Journal of Behavioral and Applied Management
2026, Vol. 26, No. 1, 3–17
https://jbam.scholasticahq.com/

ARTICLE

Individual and Organizational Level Factors Associated with Pandemic-Related Well-Being and Work Stability Among a Sample of U.S. Frontline Healthcare Workers

David Tataw
Nana Arthur-Mensah
Sandra Spataro
Deborah A. Patten
Ujjala Patel
Julie Lasley
Northern Kentucky University

The COVID-19 pandemic undermined the well-being and stability of frontline healthcare workers and healthcare organizational effectiveness. We assessed individual and organizational level factors associated with negative pandemic outcomes (general conditions of work, hours worked per week, burnout, unit turnover rate, and turnover tendencies) among 253 interdisciplinary United States frontline healthcare workers from 25 states and the District of Columbia. The findings can shape strategies to improve workplace health and organizational effectiveness during crises such as the COVID-19 pandemic. Using a modified open system model as a conceptual framework, a cross-sectional and retrospective survey design, regression models, analysis of variance (ANOVA), and analysis of covariance (ANCOVA) were implemented. The individual-level predictor was resilience, while organizational-level predictors included views of leadership and interprofessional healthcare practice (IPHP). Burnout, turnover, and turnover tendencies diminished as resilience, views of leadership, and IPHP grew stronger. IPHP had a stronger negative relationship with pandemic outcomes relative to resilience and views of leadership. Also, worsened work conditions positively correlated with increased resilience. Among pandemic outcomes, conditions of work were positively associated with burnout and unit turnover, while burnout was positively associated with unit turnover and turnover tendency. In addition, number of hours worked had stronger positive association with diminishing general work conditions than burnout. Internal inputs and workers' outcomes were introduced as conceptual elements in a modified open system model. Study results suggesting increases in resilience as general work conditions worsened, and IPHP stayed strong, were fresh contributions to the literature.

Before the COVID-19 pandemic, the workplace environment, occupational burnout, and turnover had worsened for frontline healthcare workers (Martin & Ramos-Gorand, 2017; Mohanty et al., 2019). The COVID-19 pandemic introduced extraordinary dynamics that intensified adverse outcomes in healthcare organizations, such as extreme workloads (Billings et al., 2021), employee burnout (Leo et al., 2021; Moukaddam et al., 2020), and the desire to quit jobs or careers (Seathu et al., 2024). The pandemic also shifted interprofessional configurations among frontline healthcare workers. The role and profile of respiratory therapists in the hospital care team were exponentially increased (Miller, Roberts, Hinkson et al., 2021; Strickland et al., 2022), while clinical staff had to collaborate more with social services and behavioral health professionals (Donnelly et al., 2025; Ross et al., 2021).

In the crisis environment of the pandemic, negative pandemic outcomes such as poor work conditions, number of hours worked per week, burnout, and turnover, including unit turnover and turnover tendencies (Billings et al., 2021), reduced both employee performance and patient outcomes (Majeed & Baig, 2021). Adverse pandemic outcomes might have been intensified or mitigated by individual factors such as resilience (McEwen, 2022) and organizational factors such as interprofessional healthcare practice (Al Sabei et al., 2022; Cucolo et al., 2024) and leadership support (Karreinen et al., 2023; Luo

Article citation: Tataw, D., Arthur-Mensah, N., Spataro, S., Patten, D. A., Patel, U., & Lasley, J. (2026). Individual and organizational level factors associated with pandemic-related well-being and work stability among a sample of U.S. frontline healthcare workers. *Journal of Behavioral and Applied Management, 26*(1), 3–17.

et al., 2022). Poor work conditions were created by direct COVID-19 care, low staffing, and inability to complete work(Burr et al., 2022; Miller, Roberts, Hinkson et al., 2021; Miller, Roberts, Smith et al., 2021). Employee burnout is a strain outcome due to prolonged exposure to stressful work characteristics or experiences of distress (Bakker & Demerouti, 2024). Turnover refers to employees leaving their job or career (SME Annual Report, 2013), which includes departure or intention to leave. Resilience is the ability to positively adapt to traumatic or adverse experiences (Luthar & Cicchetti, 2000). Interprofessional healthcare practice involves multiple health workers from different professional backgrounds working together to deliver patient care (World Health Organization [WHO],2010). In order to develop interventions that can resolve workplace challenges ushered in by public health crises such as the COVID-19 pandemic, it is important to understand the individual and organizational factors that drove or mitigated negative pandemic outcomes.

In this paper, the authors used a modified open system model as a conceptual framework to explore the association between adverse pandemic outcomes and individual (resilience) and organizational level factors (IPHP, leadership support) among an interdisciplinary sample of United States frontline healthcare workers. Healthcare disciplines studied included behavioral therapists, nurses, physicians, non-physician providers, radiation therapists, respiratory therapists, and social services professionals. The study also identified pathways to organizational effectiveness evidenced by reductions in poor general work conditions such as direct COVID-19 care, low staffing, and inability to complete work; number of hours worked per week; burnout; turnover; and turnover tendencies (Rahimi et al., 2023; Yi et al., 2024). The results should shape interventions for improving employee work conditions, well-being (burnout), and workforce stability (turnover and turnover tendencies), which contribute to performance and patient outcomes during pandemics and other crises (Majeed & Baig, 2021).

Given the limited evidence base of proposed interventions to address the COVID-19 Pandemic workplace challenges (Natale et al., 2020; WHO, 2020a,b), scholars have suggested the following pathways to effective interventions: more rigorous studies to understand the impact of pandemic outcomes (Leo et al., 2021); a consideration of factors associated with pandemic outcomes including individual and organizational level factors (Hiver et al., 2021); and the inclusion of a broader range of frontline healthcare workers (Tataw et al., 2025). This study responded to the three propositions above and would make three significant contributions to our understanding of the experience of frontline healthcare workers during the COVID-19 pandemic and similar crises.

The study advances research on the impact of interprofessional healthcare practice (IPHP) during crises. There was an emerging interprofessional configuration at the height of the pandemic, as respiratory therapists, behavioral health professionals, and social services professionals joined nurses and physicians at the forefront of the pandemic crisis. This is particularly significant because of the much closer working relationship between respiratory therapists, nurses, and physicians/non-physician providers in COVID-19 hospital care teams (Kentish-Barnes et al., 2021; Milo et al., 2023). The limited number of studies that probed into the association between IPHP and pandemic-era outcomes, such as workplace environment, burnout, and turnover, have yielded mixed results (Raderstorf et al., 2020).

This study also expands the analysis of negative pandemic outcomes and mitigating individual and organizational factors, beyond the experience of nurses and physicians. There is a dearth of studies which include an equivalent diversity of roles as in this study, capturing the experience of radiation therapists, behavioral therapists, respiratory therapists, social services professionals, nurses, and physicians in the same interdisciplinary sample. Until recently, research has predominantly focused on physicians, nurses, and other hospital medical staff (Leo et al., 2021; Miller et al., 2021; Rahimi et al., 2023).

In addition, the modified open systems model applied in this study identified internal inputs (general work conditions and number of hours worked), and employee outcomes (burnout, unit turnover rate, and turnover tendencies) as key conceptual elements when assessing drivers of organizational effectiveness during public health crises such as the COVID-19 pandemic.

Rationale and Literature Review

Understanding the factors that can mitigate adverse pandemic outcomes among frontline healthcare workers is important because pandemic outcomes are associated with performance and are indicators of organizational effectiveness. Frontline healthcare employee performance includes professionalism and clinical skills (Chang et al., 2022). Organizational effectiveness has been defined as responsiveness to the needs of the stakeholders (Buckley,1967; Pfeffer & Salancik,2015), such as frontline healthcare workers. Workplace environmental factors (conditions of work and number of hours worked per week), and individual pandemic outcomes (burnout, turnover, and turnover tendencies) have been associated with both employee performance and patient outcomes (Majeed & Baig, 2021; Miller & Richards, 2018). For instance, low competence has been attributed to working conditions and patient mortality rates (Hui et al., 2023). Also, burnout has led to self-abasement and incompetence and has negatively affected frontline healthcare workers' job performance (Ampon-Wireko et al., 2022; Chang et al., 2022). More so, turnover has negatively affected performance (Hanslovan, 2025). Other factors that impacted healthcare workers' performance included inadequate support from colleagues or leaders (Nowrouzi-Kia et al., 2021; Yáñez-Araque et al., 2021).

