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WORK-RELATED MUSCULOSKELETAL DISORDERS AMONG NURSES IN TERTIARY CARE HOSPITALS

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Abstract

Background: Work-related musculoskeletal disorders are highly prevalent among nurses due to repetitive strain, awkward postures, and heavy workloads, which adversely affect their physical health, job satisfaction, and quality of care. Nurses are particularly vulnerable to lower back, neck, and shoulder pain. These risks are further intensified by job burnout and physical exertion, while frustration may function as a mediating factor in the relationship between occupational strain and musculoskeletal disorders. This study examined the association between burnout, exertion, and work-related musculoskeletal disorders, with frustration considered as an intervening variable. Methodology: A quantitative research design was employed. Data were collected using validated instruments, including the Maslach Burnout Inventory, the Borg Rating of Perceived Exertion, and the Nordic Musculoskeletal Questionnaire. Statistical analysis was conducted through regression models using SPSS to evaluate direct and mediating relationships among the variables. Results: The findings demonstrated that work-related musculoskeletal disorders were significantly predicted by both burnout and physical exertion. Frustration partially mediated the relationships between burnout and musculoskeletal disorders as well as between exertion and musculoskeletal disorders. These results highlight the combined psychological and ergonomic influences on nurses' musculoskeletal health.Conclusion: The study concludes that both occupational burnout and physical exertion contribute significantly to work-related musculoskeletal disorders among nurses, with frustration playing a mediating role. Interventions focusing on workload management, ergonomic training reforms, wellness programs, and organizational adjustments are recommended to reduce musculoskeletal disorders and promote nurses' overall health and well-being.

INTRODUCTION

Work related musculoskeletal disorders (WMSDs) are muscular injuries or illnesses nerves, soft tissue, brought about by risk factors of the workplace, including repetitive strain, awkward poses, and excessive workloads, and they are very widespread among nurses, and worldwide 60 to 98 percent (Sun, Yin et al. 2023). These are physical handicapping circumstances Health, job satisfaction and quality of care, which would cause turnover, depression and reduced quality of life. Rates of prevalence of reviews of European industries are 42 to 60% in the back and neck, most research has been done on upper limb disorders (Govaerts, Tassignon et al. 2021). The nurses have reported high prevalence (97.3%), with the high prevalence being in low back, ankles, neck and shoulders, highlighting the great necessity of the measures like the promotion of healthy lifestyles, prevention, early, positional education and frequent breaks, as well as positive work environments diagnosis, and occupational modifications, such as staffing and scheduling (Krishnan, Raju et al. 2021; Russo, 2022). New technologies and distance work have become some of the emerging challenges in the modern work environment work, demand to revise the approach to tracking and preventing MSDs in the post pandemic period, and focus on vulnerable populations (Bonfiglioli, Caraballo Arias et al. 2022; Khan, 2020). Meta analyses affirm that there are significant correlations between physical workload, occupational strain and MSDs in hospital nurses, emphasizing the role of ergonomics, exercise and organizational enhancements to decrease MSDs, sustain quality in the work, decrease medical expenses, and decrease employment changes, and longitudinal studies are desirable to testify results and educate the national prevention programs (Akbar & Hayat, 2020; Du, Zhang et al. 2021; Quader, 2024). Medical workers of all disciplines are at risk of MSDs, surgeons and dentists are more impacted in the upper extremities and nurses in the lower extremities the lower extremities, in which clumsy positions are the main causative factor, which supports the necessity Workplace design and improvement on the ergonomics (Ismail & Ali, 2020; Jacquier Bret and Gorce 2023).

