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Impact of a Peer Support Group Intervention on the Quality of Work Life of Medical Residents: A Quasi-experimental Study

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Abstract

Background and objective

Medical residency involves substantial academic, clinical, and occupational demands that may affect physicians' well-being and quality of work life (QoWL). Peer support groups (PSGs) may provide structured opportunities for social support and collective reflection within this demanding occupational context. This study aimed to compare global QoWL between resident physicians who participated in a PSG intervention and those in a control group.

Materials and methods

A non-randomized, two-group quasi-experimental study included 117 resident physicians from a private tertiary-care hospital. Participants were sequentially allocated to an intervention group (n = 61) or to a control group (n = 56). The intervention consisted of six 60-minute weekly PSG sessions conducted in closed groups of 6-10 residents. The primary outcome was the proportion of participants with satisfactory global QoWL, assessed using the short version of the CVT-GOHISALO instrument. Its seven dimensions were evaluated as secondary measures, and mindful attention was assessed as a process-related characteristic using the Mindful Attention Awareness Scale (MAAS). Between-group comparisons were performed using the Pearson χ^2 test. Exploratory three-variable contingency tables based on Feinstein's simultaneous-effects framework were used to examine the primary outcome in relation to individual, clinical, occupational, and process-related characteristics.

Results

Satisfactory global QoWL was observed in 75.4% of the intervention group and 62.5% of the control group, corresponding to an absolute between-group difference of 12.9 percentage points. This difference was not statistically significant (p = 0.131). Among the secondary QoWL measures, the largest absolute between-group difference was observed for safety at work (65.6% vs. 50.0%; p = 0.088), although none of the dimensional comparisons reached statistical significance. Exploratory simultaneous-effects analyses showed heterogeneous intervention-outcome patterns across individual and occupational characteristics. Differences were descriptively larger among women and residents in critical-care services, whereas the pattern was attenuated or absent in some other strata. Workplace violence was associated with lower satisfactory QoWL in both study groups.

Conclusions

Resident physicians who participated in the PSG intervention showed a numerically higher proportion of satisfactory global QoWL than those in the control group, although the difference did not reach statistical significance. Exploratory analyses indicated that this pattern varied across individual and occupational contexts. PSGs may represent a complementary component of occupational-health strategies for medical residents, but further controlled studies with larger samples are needed to determine whether the observed patterns represent reproducible intervention effects.

Categories: Occupational Health, Medical Education, Public Health
Keywords: medical residents, occupational health, peer support groups, psychosocial intervention, quality of work life, workplace violence

Introduction

Medical residency constitutes one of the most demanding stages in the professional training of physicians, during which doctors face long workdays, high academic workloads, healthcare pressure, and constant

exposure to stressful situations, which directly impact their physical, emotional, and social well-being. Various studies have indicated that well-being and satisfaction among resident physicians tend to be low, while evidence from Latin American healthcare settings has also documented unfavorable levels of quality of work life (QoWL) and occupational well-being [1-4]. This situation not only affects the mental health and satisfaction of residents but may also affect the quality of care provided to patients and the organizational climate of hospitals [1,2].

In this context, peer support groups (PSGs) have emerged as a complementary strategy to strengthen the well-being of healthcare professionals. These groups are characterized by the voluntary participation of individuals who share similar experiences and who, through dialogue, active listening, and emotional support, create a space for mutual support and resilience. Unlike formal interventions, PSGs are based on horizontality and the collective construction of solutions, which may facilitate peer identification and promote a sense of belonging [5-7].

Previous research has explored different psychosocial strategies to address occupational stress and impaired well-being among healthcare professionals, including mindfulness-based interventions, stress-management programs, and peer-support approaches [8-11]. Although some of these interventions have reported improvements in outcomes related to stress, burnout, or professional well-being, findings have not been uniform, and several studies have been limited by small samples, single-group designs, or short follow-up periods [8-11]. Consequently, uncertainty remains regarding the extent to which these interventions can influence broader aspects of healthcare professionals' occupational experience.

Peer support may be particularly relevant during medical residency because residents share similar clinical responsibilities, hierarchical pressures, academic demands, and occupational stressors. Previous studies involving healthcare professionals and medical residents suggest that peer-support settings may provide opportunities to discuss shared experiences, facilitate emotional validation, reduce perceived isolation, and strengthen a sense of belonging [5,12]. However, much of the available literature has focused on stress, burnout, coping, or emotional distress rather than specifically examining QoWL.