Despite mixed results and limited reach, individual resilience, interprofessional healthcare practice (IPHP), and

views of leadership behavior have been associated with core pandemic-era outcomes such as conditions of work (direct COVID-19 care, low staffing, and inability to complete work), number of hours worked, burnout, and turnover, including unit turnover rate and desire to leave (Cucolo et al., 2024; McEwen, 2022; Remtulla et al., 2021; Zarska et al., 2021). However, existing studies have predominantly focused on nurses, physicians, and related medical staff, and the influence of IPHP is still unclear. Studies hardly covered other health and social care professionals such as behavioral therapists, radiation therapists, respiratory therapists, and social services professionals. These professionals had become an integral part of the pandemic care team both inside and outside the medical care system.

Negative Pandemic Outcomes

Healthcare workers' negative pandemic outcomes considered in this study (conditions of work, number of hours burnout, turnover) are associated with each other, and with individual-level factors such as resilience, and organizational predictors such as IPHP and leadership support. The workplace environment, including conditions of work and the number of hours worked, affected burnout and turnover (Billings et al., 2021; McClinton et al., 2019; Leo et al., 2021), and burnout affected turnover (Leo et al., 2021). Also, employee burnout was associated with reduced personnel turnover (Bakker & Demerouti, 2024) and with individual-level and organizational-level factors (Moukaddam et al., 2020). More so, turnover has been linked to resilience, workplace environment, leadership support, teamwork, and burnout among medical interns and residents (Yun et al., 2023), and physicians (Seathu et al., 2024). The relationships above indicate that individual and organizational factors could potentially intensify or diminish negative adverse employee outcomes during crisis such as the COVID -19 pandemic. Understanding these relationships would shape effective organizational interventions for frontline healthcare workers during crisis. (See additional analysis of these relationships in the modified open system model in figure 1 below).

Resilience

Resilience has mitigated adverse pandemic outcomes, including worsening workplace environment, general work conditions, number of hours worked, burnout, and turnover (unit turnover rate and desire to leave) among frontline healthcare workers. Resilience was tied to burnout among frontline healthcare workers before and during the pandemic (Laberes et al., 2018; Coco et al., 2021). In addition, resilience contributed to retention during epidemics (Rahimi et al., 2023). Furthermore, moral resilience was inversely associated with occupational burnout, turnover intentions (Yi et al., 2024), and positively associated to a supportive work environment (Rahimi et al., 2023). These findings, and the findings below on IPHP and leadership support, suggest that individual and organizational factors can work together to diminish negative pandemic outcomes. This calls for additional studies to clarify the relationships and provide a roadmap for needed organizational and human resource management interventions during crisis such as the COVID-19 pandemic.

Interprofessional Healthcare Practice(IPHP)

Pandemic-era IPHP studies are limited and have mixed results (Raderstorf et al., 2020). Positive interprofessional practice before and during the pandemic had the following effects: increased capability in managing workload; decreased burnout and intention to leave; improved teamwork and collaboration; enhanced patient outcomes; and a more positive work environment (Al Sabei et al., 2022; Kaiser et al., 2018). On the other hand, negative interpersonal dynamics can exacerbate workload and stress (Cucolo et al., 2024). However, among social workers, no statistically significant association was found between participation in an interprofessional team and burnout scores when other factors are considered (McCarthy, 2021).

Factors Associated with Leadership

Leadership behavior ties together this study's outcomes and predictor variables and creates the organizational culture and structure for resilience and IPHP to thrive (Remtulla et al., 2021). Conditions of work and burnout mediated leadership's effect on nurses' intent to leave (Lee et al., 2019). Other studies demonstrated that leadership support mediated the relationship between organizational and individual support and resilience, subsequently decreasing burnout (Luo et al., 2022). Also, some pandemic studies suggested that views of leadership were related to burnout among respiratory therapists (Miller, Roberts, Hinkson et al., 2021; Strickland et al., 2022). Turnover was linked to leadership support among hospital staff (Zaheer et al., 2019).

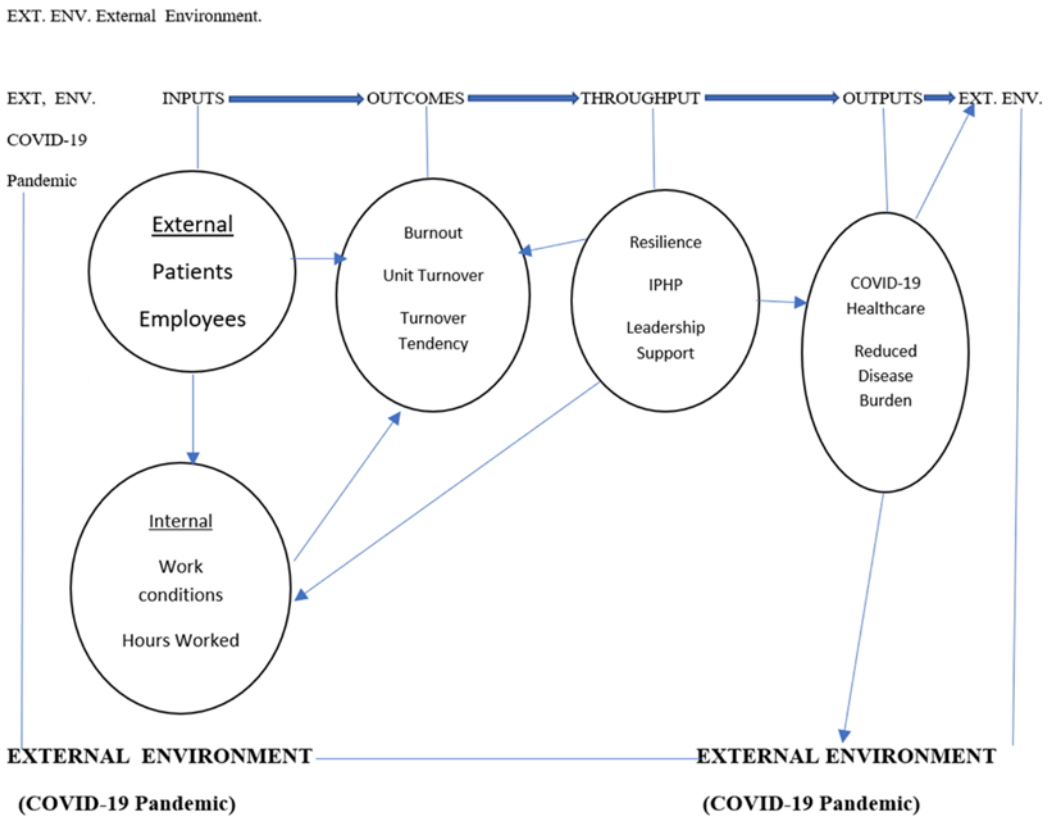
There is a dearth of studies that consider the combined impact of resilience, leadership, and IPHP on negative pandemic outcomes. The current study's focus on the influence of IPHP, resilience, and leadership, examined together, should clarify the impact of considered individual and organizational factors on negative pandemic outcomes.

The Conceptual Framework of Analysis: The Open Systems Theory

This study adopted a modified open systems model as a framework of analysis. The framework identified and clarified the relationships between the predictors (resilience, IPHP, and leadership) and outcome variables (conditions of work such as direct COVID-19 care, low staffing, and inability to complete work, number of hours worked, burnout, turnover, and turnover tendencies) in the context of the pandemic. The open-systems approach views organizations as open social systems interacting with their dynamic external environments as they adapt to changes in that environment for survival (Katz & Kahn, 2015). External environments feed organizations with various inputs, including customers, suppliers, and employees, to name the most relevant to this study (Cutlip et

Figure 1

A Modified Open Systems Model Applied to Frontline Healthcare Workers' Outcomes During the COVID-19 Pandemic



al.,2006). The systems approach focuses on homeostasis/ dynamic equilibrium, which drives organizational effectiveness by focusing on survival and growth as organizations adapt to their environment. Effectiveness has been regarded as responsiveness to the needs of the stakeholders, "how well an organization is meeting the demands of the various groups and organizations that are concerned with its activities" (Buckley,1967; Pfeffer & Salancik, 2015). The stakeholders of interest in this study are the frontline healthcare workers.

