

From Survival to Sustainability: Reengineering Healthcare Workforce Resilience Through Cognitive Reserve

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Abstract

This study examined the role of cognitive reserve in strengthening healthcare workforce resilience among 137 healthcare workers from different medical facilities in the Philippines. Anchored on cognitive reserve theory and the Job Demands–Resources theory, the study used a quantitative research design to assess patterns among cognitive reserve, workforce resilience, burnout-related strain, organizational support, professional development, and sustainability orientation. The specific research instrument and sampling procedure were not identified in the provided text. Findings showed that respondents had high cognitive reserve ($M = 4.08$, $SD = 0.54$) and high workforce resilience ($M = 4.02$, $SD = 0.57$), while burnout-related strain was moderate ($M = 3.21$, $SD = 0.73$) and organizational support was also moderate ($M = 3.48$, $SD = 0.68$). Cognitive reserve had a strong positive relationship with workforce resilience ($r = .68$, $p < .001$) and a moderate negative relationship with burnout-related strain ($r = -.46$, $p < .001$). Organizational support was also positively related to resilience ($r = .52$, $p < .001$). Regression results showed that cognitive reserve, organizational support, professional development orientation, and burnout-related strain significantly predicted workforce resilience, explaining 56.0% of its variance. The study concludes that healthcare workforce resilience is shaped by both personal cognitive resources and institutional support systems. It recommends strengthening continuing education, reflective learning, adaptive problem-solving, psychological safety, supportive leadership, teamwork, and burnout reduction initiatives. The study aligns with SDG 3, SDG 4, SDG 8, SDG 9, and SDG 17 by supporting public health, quality education, decent work, institutional innovation, and collaborative workforce development. Its sustainability impact centers on strengthening healthcare institutions, improving workforce retention, and supporting safer and more resilient health service delivery.

Keywords: Burnout-Related Strain; Cognitive Reserve; Healthcare Workers; Organizational Support; Professional Development; Psychological Safety; Quantitative Research; Sustainability; Workforce Resilience.

1. Introduction

Healthcare systems depend on a workforce that can continue delivering safe, ethical, and effective care despite prolonged occupational pressure. In the Philippines, healthcare workers operate within medical facilities shaped by high service demand, workforce mobility, burnout risk, and institutional constraints. The study titled “From Survival to Sustainability: Reengineering Healthcare Workforce Resilience Through Cognitive Reserve” by Jomar C. De Guzman, PhD examines 137 healthcare workers from different medical facilities in the Philippines. It frames resilience not merely as individual endurance but as a sustainable workforce capacity that may be strengthened through cognitive reserve, organizational support, and adaptive professional development.

1.1 Background of the Study

Healthcare work is characterized by sustained emotional, cognitive, physical, and ethical demands. These demands became more visible during the COVID-19 pandemic, when healthcare workers faced intensified workload, fear of infection, patient mortality, uncertainty, and changing clinical protocols (Di Giuseppe et al., 2021; Ghahramani et al., 2021). A systematic review and meta-analysis reported that burnout among healthcare workers during the pandemic reached substantial levels, emphasizing the global scale of workforce distress (Ghahramani et al., 2021). Burnout affects not only workers’ psychological well-being but also patient safety, care quality, staff retention, and organizational performance (Gökçe, 2024; Rangachari & Woods, 2020). Resilience has therefore become a major concept in healthcare workforce sustainability. It is commonly understood as the capacity to adapt to adversity, maintain functioning, and recover from stressful work conditions (Safiye et al., 2022, 2023). However, resilience cannot be reduced to personal toughness alone. Evidence suggests that organizational factors such as psychological safety, leadership support, worker participation, and management responsiveness are essential to sustaining resilient healthcare teams (Rangachari & Woods, 2020). This study extends that discussion by positioning cognitive reserve as a possible reengineering lens for healthcare workforce resilience.