Nurses working in the emergency department demonstrate a high MSD prevalence associated with demographic and work-related factors, and the associated interventions are ergonomic interventions, optimal scheduling, and wellness programs. is fundamental to both health and service to patients, whereas wellness programs play a key role in the future. research (Alrimali, Alreshidi et al. 2024; Yinusa & Ogoun, 2024). MSDs also influence the mental health of caregivers which needs. prevention and assistance to enhance job satisfaction and retention, and proactive measures and better working conditions through policy and organizational chang informing (Modupe, 2021; Valim, de Sousa et al. 2024). Absenteeism, presenteeism and job are predicted by work instability in relation to WMSDs. abandonment, which in turn requires early interventions in order to avoid disability and early retirement. reporting occupational health measures in order to promote health in the hospitals (Mehdi, 2019; Teixeira, de Souza Petersen et al. 2022). Female nurses with high scores of MSD and fatigue complain of less job. satisfaction, and patient load, work environment, and staffing were identified as the most significant factors; increasing. conditions, ergonomic support and wellness promotion such as posture training, regular. will help improve the well-being of nurses and the quality of care (Hameed, 2020; Günaydin and Bulut 2025). In addition to physical symptoms, patients with MSDs are likely to have despair and distress, which needs the measurement of emotions, perception of symptoms, and social support. management improvement strategies (Akbar & Hayat, 2020; Martinez Calderon, Matias Soto et al. 2022; Carlo, 2025). Night shifts and increase risks, musculoskeletal disorders are common among pediatric nurses. not significantly related with intention to leave; managing should be one of the priorities of policymakers. flexible working hours, decreased work intensity, and managing MSDs to keep employees (Ufaq, 2019, Modibbo & Inuwa, 2020; Naserian, Pouladi et al. 2024; Marc & Roussel, 2024).

It is on this background that the problem statement underlines the fact that WMSDs are painful conditions. impacting muscles, tendons, nerves as a result of repetitive strain, improper posture or overuse with. typical manifestations such as back, neck and shoulder pain enhanced by a lack of proper training, unzaxy posture, and schedules that are irregular (Muhammad & Yan, 2019; Ali, Haroon et al. 2024). Lower back pain is most common, aggravated by inactive habits and excessive workloads in case of staff shortage, emphasizing the necessity of improved workload control and employing dynamic practices (Raja & Iqbal, 2019; Kashif, Hassan et al. 2023). This study is important in that it discusses WRMSDs as an urgent occupation. health concern, how job burnout, forceful exertion, and relate to each other. frustration to offer them a multifactorial interpretation. Insights can lead evidence-based intervention like ergonomic training, changes in workload, mental. ultimately, health support, and

reforms of organizations, focusing on nurse safety and resilience. creating healthier, sustainable workplaces. The existing gap in research indicates the need of. researches into the psychological reactions of job demands and physical stress, especially. frustration as an intermediate, to educate the workplace wellness program (Rehman & Malik, 2020; Mersal, Alenezi et al. 2025; Marc et al., 2025).

Therefore, the hypotheses are to determine the relationship between job burnout and WRMSDs in among. nurses and to test the mediating effect of frustration in the correlation between burnout, exertion and WRMSDs, locating points of psychological and ergonomic interventions. The research questions: what is the relationship between job burnout and WRMSDs in the case of nurses, and to what degree does the frustration mediate the relationship between burnout, exertion, and WRMSDs? Operationally, forceful exertion can be determined as intensive physical or mental work. as a chronic factor, job burnout measured by the Borg Rating of Perceived Exertion (Borg 1998). workplace stress measured with the help of the Maslach Burnout Inventory (Maslach, Jackson et al. 1997), frustration as a resultant emotional state in thwarted goals assessed by the Basic Psychological Need. Physical injury WRMSDs and Satisfaction and Frustration Scale (Janić, Lazić et al. 2025). Nordic questionnaire of workplace strain based on the Greek version of the Nordic questionnaire measured. musculoskeletal symptoms (Dimitriou, Alegakis et al. 2023). as a combination of these definitions gives. a systematic system of study of the intricate interaction of the physical and psychological factors. becoming a contributive factor to WRMSDs in nurses.

