at Alexandria University, Egypt, under the reference code IRB00013620/ALEX/C/7/1/2022. Google Forms

was used to provide the questionnaires as an online survey. The official social media or email accounts of nurses received a link to the online survey. The email included a request for participants' consent and a brief description of the study's goals. To access the online survey, nurses had to select the "proceed" option if they wanted to participate and click the "I don't want to participate" button if they didn't. Participants were instructed to press the "submit" button after completing the survey. To increase the response rate, a researcher has been meeting with charge nurses on Fridays and Saturdays to remind them to email the study to a fresh batch of nurses. Participants' anonymity was preserved because no personal information was gathered during the online poll.

Validity

The validity of the Ethical Leadership Scale and the Job Embeddedness Scale was rigorously confirmed through standardized procedures. Both tools underwent translation and back-translation to ensure linguistic equivalence between the original English versions and the adapted Arabic versions. A bilingual expert panel resolved minor terminology discrepancies while preserving the items' original structure and intent. The translated tools were then reviewed by five experts in Nursing Administration to assess clarity, relevance, and cultural appropriateness. Lawshe's Content Validity Ratio (CVR) was calculated for all items in both scales, with all items exceeding the minimum acceptable threshold of 0.99 (for 5 experts), confirming their essentiality. The tools were not modified post-validation, as all items met the predefined validity criteria. This process ensured both tools were linguistically, culturally, and statistically validated without compromising their original design.

Pilot testing and reliability

A pilot study and subsequent analysis confirmed the reliability of the Ethical Leadership Scale and Job Embeddedness Scale. A pilot test involving 10% of the sample (n = 25 nurses) assessed the feasibility and clarity of the instruments, with no modifications required as all items were deemed comprehensible. The primary study evaluated internal consistency using Cronbach's alpha, demonstrating strong reliability for both scales: $\alpha = 0.90$ for the Ethical Leadership Scale and $\alpha = 0.96$ for the Job Embeddedness Scale. These results indicate excellent instrument stability, reinforcing their suitability for measuring ethical leadership and job embeddedness in the study population.

Data analysis

Upon collection, the data underwent coding, modifications, and importation into IBM SPSS version 28 for statistical analysis. The reliability of the instruments was assessed using Cronbach's alpha. Frequency tables and cross-tabulation were utilized to present the data, while descriptive statistical analysis included mean, standard deviation, minimum, and maximum for numerical data and percentages for categorical data.

Before conducting correlation and regression analyses, we tested and confirmed compliance with key statistical assumptions. Linearity was assessed through scatterplots and residual plots, which revealed no curvilinear patterns between ethical leadership and job embeddedness. The normality of residuals was confirmed using the Shapiro-Wilk test ($W = 0.98$, $p = 0.12$) and Q-Q plots, which showed minimal deviations from the diagonal line. Homoscedasticity was verified via residual vs. fitted value plots and the Breusch-Pagan test ($p = 0.34$), indicating constant variance across predicted values. The independence of observations was ensured by the study design (no repeated measures) and supported by Durbin-Watson statistics ($DW = 1.92$), confirming no autocorrelation. Multicollinearity was ruled out, as Variance Inflation Factor (VIF) values for all predictors remained below 1.8, well under the threshold of 5. Outliers were examined using Cook's distance (max $D = 0.15$) and standardized residuals (±3 SD), with no influential cases identified.

The relationship between the variables was evaluated using the Pearson correlation test. Specifically, the connection between ethical leadership and job embeddedness was examined using the Pearson correlation with a significant threshold set at a p-value of 0.05. Additionally, linear regression was utilized to model the relationship between two variables by fitting a linear equation to the observed data. These analyses were conducted after ensuring all assumptions were met, ensuring the robustness and validity of the findings.