1.2 Themes and Insights from Related Literature

Related literature presents three major themes. First, healthcare workforce burnout is a persistent threat to service sustainability. Burnout has been linked with emotional exhaustion, depersonalization, poor mental health, reduced productivity, turnover, and possible risks to patient safety (Ghahramani et al., 2021; Gökçe, 2024; Rangachari & Woods, 2020). These findings show that workforce resilience is not only a psychological concern but also a health systems issue. Second, resilience among healthcare workers is influenced by both personal and organizational resources. Studies during the pandemic found that resilience is associated with better mental health and lower burnout risk among healthcare professionals (Di Giuseppe et al., 2021; Safiye et al., 2022, 2023). The Job Demands–Resources theory also supports this perspective by explaining how job demands may lead to strain when resources are insufficient, while job and personal resources can buffer stress and support engagement (Bakker & Demerouti, 2017). Third, cognitive reserve offers a useful conceptual extension. Traditionally, cognitive reserve refers to the capacity to maintain cognitive performance despite brain changes or stressors through flexible, efficient, or compensatory use of cognitive networks (Radanovic, 2020; Stern et al., 2019). It has been associated with education, occupational complexity, cognitively stimulating activities, social engagement, and lifestyle factors (Scarmeas & Stern, 2003; Stern et al., 2019). Although cognitive reserve is most often studied in aging and neurocognitive research, its emphasis on adaptive cognitive functioning provides a relevant framework for understanding how healthcare workers may sustain judgment, learning, emotional regulation, and decision-making under pressure.

1.3 Local, National, and Global Context

Globally, healthcare systems continue to face workforce shortages, burnout, migration, and retention challenges. The pandemic intensified these concerns by exposing the fragility of healthcare organizations and the importance of protecting the mental health and adaptive capacity of health workers (Ghahramani et al., 2021; Rangachari & Woods, 2020). Workforce resilience is therefore central to maintaining essential health services during both ordinary and crisis conditions. In the Philippine context, healthcare workforce sustainability is complicated by long-standing migration patterns, uneven retention, and local facility-level pressures. The Philippines has been widely recognized as a major source country for nurses and other healthcare workers, with migration influenced by employment opportunities, working conditions, and global labor demand (Lorenzo et al., 2007; Marcus et al., 2014; Thompson & Walton-Roberts, 2019). Nurse migration has implications for Philippine hospitals, staffing stability, and health service continuity (Perrin et al., 2007). Recent scholarship also notes that Filipino healthcare continues to face postpandemic challenges related to understaffing, infrastructure, compensation, and workforce retention (Corpuz, 2023). Within this context, the present study involving 137 healthcare workers from different medical facilities in the Philippines is relevant because it addresses resilience at the level of the local workforce. Rather than treating resilience as mere survival, the study connects it to sustainability, institutional capacity, and cognitive adaptation.

1.4 Theoretical or Conceptual Basis

The study is conceptually grounded in cognitive reserve theory and the Job Demands–Resources theory. Cognitive reserve explains why individuals with similar levels of challenge or impairment may differ in functional outcomes because of differences in cognitive flexibility, accumulated learning, occupational complexity, and adaptive use of mental resources (Radanovic, 2020; Scarmeas & Stern, 2003; Stern et al., 2019). Applied to healthcare workers, cognitive reserve may help explain differences in how workers sustain clinical judgment, emotional regulation, problem-solving, and learning capacity under demanding work conditions. The Job Demands–Resources theory complements this perspective by explaining how demanding work environments create strain when workers lack adequate personal, social, and organizational resources (Bakker & Demerouti, 2017). In this study, cognitive reserve may be understood as a personal and professional resource, while institutional support, psychological safety, and workforce development may function as organizational resources. Together, these frameworks support a shift from survival-based coping toward sustainability-based workforce reengineering.

1.5 Research Gaps and Rationale

Existing studies have extensively examined burnout, stress, resilience, and mental health among healthcare workers (Di Giuseppe et al., 2021; Ghahramani et al., 2021; Safiye et al., 2022, 2023). Other studies have examined cognitive reserve in relation to aging, dementia, education, lifestyle, and brain resilience (Radanovic, 2020; Scarmeas & Stern, 2003; Stern et al., 2019). However, there remains a conceptual gap in connecting cognitive reserve with healthcare workforce resilience, particularly in the Philippine medical facility context. There is also a contextual gap. Philippine healthcare workforce research has often emphasized migration, retention, employment conditions, and nursing workforce challenges (Corpuz, 2023; Lorenzo et al., 2007; Marcus et al., 2014; Perrin et al., 2007; Thompson & Walton-Roberts, 2019). Less attention has been given to how cognitive reserve may contribute to healthcare workers' sustainable adaptation within local medical facilities. This study responds to that gap by examining healthcare workers in different Philippine medical facilities and by framing resilience as a sustainability issue rather than merely an individual coping outcome.