LITERATURE REVIEW

The Systems Model created by Betty Neuman was first published in 1972 and it is a holistic nursing theory that considers the whole system. open systems people are constantly in contact with both internal and external stressors, combining physiological, psychological, sociocultural, developmental and spiritual variables to describe how the defenses may be violated by stressors and become unstable, prevention measures of which are at primary, secondary, and tertiary levels (Idowu, Alabi et al. 2024). In nursing contexts, musculoskeletal disorders (MSDs) have a close association with physical requirements which include lifting. complicated by repositioning the patients, long periods standing up, and repetitive movements. psychosocial pressures such as burnout and frustration which increase risks and complicate recovery, building the loops of biomechanical overload and emotional burden (Ali & Senturk, 2019; Ihegihu, Didi et al. 2022).

The deductive approach by Neuman helps in the middle range theories (MRTs) which guide nursing. diagnoses and interventions, providing holistic measures to recover stability and professional wellbeing (Almino, Pereira da Silva et al. 2024). Job frustration comes about through poor practices. weaken the dignity of workers, where evidence-based strategies have to be employed to reclaim integrity (Marks). Although burnout is caused by stress and poor conditions which are chronic, it is aggravated (2022). emotional exhaustion and declining resilience, which aggravates MSDs further (Patel, Chesmore et al. 2022). Strong associations between ergonomic risk factors and MSDs are upheld in systematic reviews, where biomechanical and psychosocial have 30 percent each, and then physical and organizational job aspects, which emphasize the importance of posture training, exercises, etc. communication at the workplace (Anwar, Khurshid et al. 2023). Comparative structures indicate. The localized ergonomic risk theories, which deal with industry specific hazards, and MRTs based on. The models by Neuman give flexibility of approach to occupational stress globally, and it lays stress on the fact that this approach is global. value of using both local and international strategies (Almino, Pereira da Silva et al. 2024). Nurses deal with complex problems of heavy workload, fatigue, and disappointment. monotonous work and discomfort with the muscles and pains of the back, neck, and shoulders, and emotional fatigue will reduce compliance with ergonomic measures, weakening the quality of health and care (Du, Zhang et al. 2021). Violent exercise, as heavy. ameliorating or monotonous work, lowers productivity and rest, causing stress which expresses itself as frustration which correlates physical effort with psychological strain and which perpetuates the injury and reinforcing cycle. emotional burnout (Dugan, Laguerre et al. 2022). In general, the Systems Model offered by Neuman gives a. detailed framework to appreciate and treat the multifactorial essence of MSDs in among. Combining ergonomic and psychological interventions to facilitate resilience and nurses. occupational health (Coxen, van der Vaart et al. 2023).

H1: Forceful exertion is positively associated with frustration.

Work frustration due to high work is positively related to job burnout among the ICU nurses. job demands and unmet needs. Such causes as excessive working hours, emotional stress, and disrespect. help cause motivational exhaustion. This exasperation adds to

emotional exhaustion, which results in increased risk of burnout (Yanbei, Dongdong et al. 2023). Job burnout has a positive relationship with. exasperation especially with clinical nurses who work despite their sickness or exhaustion. The continued physical and emotional stress in these circumstances usually leads to the unfulfilled psychological needs. emotional exhaustion is caused by needs. Strong action, either bodily or mental, makes matters worse. this is by reducing energy reserves, as well as recovery opportunities. As frustration builds, it also worsens symptoms of burnout, which subsequently strengthen turnover intentions and weaken. professional involvement (He, Zhang et al. 2025).

H2: Frustration is positively related to Job Burnout.

Fear avoidance behaviors are worsened and the person ends up with reduced movements due to frustration. musculoskeletal symptoms. This is enhanced by the forceful exertion against unfulfilled psychological needs. frustration, the increasing physical and emotional stress. The more the burnout, the more the frustration. feeding loop which compromises recovery and engagement at work (Rouse, Ingram et al. 2024). Physical strain is usually enhanced by job burnout, and frustration is a major contributor between job burnout and. stress on musculoskeletal diseases. The level of constant emotional fatigue and dissatisfaction rises. stiffness in muscles, bad posture, and impaired recovery, which increases the chances of injury. Thus, frustration burnout is a major factor in the muscle related issues in the onset. workplace (Stapinski, Bjørkelo et al. 2023).