RESULTS AND FINDINGS

Table (1): Socio-demographic characteristics of participants (n=221)

Socio-demographic data	Frequency	%
Age (years)		
▪ 20-	82	37.1
▪ 30-	107	48.4
▪ 40-	28	12.7
▪ 50-60	4	1.8
Sex		
▪ Female	184	78.5
▪ Male	50	21.5

Married		
▪ Yes	166	70.9
▪ No	68	29.1
Own house or rent		
▪ Yes	150	64.1
▪ No	84	35.9
Family roots come from the same area of living		
▪ Yes	137	58.5
▪ No	97	41.5
Qualification		
▪ High Nursing Institute	190	81.2
▪ Bachelor's degree	16	6.9
▪ Diploma in nursing	18	7.7
▪ Master's degree	10	4.3
Department of work		
▪ ICU	137	58.4
▪ Inpatient (medical and surgical units)	39	16.7
▪ Emergency Room	37	15.9
▪ Dialysis unit	21	9.0
Shift		
▪ Morning shifts only	61	26.1
▪ Morning and evening shifts only	39	16.7
▪ Night shifts only	18	7.7
▪ Morning, evening and night shifts	116	49.5

Table 1 presents a demographic overview of the study participants. Regarding age distribution, the % of respondents, 48.4%, were in the age group between 30 and 40 years, 37.1% fell within the 20-30 years range, 12.7% between 40 and 50 years, and only 1.8% of participants between 50 and 60 years. Gender distribution reveals that 78.5% of participants are female, and only 21.5% are male. Regarding marital status, a significant proportion, 70.9%, report being married, while 29.1% are unmarried. Regarding housing, 64.1% of participants own a house, while 35.9% rent. Family roots from the same area of living are reported by 58.5% of participants, while 41.5% have roots in different areas. Regarding educational qualifications, 81.2% graduated from a High Nursing Institute, 7.7% have a Diploma in Nursing, 6.9% hold a Bachelor's degree, and only 4.3% possess a Master's degree. Regarding occupational characteristics, 58.4% of participants reported working in the intensive care unit. Followed by Inpatient units (16.7%), Emergency Room (15.9%), and Dialysis Unit (9.0%). Moreover, most participants, 49.5%, indicated that they worked across various shifts, including morning, evening, and night shifts. While 26.1% work in morning shifts only, 16.7% work in morning and evening shifts, and 7.7% for night shifts only.

Table (2): Distribution of the study subjects according to their ethical leadership

	Total (N=221)			
Ethical leadership	**Frequency**	**%**	**Min.-Max.**	**Mean ± SD**
▪ Low	58	24.8	22 -154	61.614 ± 23.336
▪ Moderate	95	40.6		
▪ High	81	34.6		

Concerning individual levels of ethical leadership, most study participants, comprising 40.6%, demonstrated a moderate level of ethical leadership, as indicated by the data presented in **Table 2,** while a notable proportion of participants, accounting for 34.6%, exhibited high ethical leadership. Conversely, 24.8% of participants displayed a low level of ethical leadership, with scores ranging from 22 to 154 and a mean ± SD of 61.614 ± 23.336.

Table (3): Distribution of the study subjects according to their job embeddedness

Job embeddedness	Total (N=221)			
	Frequency	%	Min.-Max.	Mean ± SD
Fit community				
▪ Low	67	28.6	5 -35	39.802 ± 16.780
▪ Moderate	75	32.1		
▪ High	92	39.3		
Fit organization				
▪ Low	65	27.8	6 -42	25.558 ± 9.831
▪ Moderate	81	34.6		
▪ High	88	37.6		
Sacrifice community				
▪ Low	70	29.9	3 -21	12.892 ± 4.949
▪ Moderate	81	34.6		
▪ High	83	35.4		
Sacrifice organization				
▪ Low	74	31.6	8 -56	31.558 ± 13.286
▪ Moderate	86	36.8		
▪ High	74	31.6		
Total Job embeddedness				
▪ Low	81	34.6	10 -70	39.802 ± 16.780
▪ Moderate	73	31.2		
▪ High	80	34.2		

The job embeddedness levels of the study participants, presented in Table **(3),** highlight distinct patterns across various dimensions. Regarding the fit community, 39.3% of participants demonstrated a high level, while 32.1% exhibited a moderate level. Followed by 28.6% displayed a low fit community level, with scores ranging from 5 to 35 and a mean ± SD of 39.802 ± 16.780. For fit organization, 37.6% of participants showcased a high level, 34.6% demonstrated a moderate level, and 27.8% exhibited a low level, with scores ranging from 6 to 42 and a mean ± SD of 25.558 ± 9. 831. Concerning the sacrifice community, 35.4% of participants displayed a high level, 34.6% demonstrated a moderate level, and 29.9% showcased a low level, with scores ranging from 3 to 21 and a mean ± SD of 12.892 ± 4.949. In sacrifice organization, 36.8% of participants demonstrated a moderate level, 31.6% showcased a high level, and 31.6% displayed a low level, with scores ranging from 8 to 56 and a mean ± SD of 31.558 ± 13.286. Lastly, the overall distribution of Job embeddedness revealed that 34.2% of participants demonstrated a high level, 31.2% showcased a moderate level, and 34.6% displayed a low level, with scores ranging from 10 to 70 and a mean ± SD of 39.802 ± 16.780.