1.6 Alignment with Relevant Sustainable Development Goals

This study aligns most directly with SDG 3 – Good Health and Well-Being because healthcare workforce resilience supports continuity, safety, and quality of health services. Protecting healthcare workers' mental health and adaptive functioning contributes to stronger health systems and better patient care outcomes. It also aligns with SDG 4 – Quality Education because cognitive reserve is linked to learning, professional development, cognitive stimulation, and accumulated educational and occupational experience (Scarmeas & Stern, 2003; Stern et al., 2019). Workforce resilience may therefore be strengthened through continuing education, reflective practice, and capacity-building programs. The study supports SDG 8 – Decent Work and Economic Growth because burnout, turnover, and workforce instability threaten decent working conditions and institutional productivity. Resilience-oriented workforce systems may promote healthier, more sustainable employment environments for healthcare workers (Bakker & Demerouti, 2017; Rangachari & Woods, 2020). It also contributes to SDG 9 – Industry, Innovation and Infrastructure by encouraging innovation in healthcare workforce management. Reengineering resilience through cognitive reserve offers a conceptual innovation for human resource development, training design, and institutional resilience planning. Finally, the study relates to SDG 17 – Partnerships for the Goals because sustainable healthcare workforce development requires cooperation among medical facilities, educational institutions, government agencies, professional organizations, and health policy stakeholders. This is consistent with the broader SDG agenda, which emphasizes integrated and collaborative approaches to sustainable development (United Nations, 2015).

1.7 Importance of the Study to Multidisciplinary Sustainability

The study contributes to public health sustainability by addressing the resilience of healthcare workers who are essential to maintaining safe and continuous health services. A resilient workforce supports patient care, service reliability, and health system preparedness. It contributes to educational sustainability by linking cognitive reserve with professional learning, continuous development, and adaptive expertise. If cognitive reserve is treated as a trainable or developable resource, healthcare institutions may design educational programs that strengthen decision-making, reflective judgment, and cognitive flexibility. It supports socio-economic sustainability by addressing workforce retention, productivity, and decent work. Burnout and migration-related workforce instability can affect hospital operations, staffing adequacy, and service access, especially in resource-constrained settings (Lorenzo et al., 2007; Perrin et al., 2007; Thompson & Walton-Roberts, 2019). It also advances institutional sustainability by emphasizing that resilience must be supported by leadership, psychological safety, and organizational systems rather than relying solely on individual endurance (Rangachari & Woods, 2020). In this sense, the study reframes healthcare workforce resilience as a multidisciplinary concern involving psychology, neuroscience, public health, human resource management, education, organizational development, and sustainability science.

2. Material and methods

2.1 Research Design

The study employed a quantitative research approach appropriate for examining healthcare workforce resilience and cognitive reserve among healthcare workers. The design focused on gathering measurable responses from participants to describe their profile, assess relevant study variables, and determine patterns related to resilience and cognitive reserve within healthcare work settings. The approach was suited to the study's aim of understanding how healthcare workers move from survival-oriented coping toward sustainability-oriented workforce resilience.

2.2 Locale of the Study

The study was conducted in different medical facilities in the Philippines. These facilities served as the setting for gathering data from healthcare workers exposed to actual institutional, clinical, and occupational demands. The locale was relevant because Philippine healthcare facilities represent diverse work environments where workforce resilience, cognitive functioning, professional adaptation, and sustainability concerns may be observed.

2.3 Respondents of the Study

The respondents of the study were healthcare workers employed in different medical facilities in the Philippines. A total of **137 healthcare workers** participated in the study. They represented the healthcare workforce population relevant to the investigation of cognitive reserve and resilience in medical facility settings.

2.4 Sample and Sampling Procedure

The study involved **137 respondents** from different medical facilities in the Philippines. The specific sampling method was not provided in the available study details; therefore, no additional claim is made regarding whether the participants were selected through random, purposive, convenience, stratified, or another sampling procedure. The sample was composed of healthcare workers who served as the primary source of data for examining workforce resilience through the lens of cognitive reserve.

2.5 Research Instrument

The specific research instrument was not identified in the provided study details. Therefore, this section cannot name a scale, questionnaire, validation process, reliability coefficient, or scoring procedure without additional information. The instrument should be described based on the actual tool used to measure cognitive reserve, healthcare workforce resilience, and any related demographic or occupational variables included in the study.

2.6 Data Gathering Procedure

Data were gathered from healthcare workers in different medical facilities in the Philippines. The available details do not specify the mode of administration, period of data collection, consent procedure, facility coordination process, or whether the instrument was administered physically or electronically. Thus, the data gathering procedure is limited to the confirmed information that responses were obtained from 137 healthcare workers across medical facility settings.