Open system theorists have identified cycles of input, throughput, output, and feedback between an organization and its external environment. Systems receive input from the environment either as information or as resources. The systems then process the input internally, called throughput, and release outputs into the environment to restore equilibrium to the environment (BertaLanffy, 1950, 1967; Katz and Kahn, 1966, 2015). Input as a form of feedback is either negative or positive. Negative input invites adjustments to correct the problem, while positive input calls for maintaining current activity (Katz and Kahn, 1966, 2015). Adjustments can include changes in both organizational structure and processes (Cutlip et al., 2006).

In this study, the dominant contextual factor was the COVID-19 pandemic. During the pandemic, the organizational goals stayed the same. However, the crisis in the external environment significantly altered the effectiveness dynamics, calling for a reordering of throughput to meet the needs of core internal stakeholders, such as frontline healthcare workers, so that they could continue to achieve the mission and goals of healthcare organizations.

Figure 1 above illustrates the application of a modified open systems model in analyzing factors affecting frontline healthcare workers' work environment and adverse COVID-19 pandemic outcomes. While the open system theory traditionally focuses on the external environment as a source of inputs, in this application, the negative inputs come from both the internal and external environments. Also, the traditional model only identifies inputs, throughputs, and outputs in its conceptual cycle. This modified model includes employee outcomes as an important conceptual element.

The COVID-19 pandemic changes the external environment by imposing a frightening disease burden and mortality on the general population. COVID-19 also generates negative internal inputs in the workplace environment, including worsened work conditions and increased hours worked per week. The negative inputs from the internal environment, in turn, created adverse outcomes for the frontline healthcare worker, including occupation-

al burnout, unit turnover, and turnover tendencies. This study examines individual-level factors (resilience) and organizational-level factors (leadership and IPHP) affecting internal inputs and employee outcomes identified above. Therefore, the study results should inform the type of throughput/transformation interventions to address frontline healthcare workers' adverse outcomes and stabilize the internal and external environments to achieve organizational effectiveness. The modified open systems model shaped both the objectives and hypotheses below.

Study Objectives

The purpose of this study is to assess the following:

Individual (resilience) and organizational (IPHP, leadership) factors related to perceptions of the general conditions of work, such as direct COVID-19 care, low staffing, and inability to complete work among frontline healthcare workers.

Individual (resilience) and organizational (IPHP, leadership) factors related to the number of hours worked per week among frontline healthcare providers.

Individual (resilience) and organizational (IPHP, views leadership) factors related to occupational burnout among frontline healthcare workers.

Individual (resilience) and organizational (IPHP, views leadership) factors related to unit turnover rate among frontline healthcare providers.

Individual (resilience) and organizational (IPHP, views leadership) factors related to turnover tendency among frontline healthcare workers.

Hypotheses

H1. Workplace environmental factors which include general working conditions(direct COVID-19 care, low staffing, and inability to complete work), and hours worked per week, will have the following correlations: a) inversely associated with resilience, IPHP, and a positive view of leadership; b) positively associated with occupational burnout and turnover, including unit turnover rate and turnover tendencies.

H2. Occupational Burnout will have the following correlations: a) inversely associated with resilience, IPHP, and a positive view of leadership; b) positively associated with turnover, including unit turnover rate and turnover tendencies.

H3. Turnover, including unit turnover rate and turnover tendencies, will have the following correlation: a) inversely associated with resilience, IPHP, and a positive view of leadership.

Methods

Design and Data Collection

This is a cross-sectional and retrospective survey of an interdisciplinary sample of frontline healthcare workers who experienced the COVID-19 pandemic from January 2020 to December 2022. The study relied on a convenience sample, with participants recruited through snowball sampling. Researchers leveraged their professional relationships and publicly available data to build a database of healthcare professionals' emails. Anonymous survey links were emailed to participants via a Qualtrics survey tool from July 31, 2023, to December 31, 2023. Frontline healthcare workers opened four hundred fifty survey links, and two hundred and fifty-three were completed.

Ethical Review and Conflict of Interest Declaration

The Institutional Review Board at a midsize Southern regional University in the United States approved the study as an exempt study in 2023. The authors have no conflict of interest or competing interests related to this manuscript.

Participants

The study sample included 253 frontline healthcare workers from 25 US states and the District of Columbia. To be included in the study, participants needed to meet the following criteria: (1) Must have worked as a physician or non-physician provider, nurse, respiratory therapist, radiation oncologist, behavioral therapist, or social services professional from January 2020 to December 2022; (2) must be 18 years or older; (3) must be able to provide written consent. The characteristics of the participants, their patients, facilities, and their distribution by states are summarized in Table 1 below.

Measures

Outcome variables (general work conditions including direct COVID-19 care, low staffing, and inability to complete work, number of hours worked per week, burnout, unit turnover, turnover tendencies), individual-level predictor (resilience) and organizational-level predictors (views of leadership support, IPHP) were assessed using items in a frontline healthcare workers' pandemic experience survey instrument. The questionnaire was made up of adopted and modified questions from existing instruments and questions developed from the literature by the researchers. Face validity and psychometric studies of The Pandemic Frontline Healthcare Workers Survey instrument established reliability and validity evidence for healthcare-specific measures of burnout and resilience, and initial factor structure for perceptions of interprofessional relationships and leaders' support behaviors specific to frontline workers and leaders (Tataw et al., 2025).

Questions used in this study covered constructs adopted with modification from validated instruments or developed from the literature as follows: questions on burnout, workplace environment (conditions of work and number of hours worked), and turnover were adopted from (Burr et al., 2022; Miller, Roberts, Hinkson et al., 2021; Miller, Roberts, Smith et al. 2021); questions on resilience were adopted from Winwood et al., 2013; interprofessional relationship questions were developed from interprofessional healthcare practice (IPHP) literature (Bollen et al., 2019; Remtulla et al., 2021; Tataw, 2012; Tataw & Stokes, 2023) and leadership support behavior questions

Table 1

Sample and Population Characteristics

	Sample Statistics	Population Statistics (All 50 States)
Gender	N = 216, *1	N= 9,3 million
Male	40 (18.52%)	30.7%
Female	173 (80.09%)	69.3%
Non-binary	1 (0.46%)	Data not available
Prefer not to answer	2 (0.93%)	Data not Available
Race or Ethnicity	N = 214, *3	N= 9.3 million
Asian	12 (5.61%)	13%
Black/African American	30 (14.02%)	10.6%
Hispanic/Latino	6 (2.80%)	7.6%
White/Caucasian	161 (75.23%)	61.2%
Other	5 (2.34%)	7.6%
Highest Education	N = 216, *1	N= 9.3 million
High School – Some College	7 (3.24%)	20%
College Graduate	108 (50%)	39.4%
Graduate or Professional Education	101 (46.76%)	40.7%
Provider's Role	N=214, *3	N= 9.3 million
Behavioral Therapist	14 (6.54%)	5%
Nurse	106 (49.53%)	29.6%
Physician and Non–Physician Provider	20 (9.35%)	10.5%
Radiation Therapist	19 (8.88%)	1%
Respiratory Therapist	17 (7.94%)	1%
Social Worker or Social Services Professional	10 (4.67%)	3.8%
Other	28 (13.08%)	Varies
No. of Years Served in the Role	N=215, *2	N=9.3 million
Less than 5 years	46 (21.40%)	Less than 26.2%
5 to 10 years	70 (32.56%)	Less than 23.5%
10 years +	99 (46.05%)	Less than 50.3%
Patient Population Primarily Served	N=216, *1	N=9.3 Million
Adult	148 (68.52%)	60%
Geriatric	12 (5.56%)	8%
Neonatal/Pediatrics	19 (8.80%)	5-10%
Cancer Patients	15 (6.94%)	6-7%
Other	22 (10.19%)	Varies
Facility Type	N=216, *1	N=9.3 million
Behavioral Health	41 (18.98%)	5%
Hospital Services	113 (52.31%)	41%
Long Term Care Facility	5 (2.31%)	15%
Other	29 (13.43%)	Varies
Outpatient Services	20 (9.26%)	22%
Social Work and Social Services	8 (3.70%)	4-5%
State of Employment	N=229 (100%)	N=9.3 million
Kentucky	57(25%)	1.5%
Wyoming	2(1%)	1.9%
Mississippi	6(3%)	0.9%
Ohio	32(14%)	4.1%
GA	3(1%)	3%
West Virginia	4 (2%)	0.6%
California	10(4%)	10%
New Mexico	6(3%)	0.53%
Texas	7(3%)	8%
Connecticut	4(2%)	1.1%
Wisconsin	5(2%)	1.9%
Florida	10(4%)	6%
Washington	10(4%)	2%
Arkansas	3 (1%)	0.9%
UT	5(2%)	0.8%
Tennessee	5(2%)	2.2%
Indiana	6(3%)	2.1%
District of Columbia	10(4%)	0.3%
Illinois'	9(4%)	0.4%
New York	8(3%)	6%
New Jersey	7(3%)	2.6%
Arizona	6(3%)	2%
Maryland and Virginia	8(3%)	4.1%
Michigan	6(3%)	3.1%
Total	229(100%)	No Data Available

were adopted from (Balasubramanian & Fernandes, 2022; Northhouse, 2021).