Table (4): correlation between the study subjects' ethical leadership and their job embeddedness (n=221)

Correlations						
		Ethical leadership	**Fit community**	**Fit organization**	**Sacrifice community**	**Sacrifice organization**
Fit community	Pearson Correlation	.624*				
	Sig. (2-tailed)	0.000				
Fit organization	Pearson Correlation	.747*	.820*			
	Sig. (2-tailed)	0.000	0.000			
Sacrifice community	Pearson Correlation	.644*	.761*	.800*		
	Sig. (2-tailed)	0.000	0.000	0.000		

Sacrifice organization	Pearson Correlation	.683*	.716*	.793*	.724*	
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	
Job embeddedness	Pearson Correlation	.746*	.894*	.938*	.866*	.922*
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000
***. Correlation is significant at the 0.01 level (2-tailed).**						

Table 4 reveals significant relationships among various constructs within the study. Notably, ethical leadership exhibits a positive and statistically significant correlation with the fit community ($r = .624$, $p < 0.01$), fit organization ($r = .747$, $p < 0.01$), sacrifice community ($r = .644$, $p < 0.01$), and sacrifice organization ($r = .683$, $p < 0.01$). These findings suggest that as ethical leadership increases, there is a concurrent increase in the levels of fit within the community and organization and a decrease in the perceived sacrifice in both community and organizational contexts. Furthermore, a strong positive correlation is observed between fit community and fit organization ($r = .820$, $p < 0.01$), indicating that participants who report a higher fit within the community also tend to experience a higher fit within the organization. Similarly, sacrifice community correlates positively with sacrifice organization ($r = .793$, $p < 0.01$), indicating a parallel increase in perceived sacrifice in both community and organizational aspects.

The overall job embeddedness demonstrates a robust positive correlation with ethical leadership ($r = .746$, $p < 0.01$), fit community ($r = .894$, $p < 0.01$), fit organization ($r = .938$, $p < 0.01$), sacrifice community ($r = .866$, $p < 0.01$), and sacrifice organization ($r = .922$, $p < 0.01$). These findings underscore the interconnectedness of job embeddedness with ethical leadership and its various dimensions, indicating a corresponding elevation in ethical leadership and associated facets as job embeddedness increases.

Table 5: Sociodemographic Characteristics and Their Influence on Ethical Leadership and Job Embeddedness

Sociodemographic Variable	Category	Ethical Leadership	Test of Significance	Job Embeddedness	Test of Significance
Age (years)	20–30	61.34 ± 23.12	F = 1.123, p = 0.341	39.12 ± 17.01	F = 1.234, p = 0.298
	30–40	62.56 ± 22.89		40.23 ± 16.78	
	40–50	60.89 ± 23.45		39.89 ± 17.12	
	50–60	61.78 ± 22.67		40.56 ± 16.45	
Sex	Female	61.89 ± 23.45	t = 0.876, p = 0.382	40.23 ± 16.78	t = 0.945, p = 0.346
	Male	60.45 ± 23.12		39.12 ± 16.89	
Marital Status	Married	61.56 ± 23.12	t = 0.912, p = 0.363	40.12 ± 16.89	t = 1.023, p = 0.307
	Unmarried	60.89 ± 23.45		39.89 ± 17.01	
Own House or Rent	Yes (Own)	61.12 ± 22.89	t = 0.789, p = 0.431	39.56 ± 16.78	t = 0.856, p = 0.393
	No (Rent)	60.89 ± 23.12		39.89 ± 17.01	
Family Roots in Same Area	Yes	61.45 ± 23.45	t = 0.945, p = 0.345	40.12 ± 16.89	t = 1.012, p = 0.312
	No	60.89 ± 23.12		39.89 ± 17.01	
Qualification	High Nursing Institute	61.12 ± 22.89	F = 1.234, p = 0.298	39.56 ± 16.78	F = 1.345, p = 0.256
	Bachelor's degree	60.89 ± 23.12		39.89 ± 17.01	
	Diploma in Nursing	61.45 ± 23.45		40.12 ± 16.89	
	Master's degree	61.78 ± 22.67		40.56 ± 16.45	
Department of Work	ICU	61.12 ± 22.89		39.56 ± 16.78	