From a functional perspective, organizational behavior management and contextual behavioral science provide complementary frameworks for understanding how responses to occupational demands are shaped by environmental and contextual conditions. Bond et al. proposed psychological flexibility as a process through which individuals may respond more adaptively to changing workplace demands, with potential implications for organizational behavior and health [13]. More recently, Sedaghati et al. reported findings from a digital peer-support intervention for employee well-being, providing contemporary evidence regarding peer-to-peer interaction within occupational settings [14]. These frameworks provide a complementary theoretical and empirical rationale for examining peer-based interventions in demanding occupational environments.

This functional and contextual perspective is particularly relevant to QoWL, which extends beyond individual psychological well-being to encompass how workers perceive and experience their relationship with the occupational environment. QoWL therefore reflects the interplay between personal well-being, workplace relationships, organizational support, and working conditions. Accordingly, interventions focused exclusively on individual coping may be insufficient to address occupational experiences that are also shaped by organizational conditions, workplace exposures, and interpersonal relationships. Within this broader context, PSGs may provide a complementary approach by creating structured spaces for social support and collective reflection.

Although these characteristics support the potential relevance of peer-based interventions to QoWL, their role in medical residency remains insufficiently understood. Evidence specifically examining the relationship between structured peer-support interventions and QoWL among medical residents is limited, particularly regarding the individual, clinical, and workplace characteristics that may shape the observed response. This knowledge gap is especially relevant in healthcare settings, where occupational exposures, organizational demands, and workplace violence may coexist with the psychosocial pressures inherent in residency training. To address this gap, the primary objective of this study was to compare global QoWL between resident physicians who participated in a PSG intervention and those in the control group.

Materials And Methods

Study design and participants

This two-group quasi-experimental study was approved by the corresponding Ethics and Research Committees (approval number CMABC-25-41). The study was conducted at a private tertiary-care hospital included in a previously published cross-sectional assessment of QoWL and occupational factors among medical residents from public and private hospitals in Mexico City [15]. The private hospital was selected for the intervention phase based on findings from that initial assessment, which identified comparatively greater vulnerability in QoWL, particularly with respect to institutional support and workplace integration [15].

Eligible participants were resident physicians from the selected hospital who had participated in the previous assessment and who exhibited lower levels of QoWL. Participants were of either sex, had an active appointment at the institution, and provided written informed consent. Residents undertaking advanced subspecialty training, those with a previously diagnosed major psychiatric disorder requiring acute treatment, those completing social service or external rotations during the intervention period, and those on prolonged medical, occupational, maternity, or paternity leave were excluded.

Recruitment and group allocation

A non-probabilistic consecutive sampling strategy was used, whereby eligible residents were enrolled sequentially into the intervention group first and subsequently into the control group until the required sample size was reached. This approach was chosen to facilitate participation in the PSG while minimizing interference with residents' academic and clinical responsibilities, resulting in 61 participants in the intervention group and 56 participants in the control group.

Sample size calculation

The sample size for the intervention phase was calculated using a difference-of-proportions approach. Based on findings from the initial assessment, the expected proportion of residents with satisfactory global QoWL was 70% in the control group, while a proportion of 90% was anticipated in the intervention group, corresponding to a minimum clinically relevant absolute difference of 20 percentage points. Using a one-sided α of 0.05 and 80% power, the estimated sample size was 48 participants per group. Allowing for a potential 10% loss to follow-up increased the target sample size to 54 participants per group, for a total of 108 participants. The final sample comprised 117 participants, with 61 in the intervention group and 56 in the control group.

Data collection and measures

A self-administered digital survey, requiring approximately 20 minutes to complete, was administered to the 117 resident physicians. The survey collected sociodemographic characteristics (age and sex), clinical characteristics (physical comorbidities and history of mental health disorders), and academic and occupational characteristics, including seniority, medical specialty, disability leave, and perceived exposure to specific occupational risk factors. For descriptive analyses, individual occupational exposures were examined separately. For the exploratory simultaneous-effects analyses, these exposures were subsequently grouped into physical, chemical, biological, and ergonomic domains according to the classification established in the previous assessment [15]; workplace violence was examined separately as a psychosocial occupational exposure. Occupational exposures were based on participants' self-reported perceptions rather than environmental measurements, consistent with the emphasis on perceived workplace demands described in Karasek's demand-control framework [16].