H3: There is a positive relationship between musculoskeletal Disorder and frustration.

Physical strain is caused by forceful activities like lifting or repositioning of patients, and This pathway of musculoskeletal disorders can be mediated by frustration. In situations where the nurses are overwhelmed. or not able to control their tasking activities which are demanding, frustration will increase the effects of exertion on the body. This gives us emotional stress that aggravates muscle tension and recovery, and makes musculoskeletal injury more severe. nursing roles cause physical because of the strenuous work (Walker, Katon et al. 1997). strain that is aggravated by psychosocial stressors such as emotional exhaustion and unmet needs. Frustration is a psychological balancing factor, connecting the physical activity with musculoskeletal disorders and increasing physical distress. This is also a pathway to job burnout, due to being sustained. frustration kills the resilience and leads to greater emotional exhaustion. Therefore, frustration is an essential. variable relating exertion, burnout, and musculoskeletal health outcomes in nurses (Sutarto, Wijayanto et al. 2022).

H4: Forceful Exertion had a mediating effect on Musculoskeletal through Frustration Disorders in nurses.

The frustration caused by the burnout induced exhaustion and unmet psychological needs exacerbates. physical and emotional stress among nurses. It interferes between forceful exertion and musculoskeletal disorders, the association of physical efforts with psychosomatic distress. This same frustration also serves as the mediator between job burnout and musculoskeletal outcomes, which indicates its key position. Turning stress into physical health dangers when at work (He, Zhang et al. 2025). Job burnout in nurses tends to result in frustration, which mediates the route to musculoskeletal diseases through. increasing physical stress and decreasing coping. Extreme demands and emotional burnout. enhance vulnerability, and frustration is one of the important factors that deteriorate the injury outcome. Consistently, intense effort like lifting patients and operating equipment is positively related to. musculoskeletal illnesses, which points to the twofold effect of psychological stress and physical. stress on the health of nurses (Du, Zhang et al. 2021).

H5: Frustration mediated the relationship between Job Burnout and Musculoskeletal Disorders in nurses.

The musculoskeletal disorders (MSDs) affecting the back, neck, and other areas are high among the nurses. shoulders because of aggressive activities such as moving patients and using devices. This physical strain, in conjunction with work burnout and frustration, elevates the risk of injuries, which confirms the forceful. MSDs are positively correlated with exertion in nursing (Valim, de Sousa et al. 2024). Forceful exertion, such as lifting and repositioning of patients, imposing strong burden on the muscles and joints of nurses, it is difficult. Increased the probability of musculoskeletal disorders (MSDs). Concurrently, job burnout results because of emotional fatigue and high workload only adds to physical weakness, enhancing the prevalence of MSDs. Combined, these aspects indicate that both physical workloads and psychological stress also play a major role in exposing nurses to the risk of musculoskeletal disorders. (Gumasing 2025).

H6: Musculoskeletal Disorders among Nurses are positively related to Forceful exertion.

Workload and emotional exhaustion are signs of job burnout among nurses that is of high significance. enhances the musculoskeletal disorders risk. Physical is aggravated by continuous stress and fatigue. Job

Burnout strain which causes pain in the neck, shoulders and back. This points to the fact that burnout is positive relationship. linked to the occurrence and the magnitude of the WMSDs among those in the nursing fraternity (Almhdawi, Alrabbaie et al. 2021). Nurse burnout, which is characterized by massive stress and fatigue, increases the risk of musculoskeletal disorders. Permanent physical and emotional stress. causes more tension in the neck, shoulders, and wrists, and thus injuries become more common. This shows that job burnout has a positive significant association with WMSDs among nurses (Zare, Choobineh). et al. 2021).
H7: job burnout is positively related to Musculoskeletal Disorders among Nurses.