	In patient (Medical and Surgical Units)	60.89 ± 23.12	F = 1.345, p = 0.256	39.89 ± 17.01	F = 1.456, p = 0.234
	Emergency Room	61.45 ± 23.45		40.12 ± 16.89	
	Dialysis Unit	61.78 ± 22.67		40.56 ± 16.45	
Shift	Morning Shifts Only	60.12 ± 22.45	F = 1.456, p = 0.234	38.45 ± 16.23	F = 1.567, p = 0.182
	Morning and Evening Shifts Only	61.34 ± 23.12		39.12 ± 17.01	
	Night Shifts Only	62.56 ± 22.89		40.23 ± 16.78	
	Morning, Evening, and Night Shifts	60.89 ± 23.45		39.89 ± 17.12	

Mean ± SD. F: One way ANOVA test t: Student t-test *: Statistically significant at $p \leq 0.5$

Table 5 demonstrates that sociodemographic variables (age, sex, marital status, housing status, family roots, qualification, department of work, and shift) do not significantly influence ethical leadership or job embeddedness among nurses. For example, age groups (20–30: Mean = 61.34; 50–60: Mean = 61.78) and sex (female: Mean = 61.89; male: Mean = 60.45) show no significant differences ($p > 0.05$). Similarly, marital status, housing status, and other variables are insignificant ($p > 0.05$).

Table (6): Linear Regression Analysis of Ethical Leadership and Job Embeddedness Subscales (n = 221)

Dependent Variable [a]	**Independent Variable [b]**	**Unstandardized Coefficients (B)**	**Standardized Coefficients (β)**	**Standard Error**	**t-value**	**p-value**	**R**	**R^2**
Fit-Community	Ethical Leadership	0.745	0.572	0.042	17.738	0.000 *	0.756	0.572
Fit-Organization	Ethical Leadership	0.982	0.634	0.048	20.458	0.000 *	0.796	0.634
Sacrifice-Community	Ethical Leadership	0.486	0.452	0.035	13.886	0.000 *	0.672	0.452
Sacrifice-Organization	Ethical Leadership	0.823	0.598	0.045	18.289	0.000 *	0.773	0.598
total Job Embeddedness	Ethical Leadership	1.483	0.746	0.087	17.048	0.000 *	0.746	0.557

a. Dependent Variable: Job embeddedness b. Predictors: (Constant), Ethical leadership
F (ANOVA) *Value of $p \leq 0.05$ (significant)
Model Equation: Job embeddedness = 1.483+ 0.746 ×Ethical leadership

The linear regression analysis in **Table 6** reveals a strong and statistically significant relationship between ethical leadership and various dimensions of job embeddedness among nurses. Ethical leadership positively influences all subscales of job embeddedness, with the most substantial impact on Fit-Organization ($B = 0.982$, $\beta = 0.634$, $p < 0.001$), explaining 63.4% of the variance ($R^2 = 0.634$). This indicates that ethical leaders play a critical role in aligning nurses with their workplace's values, goals, and culture. Ethical leadership also significantly enhances Fit-Community ($B = 0.745$, $\beta = 0.572$, $p < 0.001$), explaining 57.2% of the variance ($R^2 = 0.572$), suggesting that ethical leaders help nurses feel more connected to their local environment and social networks. Additionally, ethical leadership positively affects sacrifice organization ($B = 0.823$, $\beta = 0.598$, $p < 0.001$), explaining 59.8% of the variance ($R^2 = 0.598$), and Sacrifice-Community ($B = 0.486$, $\beta = 0.452$, $p < 0.001$), explaining 45.2% of the variance ($R^2 = 0.452$), indicating that ethical leaders foster nurses' willingness to invest in and stay with their organization and community. Overall, ethical leadership has a strong effect on total job embeddedness ($B = 1.483$, $\beta = 0.746$, $p < 0.001$), explaining 55.7% of the variance ($R^2 = 0.557$). The regression model, expressed as Job Embeddedness = 1.483 + 0.746 × Ethical Leadership,

shows that each unit increase in ethical leadership enhances job embeddedness by 0.746 units, highlighting the importance of ethical leadership in fostering nurses' connection to their work and workplace.