Pandemic outcomes, including burnout, workplace environmental factors, and turnover, were measured as follows:

Burnout

Occupational burnout perceptions were measured using seven questions covering emotions, fatigue, frustration, overwork, illness, and missing work. An example of a question is: "I felt fatigued when I got up in the morning and had to face another day on the job." Response options ranged from 1—strongly disagree to 5—strongly agree.

Workplace Environment

The workplace environmental factors included three questions covering general work conditions (direct COVID-19 care, low staffing, and inability to complete work) and one on weekly hours worked. An example of a question was the question on low-staffing: 'During the pandemic, how many shifts did you work without adequate staffing?', with response options, 1 – Frequently (staffed for < 50% of shifts), 2 – Occasionally (staffed for 50-74% of shifts), 3 – Rarely (staffed for 75-99% of shifts), and 4 – Never (staffed for 100% of shifts).

Turnover

Turnover was measured by one question on unit turnover rate and two questions on turnover tendencies covering the intention to stay on the job and the intention to change careers. An example of a question is the intention to remain in the same career during the pandemic, captured as follows: "During the pandemic, I considered changing careers." Responses ranged from 1—strongly disagree to 5—strongly agree.

The main predictors of the outcome variables considered include resilience, interprofessional healthcare practice, and views of leadership behavior, and were measured as follows:

Resilience

Individual resilience perceptions were measured using eight questions covering core values, personal strengths, sense of purpose, stress management, healthy habits, physical fitness, work-life balance, and supportive colleagues. An example of a question is: "During the pandemic, I had developed some reliable ways to deal with my stress of challenging events at work." Responses ranged from 1 – strongly disagree to 5 – strongly agree.

Interprofessional Health Practice Perceptions(IPHP)

Frontline healthcare workers' perceptions of interprofessional practice were measured using eight items: interprofessional communication, professional identity, interprofessional conflict, working well as a team, mutual respect, interprofessional training, clear roles, and trust. An example of a question is "During the pandemic, communication among the different professions was effective," with response options ranging from 1 – strongly disagree to 5 – strongly agree.

Leadership Support Behavior Perceptions

Frontline healthcare workers' perceptions of leadership support behavior were measured using 11 items covering leadership support and action in the following areas: working through difficulties, helping to find answers to problems, comfort, taking the initiative, listening, psychological and emotional support, communication, consistency, willingness to change, and decisiveness. An example of a view of leadership behavior question is "When I felt uncertain about organizational change, I trusted my director/manager would help me to work through the difficulties," with response options ranging from 1 – strongly disagree to 5 – strongly agree.

Further, questions on some quantitative outcomes and predictor variables were combined to develop three outcome scales (Burnout, turnover tendencies, and general conditions of work) and three predictor scales (resilience, interprofessional healthcare practice, and leadership behavior). The developed scales and one individual question on unit turnover rate were fitted into simple and multiple regression models, as listed in Tables 3 and 5 in the results section. Scales were implemented to quantify how ideal (or not) conditions were. Scales were based on averages, and questions with more than 5 points were normalized to 5 points before inclusion. The number of hours worked per week, which is an indicator of the workplace environment, was not included in the newly developed scaled variables since it is a categorical variable and was not included in regression analysis but was considered in the analysis of variance (ANOVA) and analysis of covariance (ANCOVA) as indicated in Tables 4 and 6 in the results section.

Additional data preparation included averaging and recoding. Higher numbers signified higher risk for all pandemic outcome scales and individual questions considered in this study (general work conditions, hours worked/week, burnout, and unit turnover and turnover tendencies). Higher numbers signified better predictor scales (resilience, interprofessional healthcare practice, and leadership behavior). Where higher numbers were assigned to lower risk or lower protective value, the items were recoded to ensure higher numbers reflected higher risk or better protective value. The outcome variables, hours of work per week and low staffing, were recoded from 1 to 6 levels to a scale of 1 to 4. Demographics were not recoded. Depending on the context, the " other " response option was recoded as a new option or integrated into an existing one. Further, missing values were treated as missing-at-random and effectively "imputed" using averages.

Data Analysis

The data in this study were collected through the Qualtrics survey tool and analyzed using Minitab 20 Statistical Software (2010, www.minitab.com) and the 2010 edition

of Microsoft Excel. Data collected were analyzed using linear and multiple regression analysis, analysis of variance (ANOVA), and analysis of covariance (ANCOVA). The scales developed were classified as outcomes or predictors, and general linear models (regressions and ANOVAs) were used to identify and quantify relationships. Models were considered on univariate (single predictor) and multivariate (multiple predictors) levels. Numerical predictors were considered first and, when possible, also used as covariates in ANCOVA to further test the significance of categorical predictors.

The three predictor scales, outcome scales, and one individual question described in the measurement section were fitted into simple linear and multiple regression models reported in Tables 3 and 5, respectively. The regression models were used to identify potential sets of scaled predictors of different pandemic outcomes. In the simple linear regression analysis reported in Table 3 in the results section, there were a total of seventeen models, with six models for general conditions of work, five for burnout, three for unit turnover rate, and three for turnover tendencies, using only one predictor at a time. Simple linear regression models for which the p-value of the beta coefficient was found to be 0.05 or less were considered significant.

Multiple regression analysis reported in Table 5 produced four regression models. For all multiple regression models, the "backward elimination" method was used to select the best predictors to incorporate in final models, where variables were removed one at a time from an original model having all scaled predictor variables to a significance level of 0.05 or less. The authors retained all variables in the model for which the p-value was found to be 0.05 or less.

The authors also reported the coefficient of determination (R^2), which estimates the proportion of variation in the outcome variable explained by the statistical model (Bhandari, 2022). Based on suggestions in the literature, R2 values above 0.0%- 29%, 30%- 49%, and 50% or more are respectively considered small, medium, and large with regard to the model's predictive ability (Bhandari, 2022).

Categorical predictors are assessed individually using ANOVA (Table 4) and multiple comparisons using ANCOVA (Table 6). Note that to accomplish this, categories having few observations (fewer than 5) were either removed or combined into "other" when possible. Covariance analysis tests the significance of the different categorical predictors versus the outcomes of interest while considering the effect of the quantitative predictors. This is a more rigorous comparison of the statistically significant results in ANOVA listed in Table 4. Here, we test the significance of the different categorical predictors versus the outcomes/independent variables of interest while considering the effect of the quantitative/predictor ones identified in multiple regression analysis in Table 5. As demonstrated in Table 6, this is done in separate models for all outcomes of interest. The pairwise comparisons were included if the information gained from including the categorical predictors proved significant at 95% confidence.

Results

In this section, the authors present the results of both descriptive statistics (Tables 1 and 2) and analytic statistics (Tables 3, 4, 5, 6). Descriptive statistics include population and participant characteristics covering the following: demographics, patient categories, facility types, and distribution by state (Table 1); and core variables (Table 2). Analytic statistics include the results of assessed associations between pandemic outcomes (general work conditions including direct COVID-19 care, low staffing, and inability to complete work, hours worked, burnout, unit turnover, turnover tendencies) and both individual (resilience) and organizational predictors (IPHP and leadership behavior) using linear regression (Table 3), ANOVA (Table 4), multiple regression models (Table 5) and ANCOVA (Table 6). Overall, the results demonstrated associations between pandemic outcomes and both individual and organizational factors considered in this study.

Characteristics of Participants, Patients, and Facility Type

Table 1 covers population and participant characteristics, including gender, race/ethnicity, educational level, provider role distribution, years of service, patients served, facility type, and distribution by state.