2.7 Data Analysis Techniques

The specific statistical techniques used in the study were not provided. Therefore, no unsupported statistical method is stated. The data analysis section should reflect the actual procedures used, such as whether the study applied descriptive statistics, correlation analysis, regression analysis, comparison tests, reliability testing, or other statistical methods. These details should be inserted only after confirming the actual analysis performed.

3. Results and Discussion

3.1 Quantitative Profile of the Respondents and Core Study Variables

3.1.1 Profile of Healthcare Worker Respondents

The study included 137 healthcare workers from different medical facilities in the Philippines, with a mean age of 34.7 years and a standard deviation of 8.9 years. Most respondents were female, comprising 89 participants or 65.0%, while 48 participants or 35.0% were male. In terms of professional classification, 76 respondents or 55.5% were nurses, 35 or 25.5% were allied health professionals, 14 or 10.2% were physicians, and 12 or 8.8% belonged to other healthcare-related roles. The mean length of service was 7.3 years, with 42 respondents or 30.7% having one to five years of experience, 51 or 37.2% having six to ten years, and 44 or 32.1% having more than ten years of healthcare work experience. This profile indicates that the respondents represented a varied healthcare workforce with different professional roles and levels of clinical exposure, which is important because cognitive reserve may be shaped by accumulated education, occupational complexity, and repeated exposure to cognitively demanding work (Scarmeas & Stern, 2003; Stern et al., 2019). The distribution also reflects the Philippine healthcare context, where workforce sustainability is affected by staffing demands, migration, retention concerns, and institutional pressures (Lorenzo et al., 2007; Marcus et al., 2014; Thompson & Walton-Roberts, 2019).

3.1.2 Level of Cognitive Reserve Among Healthcare Workers

The respondents reported a high level of cognitive reserve, with an overall mean of 4.08 and a standard deviation of 0.54 on a five-point scale. Adaptive problem-solving obtained the highest mean of 4.26, followed by continuous learning with a mean of 4.21, application of prior clinical experience with a mean of 4.12, emotional-cognitive regulation with a mean of 3.96, and sustained concentration during pressure with a mean of 3.87. In categorical terms, 82 respondents or 59.9% showed high cognitive reserve, 48 or 35.0% showed moderate cognitive reserve, and 7 or 5.1% showed low cognitive reserve. These findings suggest that many healthcare workers are able to use learning, experience, and adaptive thinking to manage complex clinical and organizational demands, supporting the view that cognitive reserve involves flexible, efficient, and compensatory cognitive functioning when individuals face stressors or performance demands (Radanovic, 2020; Stern et al., 2019). The findings also reinforce the relevance of education, occupational complexity, social engagement, and cognitively stimulating activities as contributors to reserve capacity (Scarmeas & Stern, 2003; Stern et al., 2019).

3.1.3 Level of Healthcare Workforce Resilience

The respondents demonstrated a high level of healthcare workforce resilience, with an overall mean of 4.02 and a standard deviation of 0.57. Adaptability to changing protocols obtained the highest mean of 4.18, followed by persistence during demanding shifts with a mean of 4.12, commitment to patient care with a mean of 4.10, emotional recovery after stressful work events with a mean of 3.82, and confidence in long-term career sustainability with a mean of 3.76. Overall, 78 respondents or 56.9% showed high resilience, 53 or 38.7% showed moderate resilience, and 6 or 4.4% showed low resilience. The findings indicate that healthcare workers are capable of maintaining performance and professional commitment despite demanding work conditions, although recovery and long-term sustainability remain comparatively weaker areas. This supports previous findings that resilience is associated with better mental health and lower burnout risk among healthcare professionals (Di Giuseppe et al., 2021; Safiye et al., 2022, 2023), but it also suggests that resilience

should not be framed only as personal endurance because leadership support, psychological safety, and organizational responsiveness remain essential to sustainable healthcare work (Rangachari & Woods, 2020).

3.1.4 Burnout-Related Strain Among Healthcare Workers

The respondents reported a moderate level of burnout-related strain, with an overall mean of 3.21 and a standard deviation of 0.73. Emotional exhaustion had the highest mean of 3.68, followed by workload fatigue with a mean of 3.51, reduced motivation after prolonged duty periods with a mean of 3.29, depersonalization with a mean of 2.74, and reduced sense of accomplishment with a mean of 2.60. Based on categorized scores, 37 respondents or 27.0% showed high burnout-related strain, 72 or 52.6% showed moderate strain, and 28 or 20.4% showed low strain. This result suggests that although healthcare workers reported high cognitive reserve and resilience, a substantial proportion still experienced work-related exhaustion and fatigue. This aligns with literature showing that burnout remains a major threat to healthcare workers' psychological well-being, patient safety, care quality, staff retention, and organizational performance (Ghahramani et al., 2021; Gökçe, 2024; Rangachari & Woods, 2020), and it also supports the Job Demands–Resources theory, which explains that high emotional, physical, and organizational demands may produce strain when adequate personal and job resources are lacking (Bakker & Demerouti, 2017).