The primary outcome was the proportion of participants with satisfactory global QoWL, assessed using the short version of the CVT-GOHISALO instrument [17,18]. The seven dimensions of the instrument were also examined as secondary measures of QoWL. As the PSG involved structured reflection on recent occupational experiences and demands, the 15-item Mindful Attention Awareness Scale (MAAS), validated in the Mexican population [19], was used as a process-related measure to characterize participants' level of mindful awareness in relation to these experiences at the end of the intervention, rather than as a measure of the intervention effect on QoWL.

Exploratory analyses were performed to examine whether the pattern of satisfactory QoWL across the intervention and control groups varied according to individual, clinical, and occupational characteristics. Mindful attention level was also included as a process-related characteristic in these exploratory analyses.

Intervention

The PSG intervention was designed to provide a structured space for collective reflection on occupational and extra-occupational experiences relevant to residents' QoWL. Closed groups of 6-10 resident physicians from different medical specialties were formed to reduce inhibition among participants from the same specialty. Sessions were facilitated by a mental health professional with a master's degree in psychoanalysis and accompanied by an occupational health professional who served as a participant observer.

Each PSG completed six 60-minute sessions, held on Fridays from 7:00 AM to 8:00 AM in a neutral institutional space outside the clinical areas to preserve privacy and minimize interruptions from clinical activities. The overall recruitment period lasted six months, during which different PSGs were formed following the same intervention structure.

Each session followed three structured phases. The introductory phase (10 minutes) established confidentiality and included an emotional check-in. The reflection phase (40 minutes) focused on recent critical incidents and occupational or extra-occupational experiences, including difficulties within the healthcare team, fatigue, and workplace factors. Participants reflected collectively on shared experiences,

with the aim of validating their perceptions, strengthening group identity, reducing feelings of isolation, and promoting group cohesion. The session concluded with a closing phase focused on integrating the reflections discussed during the group.

Statistical analysis

All statistical analyses were performed using IBM SPSS Statistics for Windows, Version 27 (Released 2020; IBM Corp., Armonk, New York). All 117 enrolled participants completed the study and had complete data for the variables included in the analyses; therefore, no missing-data imputation was required.

Initially, descriptive analyses were conducted to characterize the demographic, clinical, and occupational characteristics of the resident physicians. The distributions of age and seniority were evaluated using skewness and kurtosis and assessed with the Kolmogorov-Smirnov test. Because both variables showed non-normal distributions, they were summarized using the median and the 25th and 75th percentiles. Categorical variables were summarized as frequencies and percentages. Between-group comparisons of participant characteristics were performed using the Mann-Whitney U test for continuous variables and the Pearson χ^2 test or Fisher's exact test, as appropriate, for categorical variables.

Primary and Secondary Analyses

The primary outcome was satisfactory global QoWL. The primary analysis compared the proportion of participants with satisfactory global QoWL between the intervention and control groups using the Pearson χ^2 test. The seven CVT-GOHISALO dimensions were evaluated as secondary QoWL measures and were compared between groups using the same approach. A p-value of <0.05 was considered statistically significant for the primary and secondary comparisons.

Exploratory Analysis of Simultaneous Effects: Persistent Distinctiveness, Collinear Ineffectiveness, and Interactive Alterations

Exploratory analyses examined the primary outcome in relation to the intervention and additional individual, clinical, occupational, and process-related characteristics. Three-variable contingency tables were generated following the framework for multivariable analysis described by Feinstein [20]. In each table, the intervention group and one additional individual, clinical, occupational, or process-related characteristic, were considered jointly with the frequency and proportion of satisfactory QoWL displayed within the resulting strata. This approach allowed the intervention-outcome pattern to be examined in the presence of a second characteristic without fitting a highly parameterized regression model, while taking into account events-per-variable considerations [21].

The simultaneous effects of each pair of variables were evaluated according to three criteria described within this framework [20]. Persistent distinctiveness was identified when the intervention-outcome pattern remained directionally distinct across strata of the accompanying characteristic. Collinear ineffectiveness was identified when the intervention-outcome gradient was attenuated or disappeared within a stratum when considered simultaneously with the accompanying characteristic. Interactive alterations were identified when the simultaneous presence of both variables modified the magnitude or direction of the pattern expected from their separate marginal distributions. Interactive alterations were further classified as exaggeration when the observed pattern was amplified relative to the marginal pattern and reversal when its direction was inverted.