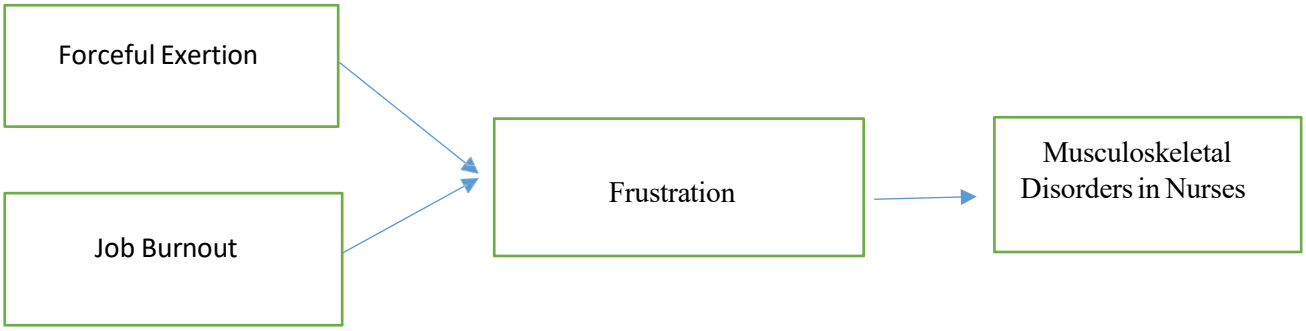

Figure 1: Theoretical Framework

METHODOLOGY

The paradigm of this research is positivist and focuses on objectivity, measurable evidence, and so on. hypothesis testing to test the association between forceful exertion, frustration, job burnout, and among nurses musculoskeletal disorders (Pothuganti, P Ramachandra et al. 2025). A The deductive approach is used, which relies on occupational health theories to test hypotheses. by means of empirical information (Barroga, Matanguihan et al. 2023). The survey plan involves structured. self-report questionnaires to gather measurable data of nurses in tertiary care hospitals in. Lahore, making certain efficiency and consistency (Ahmad, Muhammad Zeeshan et al. 2025). A quantitative choice of a cross-sectional type will give a picture of WMSDs and related. stressors, trading between rigor and feasibility (Zinabu, Getie et al. 2024). The population includes nurses of Mayo, Sir Ganga Ram, Services, and Jinnah Hospitals, were sampled on workload. diversity and representativeness (Aslam, Mukhtar et al. 2024). A sample size of 348, determined through G Power analysis, 360 responses were extended to provide a statistically sound representation. reliability (Sterpin, Rivas et al. 2021). The study was based on a non-probability convenience. Musculoskeletal Fatigue in Nurses Exasperation. Forceful Exertion method of sampling (Stratton 2023). The unit sampled is the individual nurse, and the units are the nurses. experiences of participant of WMSDs, frustrations, forceful movements, and work burnout assessed. by use of standardized self-report questionnaires as well as occupational health measures (Usman, Shahid et al. 2023). 98).

Measures and Instrument

A five-point Likert scale (5 Strongly Agree, 1 Strongly Disagree) was used in this study provide regularity and get the strength of perceptions in a definite, quantifiable manner (Jebb, Ng et al. 2021). Such demographic information was gender, age and years of experience, height and weight. There were four standardized instruments: Forceful Exertion (9 items) provided in the Rating of Perceived. Exertion (Borg 1998). The Maslach Burnout Inventory has 7 items of Job Burnout (Maslach, Jackson et al. 1997). Frustration (14 items) of the Basic Psychological Need Satisfaction and Work-Related Musculoskeletal Disorders(6). and Frustration Scale (Janic, Lazic et al. 2025) data of the Greek variant of the Nordic Musculoskeletal Questionnaire (Dimitriou, Alegakis et al. 2023)

Data Collection Method

The survey employed in this research was via Google in the form of self-administered questionnaires, which were structured. Forms, which were handed out to the nurses in a sample number of hospitals within Lahore to provide data on WMSDs that were measurable. and their associations with frustration, the application of force, and job burnout (Leon, Lapkin et al. 2022). Standardized tools were used to provide consistency and statistical analysis of occupational. Young people (Izah, Sylva et al. 2023) and the method offered valid, similar information in hospitals under practicable and ethical circumstance (Teresi, Yu et al. 2022).