Table 2

Descriptive Statistics of Variables

Variable	n	Mean	SD	Min	Q1	Median	Q3	Max
General Conditions of Work	217	4.29	0.58	2.75	3.88	4.25	4.63	6.00
Burnout	217	3.67	0.76	1.14	3.29	3.86	4.21	5.00
Satisfaction	217	2.73	0.61	1.00	2.25	2.75	3.25	4.00
Turnover	213	3.76	1.83	1.00	2.00	4.00	5.00	6.00
Turnover Tendency	217	3.12	1.30	1.00	2.00	3.00	4.00	5.00
Views of Leadership	217	3.19	0.99	1.00	2.52	3.27	4.00	5.00
Interprofessional Healthcare Practice	217	3.08	0.89	1.00	2.50	3.13	3.73	4.00
Resilience	217	3.50	0.62	2.00	3.13	3.63	3.88	4.88

Table 3

Simple Linear Regression Models

Outcome	Predictor	Coefficient	Correlation (r)	R^2	T-value	P-value
General Conditions of Work	Resilience	0.0513	0.054	0.29%	0.79	0.428
	Views of Leadership	-0.0319	-0.054	0.29%	-0.80	0.426
	IPHP	-0.1192	-0.182	33.30%	-2.71	0.007
	Burnout	0.1206	0.157	22.46%	2.33	0.021
	Unit Turnover	0.0420	0.132	21.75%	1.94	0.054
	Turnover Tendency	0.0465	0.104	1.08%	1.53	0.127
Burnout	Resilience	-0.5119	-0.415	37.25%	-6.69	<0.001
	Views of Leadership	-0.3327	-0.435	18.57%	-7.09	<0.001
	IPHP	-0.3799	-0.444	29.38%	-7.28	<0.001
	Unit Turnover	0.1685	0.405	26.37%	6.43	<0.001
	Turnover Tendency	0.3359	0.576	33.16%	10.33	<0.001
Unit Turnover	Resilience	-0.525	-0.178	23.17%	-2.63	0.009
	Views of Leadership	-0.449	-0.244	25.49%	-3.65	<0.001
	IPHP	-0.548	-0.267	7.14%	-4.03	<0.001
Turnover Tendency	Resilience	-0.885	-0.419	17.54%	-6.76	<0.001
	Views of Leadership	-0.608	-0.464	21.54%	-7.68	<0.001
	IPHP	-0.6514	-0.445	19.76%	-7.28	<0.001

The participants were predominantly female, white, and nurses. Most possess a college degree or higher, have served adult patients, worked in hospitals, and have worked for over 5 years. The demographic distribution of participants mirrored the distribution of frontline healthcare workers in the US population.

Table 2 presents the descriptive statistics for key variables, including each variable's mean and standard deviations. A five-number summary for each variable showed that the data is evenly distributed.

Results of Linear Regression and ANOVA

Table 3 relates specific predictors individually to the outcomes using simple linear regression, while Table 4 presents categorical predictors assessed individually using ANOVA. Weekly hours worked were used as a predictor.

Linear regression model results revealed that the general condition of the work scale was positively associated with burnout and unit turnover rate, but not turnover tendencies. There was a negative association between the general condition of work and IPHP, but there was no relationship with resilience and leadership views. In addition, the occupational burnout scale was negatively associated with resilience, views of leadership, and IPHP but positively associated with unit turnover rate and turnover tendencies. Both unit turnover and turnover tendencies were negatively associated with resilience, views of leadership, and IPHP.

Factors associated with the general work environment are assessed through linear regression and ANOVA. ANOVA results showed a statistically significant relationship between the number of hours worked per week and perceived work conditions and burnout experienced. From Tukey groupings, the higher the number of hours worked, the worse perceived conditions of work became, and the higher the reported levels of burnout experienced. Frontline healthcare workers who worked above 50 hours weekly rated their work conditions as more stressful than those who worked 40 to 50 hours weekly. Equally, front-

Table 4

Individual Categorical Predictors: Effects of Weekly Hours

Outcome (Weekly Hours)	F-Value	P-value	Significance
General Conditions of Work	16.35	<0.001	Yes
Burnout	3.21	0.024	Yes
Satisfaction	0.84	0.473	No
Unit Turnover	1.54	0.206	No
Turnover Tendency	1.21	0.306	No
Views of Leadership	0.83	0.447	No
Interprofessional Healthcare Practice (IPHP)	0.76	0.516	No
Resilience	1.33	0.266	No

Table 5

Multiple Regression Models

		Output				Variables Removed	
Outcome	**Predictor**	**Coefficient**	**Sums of Squares**	**T-value**	**P-value**	**T-value**	**P-value**
General Conditions of Work R^2=24.78%	Resilience	0.151	1.529	2.17	0.031	-	-
	Views of Leadership	-	-	-	-	0.92	0.360
	IPHP	-0.1021	1.410	-2.09	0.0489	-	-
	Burnout	0.1183	1.232	1.95	0.052	-	-
	Unit Turnover	-	-	-	-	0.99	0.324
	Turnover Tendency	-	-	-	-	-0.06	0.949
Burnout R^2=53.11%	Resilience	-0.2388	3.794	-3.36	0.001	-	-
	Views of Leadership	-	-	-	-	-1.30	0.194
	IPHP	-0.1666	3.681	-3.31	0.001	-	-
	Turnover	0.0755	3.319	3.14	0.002	-	-
	Turnover Tendency	0.1936	8.471	5.02	<0.001	-	-
Turnover R^2=26.70%	Resilience	-	-	-	-	-1.28	0.202
	Views of Leadership	-	-	-	-	-1.72	0.086
	IPHP	-0.548	50.64	-4.03	<0.001	-	-
Turnover Tendency R^2=42.90%	Resilience	-0.575	23.463	-4.51	<0.001	-	-
	Views of Leadership	-0.3027	12.457	-3.29	0.001	-	-
	IPHP	-0.3554	14.624	-3.56	<0.001	-	-

line workers who worked 40-50 hours weekly rated their workplace stress higher than those working 20- 40 hours and those working less than 20 hours weekly.

Results of Multiple Regression Analysis and ANCOVA

Tables 5 and 6 present multiple regression analysis and ANCOVA results, respectively. Table 5 presents multiple regression analysis in separate models for all outcomes of interest. Table 6 presents the significance of the categorical predictors versus the outcomes of interest while considering the effect of the quantitative ones.

Table 6

Analysis of Covariance Results (ANCOVA): Effect of Weekly Hours

General Conditions of Work (Independent) vs. Resilience/IHP/Burnout(Predictors) + Individual Categorical Predictors	
Categorical Var	**F (p-value)**
Role	0.74 (0.620)
Years in Role	1.128 (0.279)
Hours/Week	16.84 (<0.001)
Facility Type	0.83 (0.530)
Patient Demographic	1.83 (0.124)
Burnout vs. Resilience/IHP/Turnover/Turnover Tendency + Individual Categorical Predictor	
Categorical Var	**F (p-value)**
Role	2.12 (0.055)
Years in Role	1.29 (0.279)
Hours/Week	2.04 (0.112)
Facility Type	1.09 (0.368)
Patient Demographic	1.28 (0.281)

Multiple regression analysis results show that general work conditions are positively associated with resilience but negatively associated with IPHP. General conditions of work are also positively associated with burnout but have no relationship with unit turnover rate and turnover tendency and have no relationship with views of leadership. Multiple regression results also show that burnout is negatively associated with resilience and IPHP but positively associated with unit turnover rate and turnover tendency. Unit turnover is negatively associated with IPHP but has no relationship with resilience or views of leadership behavior. However, turnover tendency is negatively associated with resilience, views of leadership, and IPHP.

Multiple regression analysis and ANCOVA assess workplace environmental factors. ANCOVA results present the significance of hours worked per week using quantitative predictors as covariates. ANCOVA revealed that in a more rigorous comparison of ANOVA results, hours worked per week affected perceived work conditions but not burnout.

Outcomes Variable Predictability

The coefficient of determination (R2) values range from 1.08% to 37.16% for statistically significant simple linear regression models and 24.78% to 53.11% for multiple regression models. Therefore, multiple regression models have stronger variable predictability(moderate to strong) than linear regression models (weak to moderate). Equally, outcome models with larger R2 have stronger variable predictability among multiple regression models than models with smaller R2.