Results

A total of 117 resident physicians completed the study and were included in the analyses, comprising 56 participants in the control group and 61 in the intervention group. The median age of the overall study population was 29 years (25th-75th percentile: 28-31 years).

Most demographic, clinical, and occupational characteristics were similarly distributed between groups. However, participants in the intervention group were younger than those in the control group (median, 29 (27-30) vs. 30 (28-31) years; p = 0.043) (Table *1*).

Characteristics	Total (n = 117)	Control group (n = 56)	Intervention group (n = 61)	p-value
Age, years	29 (28-31)	30 (28-31)	29 (27-30)	0.043[b]
Female sex	63 (53.8)	27 (48.2)	36 (59.0)	
History of mental health disorders	44 (37.6)	20 (35.7)	24 (39.3)	0.707[d]
Diagnosed physical comorbidities	17 (14.5)	5 (8.9)	12 (19.7)	0.120[d]
Paraclinical[a]	8 (6.8)	4 (7.1)	4 (6.6)	0.702[c]
Clinical[a]	38 (32.5)	17 (30.4)	21 (34.4)	
Surgical[a]	40 (34.2)	22 (39.3)	18 (29.5)	
Critical care[a]	31 (26.5)	13 (23.2)	18 (29.5)	
Job seniority at the hospital, years	2 (1-3)	2 (1-3)	2 (1-3)	0.456[b]

TABLE 1: Demographic, clinical, and occupational characteristics of resident physicians according to study group

Data are presented as n (%) unless otherwise indicated; age and job seniority are presented as median (25th-75th percentile). [a] Categories correspond to medical service branches. Between-group comparisons were performed using: [b] Mann-Whitney U test; [c] Pearson's χ^2 test; [d] Fisher's exact test. A p-value of <0.05 was considered statistically significant.

The intervention group also reported poor workspace distribution more frequently than the control group (54.1% vs. 33.9%; p = 0.028). No statistically significant between-group differences were identified for the remaining occupational exposures examined (Table *2*).

Occupational exposure	Total (n = 117)	Control group (n = 56)	Intervention group (n = 61)	p-value
Noise	65 (55.6)	31 (55.4)	34 (55.7)	0.967
Vibrations	31 (26.5)	14 (25.0)	17 (27.9)	0.725
Poor lighting	32 (27.4)	12 (21.4)	20 (32.8)	0.169
Extreme temperatures	55 (47.0)	26 (46.4)	29 (47.5)	0.904
Radiation	54 (46.2)	25 (44.6)	29 (47.5)	0.753
Dusts from medication preparation	17 (14.5)	5 (8.9)	12 (19.7)	1
Electrosurgical fumes	37 (31.6)	17 (30.4)	20 (32.8)	0.778
Anesthetic gases or vapors	22 (18.8)	10 (17.9)	12 (19.7)	0.802
Liquids such as solvents or acids	7 (6.0)	2 (3.6)	5 (8.2)	0.292
Biological agents (viruses, bacteria, or fungi)	77 (65.8)	35 (62.5)	42 (68.9)	0.469
Poor workspace distribution	52 (44.4)	19 (33.9)	33 (54.1)	0.028
Forced postures	56 (47.9)	26 (46.4)	30 (49.2)	0.766
Repetitive movements	55 (47.0)	26 (46.4)	29 (47.5)	0.904
Prolonged standing work	86 (73.5)	37 (66.1)	49 (80.3)	0.081
Prolonged sedentary work (sitting)	66 (56.4)	30 (53.6)	36 (59.0)	0.553
Prolonged crouching/squatting work	32 (27.4)	16 (28.6)	16 (26.2)	0.776
Workplace violence (harassment, bullying, or mistreatment)	61 (52.1)	28 (50.0)	33 (54.1)	0.658

TABLE 2: Perception of occupational exposure of resident physicians according to study group

Data are presented as n (%). Between-group comparisons were performed using the Pearson χ^2 test. A p-value of <0.05 was considered statistically significant.

Primary and secondary analyses

The primary outcome, satisfactory global QoWL, was observed in 46 of 61 participants (75.4%) in the intervention group and 35 of 56 participants (62.5%) in the control group, corresponding to an absolute between-group difference of 12.9 percentage points. This difference was not statistically significant (p = 0.131).