RESULTS

Table 1: ***Demographics Analysis***

Demographic Variables	Categories	Frequency	Percentage
Gender	Male	44	12.2
	Female	314	87.2
Age	18–25	37	10.3
	25–35	180	50.0
	35–45	113	31.4
	45 or above	29	8.1
Years of Experience	<1 year	23	6.4
	1–5 years	73	20.3
	6–10 years	193	53.6
	>10 years	71	19.7
Height (cm)	160–170	141	39.2
	170–180	83	23.1
	180–190	101	28.1
	>190	33	9.2
Weight (kg)	45–55	37	10.3
	55–65	85	23.6
	65–75	190	52.8
	>75	48	13.3

The sample is composed of mostly females (87.2%), aged 25 to 35 (50%), and the majority of the sample had 6 to 10 years. of experience (53.6%). Mean physical dimensions are central around 160 to 170 cm in height. (39.2%) and 65 to 75 kg in weight (52.8%).

Table 2: ***Cronbach's alpha of all Variables***

Variables	No. of Items	Cronbach's alpha
Forceful Exertion	09	0.381
Job Burnout	07	0.816
Frustration	14	0.774
Musculoskeletal disorders in nurses	06	0.684

The reliability test indicates that there is inconsistency in terms of internal consistency between the study variables. Forceful exertion was of low Cronbachs alpha (0.381), which shows a low level of reliability probably because of item heterogeneity or vague expression. Job burnout on the contrary showed high reliability. The frustration (0.816), musculoskeletal disorders (0.774) were good in consistency. moderate reliability (0.684). Generally, burnout and frustration scales are strong, musculoskeletal. moderately consistent disorders, whereas the forceful exertion scale needs revision to be more. accuracy.

Table 3: ***Descriptive Statistics of all Variables***

Variables	Mean	S . D	Skewness	Kurtosis
Forceful Exertion	2.8083	.40568	.179	-.265
Job Burnout	3.1754	.77755	.528	.688
Frustration	3.2828	.49051	.483	.363
Musculoskeletal disorders in nurses	3.2094	.61696	-.530	-.179

The descriptive analysis shows that the mean of the forceful exertion was moderate (2.81) with. near normal, whereas job burnout (3.18) and frustration (3.28) were positively correlated with it, in a slight degree. distorted, reflective, concentrated responses around the mean. Musculoskeletal disorders (3.21) possessed negative skew which indicates more response with less spary dispersion. Overall, The most frequent ones were frustration and musculoskeletal disorders, but burnout showed the least. greater variability.

Table 4: *Correlation of all Variables*

		FE	JB	Fr	MSD
FE	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	360			
JB	Pearson Correlation	.240**	1		
	Sig. (2-tailed)	.000			
	N	360	360		
Fr	Pearson Correlation	.170**	.527**	1	
	Sig. (2-tailed)	.001	.000		
	N	360	360	360	
MSD	Pearson Correlation	-.035	.422**	.525**	1
	Sig. (2-tailed)	.505	.000	.000	
	N	360	360	360	360

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation table displays the correlation between four variables viz. FE, JB, Fr, and MSD, conditional. on a sample of 360 observations. FE is positively related to JB (0.240) and Fr (0.127). statistically significant at the 0.01 level, but it does not indicate any significant relationship (0.170). with MSD (0.035, not significant). JB is positively correlated with Fr (0.527) and averagely. associated with MSD (0.422), and both significant. Likewise, the correlation between Fr and positive is high. with MSD (0.525), also significant. In general, these are all interconnected with JB, Fr, and MSD, whereas FE is close to it. is independent and displaying poor relationships with JB and Fr and no substantial relationship with MSD. This implies that FE has a certain level of autonomy, but JB, Fr, and MSD are congregated. group of highly related variables.