Discussion

This study assessed the association between adverse outcomes of the COVID-19 pandemic, including work-

place environment (general working conditions and hours worked per week), occupational burnout and turnover (unit turnover rate and turnover tendencies), and individual predictors (resilience) and organizational level predictors (view of leadership behavior and IPHP). The results supported the hypotheses and aligned with the relationships anticipated in the open systems theory approach as described below.

Consistent with the hypothesis, adverse pandemic outcomes generally diminished in linear and multiple regression models as individual and organizational factors increased. In multiple regression models, as work conditions worsened, resilience increased. Pandemic outcomes were associated with each other, and conditions of work and hours worked appeared to influence employee outcomes.

Predictor variables showed varying degrees of consistency in relationships with pandemic outcomes and frequency of appearance in linear and multiple regression models. These variations represented the relative strength of association. Based on the consistency of relationships and frequency of appearance in linear and multiple regression models, the relationship between IPHP and negative pandemic outcomes was strongest. In contrast, the association between pandemic outcomes, resilience, and leadership views was weaker. Also, resilience had a stronger association with pandemic conditions relative to views of leadership. In the same vein, turnover and turnover tendencies had stronger associations with burnout than with general conditions of work. Their relationship with general conditions of work was weaker than the relationship between burnout and general conditions of work. Equally, based on the consistency of relationships revealed in ANOVA versus ANCOVA results, the number of hours worked per week is more strongly associated with poor work conditions of work than burnout.

Where there were statistically significant associations between outcome and predictor variables, there was a general consistency of association patterns across all methods of analysis, including linear regression analysis, multiple regression analysis, ANOVA, and ANCOVA. Predictors (resilience, IPHP, views of leadership) were generally inversely related to negative pandemic outcomes (general conditions of work, burnout, unit turnover rate, turnover tendencies). Also, internal inputs (conditions of work and number of hours worked) appear to affect employee outcomes (burnout, turnover, turnover tendencies). These consistent patterns add to the reliability of the evidence unearthed in this study.

The results of this study aligned with relationships anticipated in the modified open systems model applied in this study. External inputs (Covid-19 Pandemic, and internal inputs (general conditions of work, number of hours worked)) contributed to frontline workers' pandemic outcomes (burnout, turnover, turnover tendencies), and to the varying strength of individual and organizational factors (resilience, IPHP, leadership) that defined the character of throughputs. Throughputs contributed to organizational effectiveness necessary for maintaining homeostasis in a turbulent pandemic environment. Also, the modified open systems model as applied in the COVID-19 pandemic context contributed to systems theory by elevating the role of the internal environment as a generator of inputs (general conditions of work and number of hours worked), and influencer of stakeholder outcomes (burnout, turnover, turnover tendencies).

Relationship to the Literature

The findings in this study supported results in many contemporary studies. Other findings departed from contemporary studies and added to our knowledge of the role of resilience and interprofessional healthcare practice in mitigating pandemic outcomes. There were specific departures from the current literature. First, increases in individual resilience correlate with worsening work conditions. Second, IPHP has a stronger association with adverse pandemic outcomes when compared to resilience and views of leadership.

The general finding of inverse relationships between individual and organizational predictors and negative pandemic outcomes aligns with findings in contemporary studies. Equally, the positive relationships among pandemic outcome variables were consistent with contemporary trends in the literature. Current scholarship has documented negative associations between workers' outcomes (conditions of work, hours worked, burnout, and turnover) and individual factors, such as resilience (McClinton et al., 2019), and organizational factors, such as leadership behavior and IPHP (Zarska et al., 2021). Contemporary studies also showed positive associations between workplace environment and turnover (Moukaddam et al., 2020), and between healthcare workers' turnover and individual factors such as resilience and burnout, as well as organizational-level factors including views of leadership support, and teamwork (Han et al., 2019; Seathu et al., 2024). These findings suggest that if healthcare organizations strengthen individual-level resources such as resilience and organizational-level resources such as IPHP and leadership, they can improve the wellbeing and workforce stability of frontline healthcare workers in times crisis such as COVID-19 pandemic.

Departing from contemporary literature, multiple regression models showed resilience increasing as general work conditions worsened. Also, IPHP was inversely related to all pandemic outcomes, while there was no relationship between pandemic outcomes and views of leadership. These results suggest that IPHP can boost resilience even in the face of work stress while suppressing views of leadership. On the other hand, contemporary research shows that frontline healthcare workers' perceptions of conditions of work, hours worked, burnout, and turnover were inversely correlated with resilience (Coco et al., 2021; Rahimi et al., 2023; Yi et al., 2024) and leadership (Moukaddam et al., 2020). These findings suggest that to maintain wellbeing and workforce stability during crisis, healthcare organizations need to strengthen both IPHP and resilience at the same time, and all the time, not

just during crisis. Positive IPHP combined with resilience will help frontline healthcare workers to weather crisis well.

The relative strength of association between IPHP and pandemic outcome variables (general condition of work, burnout, unit turnover rate, and turnover tendencies), compared to their relationship with leadership behavior, was a departure from contemporary trends. Recent studies found that leadership behavior provided the fundamental framework that tied outcomes and predictor variables together (Lee et al., 2019) and provided the functional, cultural, and structural elements for resilience and IPHP to thrive (Karreinen et al., 2023; Luo et al., 2022; Remtulla et al., 2021). Furthermore, current IPHP studies were limited (Kaiser et al., 2018) and had mixed results (McCarthy, 2021; Raderstorf et al., 2020). These findings suggest that though leadership is important, healthcare organizations must develop positive IPHP if they are to maintain wellbeing and workforce stability among frontline healthcare workers during crisis such as COVID-19 pandemic.

Recommendations

To mitigate the negative impact of crisis such as the COVID-19 pandemic, we recommend specific organizational actions below to be implemented during crisis and times of stability. These involve the development and maintenance of IPHP and resilience simultaneously all the time.

The results of this study specifically suggest that healthcare organizations should prioritize the institutionalization of IPHP. In this study, IPHP emerges as a sustainable protective factor against worsening work conditions, burnout, unit turnover rate, and turnover tendency during crises such as the COVID-19 pandemic. Healthcare organizations should integrate IPHP training in frontline healthcare workers onboarding activities, and maintain IPHP as required continuous training and annual performance evaluations. Also, healthcare leaders should be trained and assessed on their ability to lead IPHP activities.

The study also showed that resilience increases as working conditions worsened, when IPHP is positive. Various interventions have been developed or recommended to enhance resilience in frontline healthcare workers so as to mitigate worsening workplace environments, burnout, and turnover during crisis such as the COVID-19 pandemic. These include individual-level strategies such as maintaining work-life balance, stress management, self-care, communication skills training, and organizational strategies such as improving work processes, involving frontline workers in decision-making, providing psychosocial support, access to mental health resources, and developing and maintaining a culture of peer and positive leader support (Luo et al., 2021; Moukaddam et al., 2020; Zerden et al., 2021).

Limitations

Despite its many strengths, this study had some limitations. Since the study sample is a convenience sample selected through the snowball sampling method, the sample's representativeness of the population could be undermined, and there is a likelihood of bias. Further, the study depends on self-report, which has limitations such as participant subjectivity, limited options that respondents might not experience, and selection of the most socially acceptable options, so-called "social desirability bias." In addition, as in any observational design, correlations did not imply causation.

The limitations described above notwithstanding, this study had several strengths and significantly contributed to the literature. The overall consistency of patterns of associations across methods of analysis mitigated weaknesses. The study also drew participants from more healthcare roles than most studies reported in the literature, and the distribution of roles among study participants is similar to that of US healthcare professionals. Furthermore, there was representation from many US states, and the counts and percentages of types of facilities and patient demographics were similar to the population statistics for the US (See Table 1 for sample and population statistics).

Conclusion and Recommendations

This study demonstrates that individual and organizational factors affected adverse pandemic outcomes, such as conditions of work, hours worked per week, burnout, unit turnover rate, and turnover tendency among frontline healthcare providers. The results also underscored the role of organizational behavior in individual employee outcomes during crises such as the COVID-19 pandemic. Employee success during the COVID-19 pandemic was linked to individual-level competencies such as resilience and organizational-level competencies such as interprofessional relationships and supportive leadership behavior. We recommend intentional organizational development efforts that would enhance individual, group, and organizational-level competencies, including resilience, supportive leadership, and IPHP. These competencies could reduce negative outcomes during pandemics and other public health emergencies and disasters.