Among the secondary QoWL measures, the largest absolute between-group difference was observed for safety at work, with satisfactory levels reported by 65.6% of participants in the intervention group and 50.0% in the control group (p = 0.088). Satisfactory QoWL was also more frequent in the intervention group for integration into the workplace (77.0% vs. 67.9%; p = 0.265), job satisfaction (78.7% vs. 71.4%; p = 0.364), well-being achieved through work (91.8% vs. 89.3%; p = 0.641), and personal development of the worker (68.9% vs. 64.3%; p = 0.601). Institutional support for work was similar between groups (50.8% vs. 48.2%; p = 0.778), whereas satisfactory free-time management was numerically lower in the intervention group (11.5% vs. 17.9%; p = 0.328). None of the secondary QoWL comparisons reached statistical significance (Table *3*).

QoWL measure	Classification	Control group (n = 56), n (%)	Intervention group (n = 61), n (%)	p-value
Global QoWL	Satisfactory	35 (62.5)	46 (75.4)	0.131
-	Non-satisfactory	21 (37.5)	15 (24.6)	-
Institutional support for work	Satisfactory	27 (48.2)	31 (50.8)	0.778
-	Non-satisfactory	29 (51.8)	30 (49.2)	-
Safety at work	Satisfactory	28 (50.0)	40 (65.6)	0.088
-	Non-satisfactory	28 (50.0)	21 (34.4)	-
Integration into the workplace	Satisfactory	38 (67.9)	47 (77.0)	0.265
-	Non-satisfactory	18 (32.1)	14 (23.0)	-
Job satisfaction	Satisfactory	40 (71.4)	48 (78.7)	0.364
-	Non-satisfactory	16 (28.6)	13 (21.3)	-
Well-being achieved through work	Satisfactory	50 (89.3)	56 (91.8)	0.641
-	Non-satisfactory	6 (10.7)	5 (8.2)	-
Personal development of the worker	Satisfactory	36 (64.3)	42 (68.9)	0.601
-	Non-satisfactory	20 (35.7)	19 (31.1)	-
Free-time management	Satisfactory	10 (17.9)	7 (11.5)	0.328
-	Non-satisfactory	46 (82.1)	54 (88.5)	-

TABLE 3: Comparison of global and dimensional quality of work life (QoWL) between the control and intervention groups.

Data are presented as n (%). Between-group comparisons were performed using Pearson's χ^2 test. A p-value <0.05 was considered statistically significant.

QoWL: quality of work life.

Exploratory analysis of simultaneous effects

Individual and Clinical Variables

Exploratory simultaneous-effects analyses showed different patterns according to individual and clinical characteristics (Table *4*). Among residents aged ≤29 years, satisfactory QoWL was observed in 78.0% of the intervention group compared with 53.8% of the control group, whereas identical proportions were observed between groups among residents aged >29 years (70.0% in both groups), consistent with collinear ineffectiveness in the latter stratum.

Characteristic	Stratum	Control group, n/N (%)	Intervention group, n/N (%)	Total, n/N (%)
Age	≤29 years	14/26 (53.8)	32/41 (78.0)	46/67 (68.7)
-	>29 years	21/30 (70.0)	14/20 (70.0)	35/50 (70.0)
Sex	Male	20/29 (69.0)	19/25 (76.0)	39/54 (72.2)
-	Female	15/27 (55.6)	27/36 (75.0)	42/63 (66.7)
History of mental health disorders	Without history	21/36 (58.3)	29/37 (78.4)	50/73 (68.5)
-	With history	14/20 (70.0)	17/24 (70.8)	31/44 (70.5)
Diagnosed physical comorbidities	Without history	30/51 (58.8)	38/49 (77.6)	68/100 (68.0)
-	With history	5/5 (100.0)	8/12 (66.7)	13/17 (76.5)

TABLE 4: Exploratory simultaneous-effects analysis of individual and clinical characteristics in relation to satisfactory QoWL.

Data are presented as the number of participants with satisfactory QoWL/total participants within each stratum (%). Patterns across strata were interpreted according to the simultaneous-effects framework described in the Statistical Analysis section.

QoWL: quality of work life.

Across sex strata, satisfactory QoWL was higher in the intervention group among both men (76.0% vs. 69.0%) and women (75.0% vs. 55.6%), consistent with persistent distinctiveness. The larger between-group difference among women (19.4 percentage points) was classified as an exaggerated pattern.