Table 5: *Model Summary*

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.445[a]	.198	.193	.55417	.198	43.975	2	357	.000
2	.575[b]	.331	.325	.50686	.133	70.766	1	356	.000

a. Predictors: (Constant), JB, FE
b. Predictors: (Constant), JB, FE, Fr

Table 6: ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27.010	2	13.505	43.975	.000[b]
	Residual	109.637	357	.307		
	Total	136.648	359			
2	Regression	45.190	3	15.063	58.635	.000[c]
	Residual	91.457	356	.257		
	Total	136.648	359			

a. Dependent Variable: MSD
b. Predictors: (Constant), JB, FE
c. Predictors: (Constant), JB, FE, Fr

The regression outputs indicate that the first model where job burnout (JB) and forceful exertion (FE) are interesting is the regression model. as predictors, accounted for 19.8 percent of the variation in musculoskeletal disorders (MSD) (R 2 =as predictors, expounded 19.8 percent of the variation in musculoskeletal disorders (MSD) (R 2 =as predictors, explained 19.8 percent of the variation in

musculoskeletal disorders (MSD) (R 2 =). .198, F = 43.975, p < .001). In the second model, the addition of frustration (Fr) resulted in the following outcome. explanatory power was also found to be 33.1% higher (R 2 =.331, F = 58.635, p <.001), which shows a stronger. model fit. Both models were statistically significant though the second model gave a better result. MSD outcomes provided, where frustration is an additional key predictor.

Table 7: ***Multiple Linear Regression with Collinearity***

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	2.678	.217		12.331	.000	2.251	3.105
	FE	-.220	.074	-.145	-2.968	.003	-.366	-.074
	JB	.362	.039	.457	9.349	.000	.286	.438
2	(Constant)	1.547	.240		6.450	.000	1.075	2.019
	FE	-.251	.068	-.165	-3.686	.000	-.384	-.117
	JB	.186	.041	.235	4.531	.000	.106	.267
	Fr	.541	.064	.430	8.412	.000	.414	.667

a. Dependent Variable: MSD

The regression result indicates that the first model that incorporated JB and FE as predictors, The. regression output indicates that job burnout (JB) had a very positive impact on in Model 1. musculoskeletal disorders (0.457, p <.001) whereas forceful exertion (FE) significantly influenced it. negative effect (β = .145, p = .003). When frustration (Fr) was introduced in Model 2, it was found as the strongest predictor (β = .430, p < .001). Burnout was quite considerable but less. effect (=.235, p =.001) and exertion remained negative (= .165, p =.001). Overall, frustration was the most significant variable, burnout was the next factor, exertion presented a similar negative effect. relationship with MSD.

DISCUSSION

It is evident in this research that psychosocial factors, especially frustration and job burnout are. central predictors of musculoskeletal disorders (MSDs) among nurses, and physical exertion. explains inconsistent and even conflicting effects. Burnout and frustration exhibited. good reliability and similar relationships with MSDs, highlighting the excessive psychosocial. load in nursing practice, the forceful exertion scale demonstrated poor internal. M consistency and even negative correlation with MSDs, indicating issues with measurement. (Luna 2024). H1 was partially supported, with exertion having a moderate correlation with frustration (r =H1 was supported weakly, and exertion had a moderate correlation with frustration (r =). 170), moderate activity can thus mitigate burnout (Dahati and Dahati) however, previous evidence suggests otherwise. 2025). There was a strong support of H2, indicating that burnout is positively related to frustration (r =). 527), which is mediated by organizational support (Yanbei, Dongdong et al. 2023). H3 was highly reinforced, and frustration was the best predictor of MSDs (r =.525; B =.541, =). (430, p <.001), acting as a mediator and a direct driver (Afsharian, Dollard et al. 2023). H4 was partly approved and it was found that exertion had little direct impact and was loosely correlated with frustration, which closely forecasted MSDs, and mediation models were extended (Das and Singh 2025). H5 established that burnout enhanced the frustration, which mediated the route to MSDs, connecting. emotional burns on physical health risks (Kuo, Lan et al. 2025). H6 produced conflicting evidence and with regression indicating that exertion has a negative effect but cohort studies indicating. concerns raised by positive correlations that are clear, one to one increases in the risk of neck and shoulder MSDs. of measurement reliability (Zimbalist, Rempel et al. 2022). H7 was supported, with burnout significantly correlated with MSDs (r =.422; B =.186, 8 =.235, p value =.001), which asserted itself. psychosocial strain increases the physical risks (Yang, Huang et al. 2022). Overall, the evidence questions the conventional biomedical approaches in demonstrating that frustration and burnout are painful psychosocial mechanisms producing MSDs, and exertion has an indirect or. is interacting with psychosocial strain, and it is worthwhile to focus on sophisticated measuring instruments. interventions aimed at decreasing frustration and burnout in an organization.