DISCUSSION

The global health crisis like the Covid -19 pandemic has impacted many industries, notably the healthcare sector, and has simultaneously expanded across multiple countries. Numerous strategies, such as lockdowns, social distancing measures, home quarantines, and travel restrictions, have been implemented to contain the spread of the outbreak. In response to this crisis, the Ministry of Health in Egypt formed a national emergency response committee and activated its command-and-control center to monitor developments both domestically and internationally, as well as to conduct health surveillance, population screening, contact tracing, and public education. In this context, this study emphasizes the value of ethical leadership in promoting job embeddedness in Egyptian healthcare organizations during a major global health crisis. Its conclusions provide insightful information to practitioners and researchers alike, closing a significant vacuum in the field. This work is valuable and original as it makes significant contributions to previously undiscovered facets of employee output by examining the effects of leader integrity and fairness on job embeddedness (35).

The results verified that the highest number of nurses have moderate ethical leadership. This might be the case because ethical leaders value justice, fairness, and the eradication of bias highly. Additionally, they value power sharing since it produces better results, loyalty, and respect. They also foster harmonious relationships and enable them to function in ways that are consistently advantageous to the larger good. This outcome is consistent with the findings of Barkhordari-Sharifabad & Mirjalili (2020) and El-Gazar & Zoromba (2021) (36, 37); nevertheless, several studies have reported a high degree of ethical leadership (38, 39).

The current study revealed that ethical leadership positively influences all subscales of job embeddedness, with the most substantial impact on Fit-Organization. This result aligns with prior research (40). As they suggest, the alignment of personal and organizational values determines how well ethical leadership fosters performance and in turns commitment. This could be explained through the development of a strong feeling of "Fit-Organization," Ethical leadership probably strengthened nurses' commitment to their healthcare systems and hospitals especially during the outbreak of Covid19. Additionally, the attitude that managers have toward their staff becomes much more important when their lives are at risk. According to the results of multiple studies, managers' supportive actions during the Covid -19 pandemic may increase nurses' commitment to their jobs (41).

The results from this study indicate that all of the job embeddedness subscales are positively impacted by ethical leadership but Fit-Community is most significantly affected. This result coincides with that of García-Cabrera et al. (2020), where Ethical leadership has been demonstrated to improve employee wellbeing and foster a sense of community among nurses. The sense of community is thought to be a crucial component in helping nurses cope with the pandemic crisis (42). Furthermore, this is supported by a qualitative descriptive study about the psychological changes in front-line nurses conducted at a hospital in Wuhan, China (the Covid -19 pandemic epicenter). The researchers emphasized how crucial nursing leaders, especially ethical behavior are in helping nurses adjust to changes by offering them psychological support and improving the sense of community among them (43).

The strong positive correlation between fit community and organization indicates that these two constructs are closely intertwined. This finding aligns with the social identity theory, which posits that individuals derive their self-concept from their membership in social groups (44). This could be explained by a supporting organizational structure and strong community links provided stability and security during a time of great fear and uncertainty. This boosted mental and emotional wellbeing and increased resilience to the stress caused by the epidemic (45).

Similarly, the positive correlation between sacrifice community and organization suggests that perceived sacrifices in one context may spill over into another. This underscores the importance of minimizing perceived sacrifices to enhance job embeddedness. This finding is consistent with previous research suggesting that ethical leadership can foster job embeddedness by promoting a positive work environment and ethical climate (46).

The linear regression analysis further reinforces the importance of ethical leadership in influencing job embeddedness. The significant regression coefficient for ethical leadership suggests a positive linear relationship, indicating that higher levels of ethical leadership are associated with increased job embeddedness. This finding aligns with the social exchange theory, which posits that employees are more likely to feel embedded in their jobs when they perceive their leaders as ethical (47).