References

Al Sabei, S. D., Labrague, L. J., Al, R. O., AbuAlRub, R., Burney, I. A., & Jayapal, S. K. (2022). Relationship between interprofessional teamwork and nurses' intent to leave work: The mediating role of job satisfaction and burnout. *Nursing Forum, 57*(4), 568–576. https://doi.org/10.1111/nuf.12706

Ampon-Wireko, S., Zhou, L., Quansah, P. E., & Larnyo, E. (2022). Understanding the effects of COVID-19 stigmatisation on job performance: a survey of frontline healthcare workers. *Annals of Medicine, 54*(1), 2039–2052. https://doi.org/10.1080/07853890.2022.2089910

Bakker, A. B., & Demerouti, E. (2024). Job demands–resources theory: Frequently asked questions. *Journal of Occupational Health Psychology, 29*(3), 188-200

Balasubramanian, S., & Fernandes, C. (2022). Confirmation of a crisis leadership model and its effectiveness: Lessons from the COVID-19 pandemic. Cogent *Business & Management, 9*(1), 2022824.

Bhandari H.N., Rimal B., Pokhrel N.R., Rimal R., Dahal K.R., & Khatri R.K (2022). Predicting stock market index using LSTM. *Science Direct, 9*,1-15.

Bertalanffy, L. (1950). The theory of open systems in physics and biology. *Science, 111*, 23-29.

Bertalanffy, L. (1967). General theory of systems: Application to Psychology. *Social Science Information, 6*(6), 125-136.

Billings, J., Ching, B. C. F., Gkofa, V., Greene, T., & Bloomfield, M. (2021). Experiences of frontline healthcare workers and their views about support during COVID-19 and previous pandemics: a systematic review and qualitative meta-synthesis. BIOMED CENTRAL *Health Services Research, 21* (1), 923. https://doi.org/10.1186/s12913-021-06917-z

Bollen, A., Harrison, R., Aslani, P., & van Haastregt, J. C. M. (2019). Factors influencing interprofessional collaboration between community pharmacists and general practitioners. A systematic review. *Health and Social Care in the Community, 27*(4), e189–e212. https://doi-org/10.1111/hsc.12705

Buckley, W. (1967). *Sociology and modern systems theory*. Prentice-Hall.

Burr, K., Hinkson, C., Smith, B. J., Roberts, K., Strickland, S., Hoerr, C., Rehder, K. J., & Miller, A. G. (2022). Factors associated with a positive view of respiratory care leadership. *Respiratory Care, 67*(10), 1236–1245. https://doi.org/10.4187/respcare.10081

Chang, Q., Su, H., Xia, Y., Gao, S., Zhang, M., Ma, X., Liu, Y., & Zhao, Y. (2022). Association between clinical competencies and mental health symptoms among frontline medical staff during the COVID-19 outbreak: A cross-sectional study. *Frontiers in Psychiatry, 13, 760521*. https://doi.org/10.3389/fpsyt.2022.760521

Coco, M., Guerrera, C. S., Santisi, G., Riggio, F., Grasso, R., Di Corrado, D., Di Nuovo, S., & Ramaci, T. (2021). Psychosocial impact and role of resilience on healthcare workers during the COVID-19 pandemic. *Sustainability, 13*(13), 7096. https://doi.org/10.3390/su13137096

Cucolo, D. F., de Campos Oliveira, J. L., Rossit, R. A. S., Mininel, V. A., Perroca, M. G., & Silva, J. A. M. D. (2024). Effects of interprofessional practice on nursing workload in hospitals: A systematic review. *The International Journal of Health Planning and Management, 39*(3), 824-843

Cutlip, S. M., Center, A. H., & Broom, G. M. (2006). *Effective public relations* (9th ed.). Upper Saddle River, NJ: Pearson

Donnelly, R., & Schoenbachler, A. K. (2025). The mental health of essential workers during the COVID-19 pandemic: The role of US state-level policies. *Society and Mental Health, 15* (1), 17-38.

Hanslovan, R. A. (2018). *Healthcare Worker Job Turnover, Organizational Cost, Organizational Performance, and Job Satisfaction: A Correlation Study* (Doctoral dissertation, Northcentral University).

Hiver, C., Villa, A., Bellagamba, G., & Lehucher-Michel, M.-P. (2021). *Burnout prevalence among European physicians: a systematic review and meta-analysis*. International Archives of Occupational and Environmental Health. https://doi.org/10.1007/s00420-021-01782-z

Hui, T., Zakeri, M. A., Soltanmoradi, Y., Rahimi, N., Rafsanjanipoor, S. M. H., Nouroozi, M., & Dehghan, M. (2023). Nurses' clinical competency and its correlates: before and during the COVID-19 outbreak. *BioMed Central Nursing, 22* (1). https://doi.org/10.1186/s12912-023-01330-9

Kaiser, S., Patras, J., & Martinussen, M. (2018). Linking interprofessional work to outcomes for employees: A meta-analysis. *Research in Nursing & Health, 41*(3), 265–280. https://doi-10.1002/nur.21858

Karreinen, S., Paananen, H., Kihlström, L., Janhonen, K., Huhtakangas, M., Viita-aho, M., & Tynkkynen, L.-K. (2023). Living through uncertainty: A qualitative study on leadership and resilience in primary healthcare during COVID-19. Bio-Med Central. *Health Services Research, 23*(1), 1–13. https://doi.org/10.1186/s12913-023-09223-y

Katz, D., & Kahn, R. L. (1966). *The social psychology of organizations.* Wiley.

Katz, D., & Kahn, R. (2015). *The social psychology of organizations.* In Organizational behavior 2 (pp. 152-168). Routledge.

Kentish-Barnes, N., Morin, L., Cohen-Solal, Z., Cariou, A., Demoule, A., & Azoulay, E. (2021). The lived experience of ICU clinicians during the coronavirus disease 2019 outbreak: a qualitative study. *Critical Care Medicine, 49*(6), e585-e597.

Lebares, C. C., Guvva, E. V., Ascher, N. L., O'Sullivan, P. S., Harris, H. W., & Epel, E. S. (2018). Burnout and stress among US Surgery Residents: Psychological distress and resilience. *Journal of the American College of Surgeons, 226* (1), 80–90. https://doi.org/10.1016/j.jamcollsurg.2017.10.010

Lee, H., Chiang, H., & Kuo, H. (2019). Relationship between authentic leadership and nurses' intent to leave: The mediating role of work environment and burnout. *Journal of Nursing Management, 27*(1), 52–65.

Leo, C. G., Sabina, S., Tumolo, M. R., Bodini, A., Ponzini, G., Sabato, E., & Mincarone, P. (2021). Burnout among healthcare workers in the COVID-19 era: A review of the existing literature. *Frontiers in Public Health, 9*(9), 750529. https://doi.org/10.3389/fpubh.2021.750529

Luo, D., Song, Y., Cai, X., Li, R., Bai, Y., Chen, B., & Liu, Y. (2022). Nurse managers' burnout and organizational support: The serial mediating role of leadership and resilience. *Journal of Nursing Management (John Wiley & Sons, Inc.), 30*(8), 4251–4261.

Luthar SS, Cicchetti D, Becker B (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development, 71*(3),543-62. https://doi.org/10.1111/1467-8624.00164

Majeed, A., & Baig, A. M. (2021). The impact of work environment on healthcare worker job satisfaction and performance. *Human Resources for Health, 19*(1), 70. https://doi.org/10.1186/s12960-021-00651-7

Martin, C., & Ramos-Gorand, M. (2017). High turnover among nursing staff in private nursing homes for dependent elderly people in France: Impact of the local environment and the wage. *Economie & Statistique,* (493), 49-66. https://www.proquest.com/scholarly-journals/high-turnover-among-nursing-staff-private-homes/docview/2078801290/se-2

McCarthy, L. P. (2021). Social work burnout in the context of interprofessional collaboration. *Social Work Research, 45*(2), 129–139. https://doi-.oclc.org/10.1093/swr/svab004

McEwen, K. (2022). Building resilience at work: A practical framework for leaders. *Journal of Leadership Studies, 16*, 42–49.