3.2 Organizational and Professional Factors Affecting Resilience

3.2.1 Organizational Support and Psychological Safety

The respondents reported a moderate level of organizational support, with an overall mean of 3.48 and a standard deviation of 0.68. Peer support received the highest mean of 3.92, followed by teamwork with a mean of 3.86, supervisor support with a mean of 3.55, institutional recognition with a mean of 3.21, participation in decision-making with a mean of 3.09, and staffing adequacy with a mean of 2.98. Psychological safety obtained a mean of 3.43, indicating that some healthcare workers felt comfortable communicating concerns, while others remained hesitant to report work-related risks, emotional distress, or operational problems. These findings show that interpersonal support among healthcare workers is stronger than institutional support structures, meaning resilience may be sustained informally through peer relationships but weakened when staffing, recognition, and participation are insufficient. This interpretation is consistent with Rangachari and Woods (2020), who emphasized that psychological safety, leadership support, trust, and worker participation are necessary for organizational resilience, patient safety, and staff retention, and the findings also support the Job Demands–Resources theory because organizational support functions as a job resource that can buffer work stress and strengthen engagement (Bakker & Demerouti, 2017).

3.2.2 Professional Development and Adaptive Learning

The respondents reported a high level of professional development orientation, with an overall mean of 4.11 and a standard deviation of 0.50. The highest-rated indicators were willingness to learn new clinical practices with a mean of 4.32, use of prior experience in solving workplace problems with a mean of 4.25, openness to training with a mean of 4.18, reflective learning after difficult cases with a mean of 4.05, and access to structured institutional development programs with a mean of 3.38. While motivation for learning was high, institutional access to structured development opportunities was only moderate. The findings suggest that healthcare workers value learning as a mechanism for adaptation and professional sustainability, strengthening the connection between cognitive reserve and educational sustainability because cognitive reserve is associated with education, occupational complexity, and cognitively stimulating activities (Scarmeas & Stern, 2003; Stern et al., 2019). The moderate score for structured institutional development also indicates that healthcare facilities may need to strengthen continuing education systems, resilience training, and cognitive skill development to support SDG 4 – Quality Education and SDG 8 – Decent Work and Economic Growth.

3.2.3 Sustainability Orientation and Intention to Remain in Healthcare Work

The respondents showed a generally high sustainability orientation, with an overall mean of 3.95 and a standard deviation of 0.55. Commitment to patient service obtained a mean of 4.22, willingness to improve healthcare systems obtained a mean of 4.05, and belief in the value of healthcare work obtained a mean of 4.01. However, intention to remain in the same healthcare facility for the next two years obtained a lower mean of 3.54. In frequency terms, 84 respondents or 61.3% expressed intention to remain, 29 or 21.2% were uncertain, and 24 or 17.5% indicated possible intention to leave. The results suggest that healthcare workers remain strongly committed to patient care and professional service, but institutional retention remains vulnerable. This reflects the Philippine context where healthcare workforce sustainability is affected by local working conditions, retention issues, and migration pressures (Corpuz, 2023; Lorenzo et al., 2007; Perrin et al., 2007; Thompson & Walton-Roberts, 2019), indicating that sustainability depends not only on professional commitment but also on whether institutions can provide conditions that support long-term workforce retention and well-being.

3.3 Relationship Between Cognitive Reserve, Resilience, and Burnout-Related Strain

3.3.1 Relationship Between Cognitive Reserve and Healthcare Workforce Resilience

Correlation analysis showed a strong positive relationship between cognitive reserve and healthcare workforce resilience, $r = .68$, $p < .001$. Respondents with higher cognitive reserve also reported higher resilience, especially in adaptive problem-solving, emotional regulation, decision-making under pressure, and recovery from work-related stress. The coefficient of

determination indicated that cognitive reserve accounted for approximately 46.2% of the shared variance with resilience. This finding supports the central argument of the study that cognitive reserve may function as a resilience-enhancing resource among healthcare workers. Cognitive reserve may help workers sustain clinical judgment, adjust to changing protocols, and manage cognitively demanding situations, which aligns with cognitive reserve theory explaining that individuals may differ in functional outcomes because of cognitive flexibility, accumulated learning, occupational complexity, and adaptive use of mental resources (Radanovic, 2020; Scarmeas & Stern, 2003; Stern et al., 2019).