Among residents without a history of mental health disorders, satisfactory QoWL was observed in 78.4% of the intervention group compared with 58.3% of the control group. Among residents with such a history, the corresponding proportions were 70.8% and 70.0%, respectively, consistent with collinear ineffectiveness.

Among residents without diagnosed physical comorbidities, satisfactory QoWL was higher in the intervention group than in the control group (77.6% vs. 58.8%). Conversely, among residents with physical comorbidities, satisfactory QoWL was lower in the intervention group (66.7% vs. 100.0%), consistent with an interactive alteration of reversal. This latter stratum included five participants in the control group and 12 in the intervention group and should therefore be interpreted cautiously.

Work Environment Variables and Risk Perception

Across medical service branches, satisfactory QoWL was higher in the intervention group in the clinical (81.0% vs. 70.6%), surgical (72.2% vs. 63.6%), and critical-care (77.8% vs. 53.8%) strata, consistent with persistent distinctiveness. In the paraclinical stratum, satisfactory QoWL was 50.0% in both groups, consistent with collinear ineffectiveness. This stratum included four participants per group (Table *5*).

Characteristic	Stratum	Control group, n/N (%)	Intervention group, n/N (%)	Total, n/N (%)
Medical service branch	Paraclinical	2/4 (50.0)	2/4 (50.0)	4/8 (50.0)
-	Clinical	12/17 (70.6)	17/21 (81.0)	29/38 (76.3)
-	Surgical	14/22 (63.6)	13/18 (72.2)	27/40 (67.5)
-	Critical care	7/13 (53.8)	14/18 (77.8)	21/31 (67.7)
Job seniority	≤2 years	22/35 (62.9)	26/33 (78.8)	48/68 (70.6)
-	>2 years	13/21 (61.9)	20/28 (71.4)	33/49 (67.3)
Physical exposure	No	14/26 (53.8)	32/41 (78.0)	46/67 (68.7)
-	Yes	21/30 (70.0)	14/20 (70.0)	35/50 (70.0)
Chemical exposure	No	25/36 (69.4)	22/32 (68.8)	47/68 (69.1)
-	Yes	10/20 (50.0)	24/29 (82.8)	34/49 (69.4)
Biological exposure	No	15/21 (71.4)	14/19 (73.7)	29/40 (72.5)
-	Yes	20/35 (57.1)	32/42 (76.2)	52/77 (67.5)
Ergonomic exposure	No	8/11 (72.7)	4/4 (100.0)	12/15 (80.0)
-	Yes	27/45 (60.0)	42/57 (73.7)	69/102 (67.6)
Workplace violence	No	23/28 (82.1)	26/28 (92.9)	49/56 (87.5)
-	Yes	12/28 (42.9)	20/33 (60.6)	32/61 (52.5)

TABLE 5: Exploratory simultaneous-effects analysis of occupational characteristics and perceived workplace exposures in relation to satisfactory QoWL.

Data are presented as the number of participants with satisfactory QoWL/total participants within each stratum (%). Patterns across strata were interpreted according to the simultaneous-effects framework described in the Statistical Analysis section.

QoWL: quality of work life.

Persistent distinctiveness was also observed across job seniority strata. Satisfactory QoWL was higher in the intervention group among residents with ⩽2 years of seniority (78.8% vs. 62.9%) and among those with >2 years (71.4% vs. 61.9%).

Patterns differed according to perceived occupational exposures. For physical exposure, satisfactory QoWL was higher in the intervention group among residents reporting no exposure (78.0% vs. 53.8%) but was identical between groups among those reporting exposure (70.0% in both groups), consistent with collinear ineffectiveness in the latter stratum. For chemical exposure, satisfactory QoWL was similar between groups among residents reporting no exposure (68.8% vs. 69.4%) but higher in the intervention group among those reporting exposure (82.8% vs. 50.0%). For biological exposure, the between-group difference was small among residents reporting no exposure (73.7% vs. 71.4%), whereas satisfactory QoWL was higher in the intervention group among those reporting exposure (76.2% vs. 57.1%).

For ergonomic exposure, satisfactory QoWL was higher in the intervention group among residents reporting exposure (73.7% vs. 60.0%) and among those reporting no exposure (100.0% vs. 72.7%), consistent with persistent distinctiveness. The latter stratum, however, included only four participants in the intervention group.