McClinton, S. S., Afsharian, A., Dollard, M. F., & Tuckey, M. R. (2019). The dynamic interplay of physical and psychosocial safety climates in frontline healthcare. Stress and health. *Journal of the International Society for the Investigation of Stress, 35*(5), 650–664. https://doi.org/10.1002/smi.2898

Miller, A. G., Roberts, K. J., Hinkson, C. R., Davis, G., Strickland, S. L., & Rehder, K. J. (2021). Resilience and burnout resources in respiratory care departments. *Respiratory Care, 66*(5), 715–723. https://doi.org/10.4187/respcare.08440

Miller, A. G., Roberts, K. J., Smith, B. J., Burr, K. L., Hinkson, C. R., Hoerr, C. A., Rehder, K. J., & Strickland, S. L. (2021). Prevalence of burnout among respiratory therapists amid the COVID-19 pandemic. *Respiratory Care, 66*(1), 1639–1648. https://doi.org/10.4187/respcare.09283

Miller, C. L., & Richards, J. E. (2018). Understanding the relationship between workplace resources, staffing, and healthcare worker morale. BioMed Central. *Health Services Research, 18*(1), 168.

Milo, R. B., Gómez, E., Suarez, C., Calero, P., & Connelly, C. D. (2023). Nurses and respiratory therapists lived experience during COVID-19 pandemic: a qualitative study. SAGE *Open Nursing, 9*. https://doi.org/10.1177/23779608231196843

Mohanty, A., Kabi, A., & Mohanty, A. P. (2019). Health problems in healthcare workers: A review. *Journal of Family Medicine and Primary Care, 8*(8), 2568–2572. https://doi.org/10.4103/jfmpc.jfmpc_431_19

Moukaddam, N., Parks, K., Le, H., Khawaja, L., & Shah, A. A. (2020). Burnout and Suicide among physicians during times of stress. *Psychiatric Annals, 50*(12), 536–541. https://doi.org/10.3928/00485713-20201103-02

Natale, J. E., Boehmer, J., Blumberg, D. A., Dimitriades, C., Hirose, S. Kair L.R., Kirk J. D., Mateev S. N., McKnight H., Plant J., Tzimenatos L. S., Wiedeman J. T., Witkowski J., Underwood M. A., & Lakshminrusimha S. (2020). Interprofessional/interdisciplinary teamwork during the early COVID-19 pandemic: experience from a children's hospital within an academic health center. *Journal of Interprofessional Care, 34* (5), 682-686.

Nowrouzi-Kia, B., Sithamparanathan, G., Nadesar, N., Gohar, B., & Ott, M. (2021). Factors associated with work performance and mental health of healthcare workers during pandemics: a systematic review and meta-analysis. *Journal of Public Health, 44*(4), 731–739. https://doi.org/10.1093/pubmed/fdab173

Northhouse, P. G. (2021). *Leadership: Theory and practice* (9th ed.) Sage Publications.

Pfeffer, J., & Salancik, G. (2015). *External control of organizations: A resource dependence perspective*. In J. B. Miner (Ed.), Organizational Behavior 2 (pp. 355-370). Routledge.

Raderstorf, T., Melnyk, B. M., Ackerman, M., & Bibyk, S. (2020). An outcomes evaluation of an innovation studio on interprofessional learning, job satisfaction, and intent to stay among clinicians. *The Journal of Nursing Administration, 50* (2), 109–114. https://doi.org/10.1097/NNA.0000000000000850

Rahimi, M. K., Heidari, E., Montaser Al Faraj, R., & Farajkhoda, T. (2023). A systematic review of the factors influencing retention or turnover intention among emergency personnel in epidemics. *Emergency Care Journal, 19*(4), 1–7. https://doi.org/10.4081/ecj.2023.11644

Remtulla, R., Hagana, A., Houbby, N., Ruparell, K., Aojula, N., Menon, A., Thavarajasingam, S., & Meyer, E. (2021). Exploring the barriers and facilitators of psychological safety in primary care teams: a qualitative study. BioMed Central. *Health Services Research, 21*(1), 1–12. https://doi.org/10.1186/s12913-021-06232-7

Ross, A. M., Schneider, S., Muneton-Castano, Y. F., Caldas, A. A., & Boskey, E. R. (2021). You never stop being a social worker? Experiences of pediatric hospital social workers during the acute phase of the COVID-19 pandemic. *Social Work in Health Care, 60*(1), 8–29.

Seathu Raman, S. S., McDonnell, A., & Beck, M. (2024). Hospital doctor turnover and retention: a systematic review and new research pathway. *Journal of Health Organization and Management, 38*(9), 45–71. https://doi.org/10.1108/JHOM-04-2023-0129

SME Annual Report (2013). *SME annual report*. National SME Development Council. Kuala Lumpur, KL

Strickland, S. L., Roberts, K. J., Smith, B. J., Hoerr, C. A., Burr, K. L., Hinkson, C. R., Rehder, K. J., & Miller, A. G. (2022). Burnout among respiratory therapists amid the COVID-19 pandemic. *Respiratory Care, 67*(12), 1578–1587. https://doi.org/10.4187/respcare.10144

Tataw, D. B. (2012). Toward human resource management in inter-professional health practice. linking organizational culture, group identity, and individual autonomy. *International Journal of Health Planning and Management, 27*(2), 130-149. https://doi.org/10.1002/hpm.2098

Tataw, D. B., & Stokes, E. W. (2023). Leadership in interprofessional healthcare practice (IPHP): Readiness, roles, and competencies for healthcare managers and human resource professionals. *Journal of Interprofessional Education & Practice, 32*. https://doi.org/10.1016/j.xjep.2023.100635

Tataw, D. B., Bryant-Lees, K., Arthur-Mensah, N., Spataro, S., & Patten, D. (2025). *Validity and reliability of measures of burnout, resilience, leadership, and interprofessional relationships among frontline healthcare workers and healthcare leaders in a time of crisis*. [Manuscript submitted for publication].

Winwood, P. C., Colon, R., & McEwen, K. (2013). A practical measure of workplace resilience: Developing the resilience at work scale. *Journal of Occupational and Environmental Medicine, 55*(10), 1205-1212.

World Health Organization. (2010). *Framework for action on interprofessional education and collaborative practice*. Geneva, Switzerland.

World Health Organization. (2020a). *Coronavirus disease (COVID-19) outbreak: Rights, roles and responsibilities of Health Workers, including key considerations for occupational safety and health*. https://iris.who.int/handle/10665/331510.

World Health Organization. (2020b). *Corona virus disease. Guidance for health workers*. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/health-workers/

Yáñez-Araque, B., Gómez-Cantarino, S., Gutiérrez-Broncano, S., & López-Ruiz, V. (2021). Examining the determinants of healthcare workers' performance: A configurational analysis during COVID-19 times. *International Journal of Environmental Research and Public Health, 18*(11), 5671. https://doi.org/10.3390/ijerph18115671

Yi, L., Chen, Z., Jiménez-Herrera, M. F., Gan, X., Ren, Y., & Tian, X. (2024). The impact of moral resilience on nurse turnover intentions: The mediating role of job burnout in a cross-sectional study. *BioMed Central Nursing, 23*(1), 1–10. https://doi-10.1186/s12912-024-02357-2

Yun, J. Y., Myung, S. J., & Kim, K. S. (2023). Associations among the workplace violence, burnout, depressive symptoms, suicidality, and turnover intention in training physicians: A network analysis of nationwide survey. *Scientific reports, 13*(1), 16804. https://doi.org/10.1038/s41598-023-44119-1

Zaheer, S., Ginsburg, L., Wong, H. J., Thomson, K., Bain, L., & Wulffhart, Z. (2019). Turnover intention of hospital staff in Ontario, Canada: Exploring the role of frontline supervisors, teamwork, and mindful organizing. *Human Resources for Health, 17*(1), 66. https://doi.org/10.1186/s12960-019-0404-2

Zarska, A., Avgar, A. C., & Sterling, M. R. (2021). Relationship between working conditions, Worker outcomes, and patient care: A theoretical model for frontline health care workers. *American Journal of Medical Quality, 36*(6), 429–440. https://doi.org/10.1097/01.JMQ.0000735508.08292.73

David Tataw (dbtataw@yahoo.com)

Nana Arthur-Mensah (arthurmensah@nku.edu)

Sandra Spataro (spataro@nku.edu)

Deborah A. Patten (patten@nku.edu)

Ujjala Patel (patel@nku.edu)

Julie Lasley (lasley@nku.edu)