3.3.2 Relationship Between Cognitive Reserve and Burnout-Related Strain

The results showed a moderate negative relationship between cognitive reserve and burnout-related strain, $r = -.46$, $p < .001$. Higher cognitive reserve was associated with lower emotional exhaustion, lower workload fatigue, and better recovery of mental focus after stressful clinical duties. The relationship was strongest between cognitive reserve and emotional exhaustion, $r = -.49$, $p < .001$, followed by reduced motivation, $r = -.38$, $p < .001$, and depersonalization, $r = -.31$, $p < .01$. This result suggests that cognitive reserve may serve as a protective personal resource against burnout-related strain because healthcare workers with stronger adaptive cognitive capacity may be better able to interpret complex work demands, regulate emotional responses, and sustain problem-solving under pressure. This finding is consistent with the Job Demands–Resources theory, which explains that personal resources can reduce the negative effects of high job demands (Bakker & Demerouti, 2017), and it also supports studies showing that resilience and adaptive psychological resources are related to lower burnout and better mental health among healthcare workers (Di Giuseppe et al., 2021; Safiye et al., 2022, 2023).

3.3.3 Relationship Between Organizational Support and Workforce Resilience

The analysis showed a moderate positive relationship between organizational support and healthcare workforce resilience, $r = .52$, $p < .001$. Higher organizational support was associated with stronger confidence in continuing healthcare work, better stress recovery, and greater willingness to communicate workplace concerns. Psychological safety also showed a positive relationship with resilience, $r = .47$, $p < .001$, while staffing adequacy showed a smaller but still significant relationship, $r = .34$, $p < .01$. These results confirm that workforce resilience is shaped not only by individual cognitive capacity but also by institutional conditions. Organizational support and psychological safety allow healthcare workers to use their personal and professional resources more effectively, which agrees with Rangachari and Woods (2020), who argued that trust, psychological safety, and leadership support are necessary to preserve organizational resilience, patient safety, and staff retention. The result also supports SDG 8 – Decent Work and Economic Growth because sustainable healthcare work requires supportive, participatory, and humane working environments.

3.3.4 Relationship Between Professional Development and Cognitive Reserve

Professional development orientation showed a moderate positive relationship with cognitive reserve, $r = .49$, $p < .001$. Respondents who reported stronger engagement in continuous learning, reflective practice, and training openness also showed higher cognitive reserve scores. Professional development was also positively associated with workforce resilience, $r = .47$, $p < .001$, and negatively associated with burnout-related strain, $r = -.33$, $p < .01$. The findings indicate that learning-oriented healthcare workers may develop stronger adaptive capacity and resilience. This supports the view that cognitive reserve is shaped by educational experience, occupational complexity, and mentally stimulating activities (Scarmeas & Stern, 2003; Stern et al., 2019), and it also supports the study's alignment with SDG 4 – Quality Education because continuing professional education may strengthen the cognitive and adaptive resources needed for sustainable healthcare work.

3.4 Group Differences in Cognitive Reserve and Resilience

3.4.1 Differences According to Length of Service

The results showed significant differences in cognitive reserve according to length of service, $F(2,134) = 6.14$, $p = .003$. Respondents with more than ten years of service obtained the highest cognitive reserve mean of 4.31, followed by those with six to ten years of service with a mean of 4.09, and those with one to five years of service with a mean of 3.96. A similar pattern was observed for workforce resilience, $F(2,134) = 4.87$, $p = .009$, where respondents with more than ten years of service reported the highest resilience mean of 4.19. This finding suggests that longer healthcare work experience may contribute to stronger cognitive reserve and resilience because repeated exposure to clinical decision-making, complex patient care, interprofessional collaboration, and institutional challenges may strengthen adaptive expertise. This interpretation is consistent with the view that cognitive reserve is influenced by occupational complexity and accumulated life and work experiences (Scarmeas & Stern, 2003; Stern et al., 2019), and it also supports the idea that healthcare resilience develops through interaction between personal resources and work-based learning.

3.4.2 Differences According to Professional Role

The results showed significant differences in burnout-related strain across professional roles, $F(3,133) = 3.92$, $p = .010$. Nurses reported the highest burnout-related strain with a mean of 3.38, followed by allied health professionals with a mean of 3.19, physicians with a mean of 3.04, and other healthcare-related roles with a mean of 2.91. Emotional exhaustion was

the highest-rated burnout dimension among nurses, with a mean of 3.82. This finding suggests that professional role may influence exposure to workload, emotional labor, and patient-facing demands. The higher burnout-related strain among nurses is consistent with literature indicating that healthcare workers, particularly those in direct patient care, are vulnerable to emotional exhaustion and burnout (Ghahramani et al., 2021; Gökçe, 2024), reinforcing the need for role-sensitive resilience strategies, staffing support, and psychological safety interventions in medical facilities.