CONCLUSION

This research is a solid finding that musculoskeletal disorders (MSDs) in nurses are. developed in the

context of the interaction between psychosocial stressors and physical workload. Although regression studies found that there was a weak or even negative correlation between forceful exertion and MSDs, positive associations were always found in prospective cohort studies indicating that statistical. there is a possibility that models do not adequately capture the effect of exertion because of measurement errors. Nurses lived high physical demands are pointed out as a long-lasting risk factor by experiences, which correlates with. Repetitive and forceful movements are studied biomechanically, but their difficult points of view are serious. consider physical workload as the only predictor of MSDs (Khoshakhlagh, Sulaie et al. 2024). In contrast, frustration and burnout were always strong predictors. Burnout was closely related to frustration, and frustration itself had the highest positive correlation with MSDs, acting as an immediate agent, as well as an intermediary between exertion, burnout, and musculoskeletal. outcomes. This is an expansion of psychosocial models that prove frustration is not just an. consequence of burnout yet a pathway through which emotional exhaustion is converted to through the critical pathway. physical health risks. These effects were buffered by organizational support which mitigated them. confinement of frustration and emotional stress, and the importance of supportive work is emphasized. environments. Taken together, these results support the statement that psychosocial pressures increase physical. stress and go a long way in musculoskeletal susceptibility. The regression model explained a third of the variation in MSDs, which is important and significant contribution of these. predictors to nurses' health. Finally, MSDs do not merely occur as a result of physical. workload, but highly intertwined with the psychosocial demands, which need holistic interventions. that combine the ideas of ergonomic redesign, workload, stress reduction, and organizational. help to protect the colleagues of nurses (Yang, Huang et al. 2022).

Despite these insights, a number of constraints need to be mentioned. The research was mainly centered on frustration, burnout, and effort, without digging deeper into more systemic or organizational variables that can also. contribute to MSDs. The findings are confined to nursing groups found in particular care environments. are not necessarily applicable to other classes of occupations. Besides, the cross-sectional design restricts. causal inference, the question of whether frustration is a precursor of MSDs remains open or whether MSDs is a precursor of frustration. self's are a source of frustration and burnout. This is because of the lack of longitudinal measures. inferences concerning the direction and the stability of mediation effects. Additionally, biomarkers are physiological, recovery patterns, and disparities across the various healthcare. The contexts were not studied and it might have been more insightful on psycho physical. mechanisms. More effective tools to measure the same should be created as a result in future studies. apply pressure in complicated medical settings, perform longitudinal and multi-site research to. explain the causal mechanisms, critically assess interventions integrating ergonomic redesign with. psychosocial support interventions like stress management, resilience training and better. staffing models. Combining biological indicators like muscle contraction and stress. self-reported biomarkers would also increase the knowledge about MSD mechanisms. By overcoming such restrictions, evidence-based interventions will be improved to minimize both physical. and psychosocial risks, enhancing musculoskeletal health of nurses, workforce sustainability, and patient safety.

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