Study limitations and future research directions

This study has limitations, including its cross-sectional design, which restricts causal inferences and reliance on self-reported data, potentially underrepresenting mental processes and introducing response bias. During data collection, convenience sampling and nursing workforce may have introduced sampling bias. While the delay between data collection and publication could affect perceived timeliness, the findings retain scientific relevance, as ethical leadership and job embeddedness remain critical to addressing healthcare workforce challenges, both during and beyond the Covid-19 pandemic. A longitudinal design and mixed-methods approach are recommended to explore

causality, enrich qualitative insights, and contextualize leadership dynamics. Additionally, the lack of confirmatory factor analysis (CFA) limits the validation of the scales' structural integrity in Arabic. Future studies should employ CFA to verify factor structures, use multi-source data (e.g., supervisor/coworker ratings) to reduce self-report bias, and test mediator/moderator models to deepen understanding of variable interactions. Investigating boundary conditions (e.g., organizational culture, crisis contexts) could further clarify the interplay between ethical leadership and job embeddedness. Despite these limitations, the study provides foundational insights for fostering resilience, reducing turnover, and guiding leadership strategies in high-stress healthcare environments, with implications for addressing workforce shortages and emerging global health challenges.

CONCLUSION

This study provides critical insights into the interplay between ethical leadership and job embeddedness among nurses during the global healthcare crisis like Covid -19 pandemic, offering significant contributions to the literature on healthcare workforce resilience and leadership. The findings confirm a robust positive relationship between ethical leadership and job embeddedness, particularly in the dimensions of fit-organization and sacrifice-community. At the time of crisis, nurses who perceive their leaders as ethical—through fairness, transparency, and support—are more likely to feel embedded in their roles due to stronger alignment with organizational values, social ties, and reduced perceived sacrifices.

Implications of the study

Healthcare institutions should prioritize structured ethical leadership training emphasizing fairness, transparency, and empathetic communication to replicate behaviors that strongly correlate with job embeddedness. Programs incorporating role-playing scenarios (e.g., pandemic resource allocation dilemmas) can help leaders practice normatively appropriate conduct, fostering trust and alignment with organizational values. Such training aligns with evidence that ethical decision-making reduces burnout and enhances retention (8, 36). Second, hospitals should implement mentorship initiatives pairing junior nurses with ethical leaders—particularly those excelling in dimensions like respect for input—to strengthen organizational "fit" and belonging.

Third, community integration strategies must address "sacrifice" dimensions to reduce turnover intent. For the 58.5% of nurses with local family roots, hospitals could collaborate with municipalities to offer housing subsidies or childcare support, mitigating personal losses tied to leaving the community—a tactic to reduce turnover by 32% in high-stress settings (33). Finally, targeted support for ICU nurses (58.4% of the sample) is critical. Implementing rotating shifts (aligning with the 49.5% in mixed-shift roles) and embedding ethical leaders in ICU teams can mitigate burnout; as Zhao et al. (2013) found, such measures improve embeddedness by 18% in critical care. Regular well-being check-ins by leaders, advocated by Mo et al. (2020), can address emotional tolls in COVID-19 units. This study advances Job Embeddedness Theory by linking ethical leadership to community-level sacrifices—a novel contribution in nursing—and extends social exchange theory (47) by showing ethical leadership fosters loyalty to communities during crises.

Declartion

Authors' contributions

Mennat Allah Abou Zeid, Ayman Mohamed El-Ashry, Ibtisam Khalaf Ayed Alanazi, Talal Mudshir A alanazi, Fatimah Ayed Haduthat Alanazi: Study conception/design; critical revisions for important intellectual content; supervision; statistical expertise. **Amal Diab Ghanem Atalla, Taghreed Hussien Aboelola, Shaimaa Ali,Bashayer Muidh D Alruwaili, Leticia P. Lopez**: Data collection/analysis; drafting of manuscript; administrative/technical/material support. All authors agreed to the manuscript content.

Ethics approval and consent to participate

Formal approval and permission to conduct the research were diligently obtained from the Research Ethics Committee of the Faculty of nursing at Alexandria University, Egypt, under the reference code; **IRB00013620/ALEX/C/7/1/2022**. All participants gave electronic informed consent to participate in the study. The right to refuse to participate in the study or to withdraw at any time was guaranteed. The data's confidentiality and the study subjects' anonymity were maintained.

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