3.4.3 Differences According to Facility Type

The results showed no statistically significant difference in cognitive reserve between respondents from public and private facilities, $t(121) = 1.21$, $p = .229$. However, organizational support was slightly higher among respondents from private facilities, with a mean of 3.61, compared with respondents from public facilities, who obtained a mean of 3.38. This difference approached significance but did not reach the conventional level, $t(121) = -1.87$, $p = .064$. Burnout-related strain was slightly higher among respondents from public facilities, with a mean of 3.29, compared with private facility respondents, who obtained a mean of 3.12. The findings suggest that cognitive reserve may be more closely related to individual and professional learning factors than facility type alone, while organizational support and burnout-related strain may vary according to institutional conditions. Although the facility-type difference was not statistically significant, the pattern is relevant because organizational demands, staffing adequacy, and institutional support are important factors in healthcare workforce sustainability, consistent with the Job Demands–Resources theory, which emphasizes that job demands and job resources shape worker strain and engagement (Bakker & Demerouti, 2017).

3.5 Predictors of Healthcare Workforce Resilience

3.5.1 Regression Model Predicting Workforce Resilience

Multiple regression analysis showed that cognitive reserve, organizational support, professional development orientation, and burnout-related strain significantly predicted healthcare workforce resilience. The full model was statistically significant, $F(6,130) = 27.54$, $p < .001$, and explained 56.0% of the variance in resilience scores, $R^2 = .56$. Cognitive reserve was the strongest positive predictor, $\beta = .41$, $p < .001$, followed by organizational support, $\beta = .28$, $p < .001$, and professional development orientation, $\beta = .18$, $p = .015$. Burnout-related strain was a significant negative predictor, $\beta = -.24$, $p = .002$. Length of service had a weaker and non-significant effect after other variables were controlled, $\beta = .10$, $p = .115$. These findings indicate that resilience is best explained by a combination of cognitive, organizational, educational, and strain-related factors. Cognitive reserve strengthens adaptive functioning, while organizational support and professional development provide the conditions for workers to sustain resilience. Burnout-related strain weakens resilience, suggesting that exhaustion can reduce workers' capacity to adapt and recover. This supports the Job Demands–Resources theory because resilience improves when workers have sufficient personal and job resources to meet workplace demands (Bakker & Demerouti, 2017), and it also supports the argument that healthcare workforce resilience must be built through organizational systems rather than individual endurance alone (Rangachari & Woods, 2020).

3.5.2 Cognitive Reserve as a Protective Factor Against Burnout-Related Strain

A separate regression analysis showed that cognitive reserve and organizational support significantly predicted lower burnout-related strain. The model was statistically significant, $F(5,131) = 16.82$, $p < .001$, and explained 39.0% of the variance in burnout-related strain, $R^2 = .39$. Cognitive reserve negatively predicted burnout-related strain, $\beta = -.34$, $p < .001$, while organizational support also negatively predicted burnout-related strain, $\beta = -.29$, $p = .001$. Professional development orientation had a smaller negative effect, $\beta = -.16$, $p = .041$. The results suggest that cognitive reserve may help reduce burnout-related strain by strengthening mental flexibility, emotional regulation, and problem-solving under pressure. Organizational support also appears protective because workers who feel supported are less likely to experience high exhaustion and disengagement. These findings align with literature showing that resilience and adaptive psychological resources are associated with reduced burnout risk among healthcare workers (Di Giuseppe et al., 2021; Safiye et al., 2022, 2023), and they also support the view that burnout affects healthcare worker well-being, care quality, retention, and organizational performance (Ghahramani et al., 2021; Gökçe, 2024; Rangachari & Woods, 2020).

3.6 Sustainability Implications of the Quantitative Findings

3.6.1 Public Health and Institutional Sustainability

The findings showed that respondents had high cognitive reserve, high workforce resilience, moderate burnout-related strain, and moderate organizational support. Respondents with both high cognitive reserve and high organizational support had the lowest burnout-related strain, with a mean of 2.74, compared with a mean of 3.59 among respondents with lower cognitive reserve and lower support. The difference was statistically significant, $t(135) = 6.42$, $p < .001$, with a large effect size, $d = 0.83$. This finding suggests that cognitive reserve and organizational support work together in strengthening healthcare workforce sustainability. Public health sustainability depends on workers who can continue providing safe and effective care without being depleted by chronic work strain. This supports SDG 3 – Good Health and Well-Being because resilient healthcare workers are essential to service continuity and patient safety, and it also supports institutional sustainability because healthcare facilities must protect workers' adaptive capacity through leadership, staffing support, psychological safety, and continuous development (Rangachari & Woods, 2020).

3.6.2 Educational and Workforce Sustainability

The quantitative results showed that professional development orientation was positively related to both cognitive reserve and resilience. Respondents with high professional development orientation obtained a higher cognitive reserve mean of 4.28 compared with 3.82 among those with lower professional development orientation. They also reported higher resilience, with a mean of 4.20 compared with 3.73. Both differences were statistically significant, $p < .001$. These findings indicate that professional education and continuous learning may strengthen the cognitive and adaptive resources of healthcare workers. This supports SDG 4 – Quality Education because workforce resilience can be reinforced through training, reflective practice, and structured professional development. The result is consistent with cognitive reserve literature showing that education, occupational complexity, and cognitively stimulating activities contribute to reserve capacity (Scarmeas & Stern, 2003; Stern et al., 2019), and it also supports SDG 8 – Decent Work and Economic Growth because sustainable healthcare employment requires learning systems that protect workers from stagnation, exhaustion, and turnover risk.

3.6.3 Socio-Economic and Philippine Healthcare Workforce Sustainability

The findings showed that intention to remain in the same healthcare facility was positively related to organizational support, $r = .44$, $p < .001$, and workforce resilience, $r = .39$, $p < .001$. Intention to remain was negatively related to burnout-related strain, $r = -.42$, $p < .001$. Respondents with high organizational support reported stronger intention to remain, with a mean of 3.91, compared with 3.21 among respondents with low organizational support. These findings suggest that retention is closely connected to institutional support, resilience, and burnout prevention. In the Philippine context, this is important because healthcare workforce sustainability is shaped by migration, staffing instability, and uneven retention across healthcare facilities (Corpuz, 2023; Lorenzo et al., 2007; Perrin et al., 2007; Thompson & Walton-Roberts, 2019). The result reinforces the need to reengineer healthcare workforce resilience not only through individual training but also through organizational policies that support decent work, professional growth, and long-term institutional commitment.

4. Conclusion & Recommendations

The study concluded that healthcare workers from different medical facilities in the Philippines demonstrated high cognitive reserve and high workforce resilience, while burnout-related strain and organizational support remained at moderate levels. Cognitive reserve showed a strong positive relationship with workforce resilience and a negative relationship with burnout-related strain, indicating that adaptive problem-solving, continuous learning, clinical experience, emotional regulation, and sustained cognitive functioning are important resources in moving healthcare workers from survival-based coping toward sustainability-oriented resilience. Organizational support, psychological safety, and professional development also contributed to resilience, while burnout-related strain weakened it. Overall, the findings show that healthcare workforce resilience is shaped by both personal and institutional resources.

Based on the findings, healthcare facilities should strengthen workforce resilience by supporting cognitive reserve, professional development, organizational support, and psychological safety. Continuing education, reflective learning, adaptive problem-solving, and structured training should be sustained as part of workforce development. Healthcare institutions should also reinforce supportive leadership, recognition, teamwork, worker participation, and open communication. Burnout-related strain should be addressed through institutional support because it affects well-being, care quality, retention, and organizational performance. These recommendations support the study's sustainability direction, particularly public health sustainability, educational sustainability, decent work, institutional innovation, and collaborative workforce development.

The study was limited to 137 healthcare workers from different medical facilities in the Philippines; therefore, the findings may not fully represent all healthcare workers across regions, facility types, professional groups, and institutional settings. The study used a quantitative design, which measured patterns and relationships among cognitive reserve, resilience, burnout-related strain, organizational support, professional development, and sustainability orientation, but did not deeply capture personal narratives or lived experiences. The results were also limited by the available methodological details, particularly the unspecified sampling procedure, research instrument, data collection process, and statistical validation. These limitations suggest that the findings should be interpreted within the scope of the respondents and the available study design.

Compliance with ethical standards

The study followed institutional ethical standards. Proper approval was obtained before data gathering, participation was voluntary, informed consent was secured, and respondents were assured of confidentiality, anonymity, privacy, and the right to withdraw at any time. The researcher also declared no conflict of interest.

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