Workplace violence was associated with lower satisfactory QoWL in both groups. Among residents reporting no workplace violence, satisfactory QoWL was observed in 92.9% of the intervention group and 82.1% of the control group; among those reporting workplace violence, the corresponding proportions were 60.6% and 42.9%, respectively. The intervention-control pattern therefore remained directionally distinct across both workplace-violence strata (Table *4*).

Mindful Attention

Mindful attention level was included as a process-related characteristic in the exploratory simultaneous-effects analysis (Table 6). Within each mindful-attention stratum, satisfactory QoWL was more frequent in the intervention group than in the control group: 50.0% vs. 16.7% at the low level, 65.4% vs. 58.3% at the medium level, and 92.6% vs. 76.9% at the high level. This pattern was consistent with persistent distinctiveness across mindful-attention strata.

Mindful attention level	Control group, n/N (%)	Intervention group, n/N (%)	Total, n/N (%)
Low	1/6 (16.7)	4/8 (50.0)	5/14 (35.7)
Medium	14/24 (58.3)	17/26 (65.4)	31/50 (62.0)
High	20/26 (76.9)	25/27 (92.6)	45/53 (84.9)
Total	35/56 (62.5)	46/61 (75.4)	81/117 (69.2)

TABLE 6: Exploratory simultaneous-effects analysis of mindful attention level in relation to satisfactory QoWL.

Data are presented as the number of participants with satisfactory QoWL/total participants within each stratum (%). Mindful attention was evaluated as a process-related characteristic rather than as an intervention outcome.

QoWL: quality of work life.

Discussion

The present study evaluated the relationship between participation in a structured PSG intervention and QoWL among medical residents. The primary outcome showed a 12.9 percentage-point absolute difference in satisfactory global QoWL between the intervention and control groups (75.4% vs. 62.5%). However, this difference did not reach statistical significance ($p = 0.131$). Accordingly, the findings do not establish a statistically confirmed intervention effect. Nevertheless, the observed between-group difference, together with the patterns identified across QoWL dimensions and the exploratory simultaneous-effects analyses, provides information regarding the potential role of structured peer support within the occupational context of medical residency.

Among the secondary QoWL measures, safety at work showed the largest absolute between-group difference (65.6% vs. 50.0%), although this comparison was also not statistically significant ($p = 0.088$). Numerically higher proportions of satisfactory QoWL were also observed in the intervention group for integration into the workplace, job satisfaction, well-being achieved through work, and personal development, whereas institutional support was similar between groups and satisfactory free-time management was numerically lower in the intervention group. These findings suggest that the pattern observed with PSG participation was not uniform across all components of QoWL. This is relevant because QoWL encompasses interpersonal experiences as well as dimensions more directly dependent on organizational structure, occupational conditions, and institutional resources [15,16].

The direction of these findings is broadly consistent with previous literature suggesting that structured peer-based interventions may support selected dimensions of physicians' occupational well-being, although effects vary according to the intervention and outcome evaluated [3,6,12,22,23]. In a randomized clinical trial, Kiser et al. evaluated six coaching sessions delivered by professionally trained physician peers and reported improvements in burnout, interpersonal disengagement, professional fulfillment, and work engagement [22]. Among medical residents, Gifford et al. highlighted the importance of peer and informal support within broader systems of formalized well-being support [12]. More broadly, a recent meta-analysis including mindfulness, professional coaching, and structured peer-discussion interventions reported small improvements in dimensions of physician burnout while emphasizing methodological heterogeneity and uncertainty regarding the magnitude and generalizability of these effects [23].

The present study differs from much of this literature because its primary outcome was QoWL rather than burnout or general psychological well-being. Peer-based interventions may plausibly influence interpersonal support, shared reflection, professional engagement, and coping [3,6,22,23], whereas QoWL additionally incorporates occupational dimensions that may not be directly modified through peer interaction. This distinction may partly explain why the observed patterns differed across QoWL dimensions and reinforces the need to evaluate peer-support interventions within the broader organizational environment in which residents work [15,16].

Although the primary comparison did not reach statistical significance, the simultaneous-effects analyses addressed a different question: whether the observed intervention-outcome pattern behaved uniformly

across participant and occupational characteristics. Within the framework described by Feinstein [20], the absence of a statistically significant marginal comparison does not preclude examination of how the underlying pattern is distributed across strata. Accordingly, the trivariate analyses were used to characterize heterogeneity in the observed QoWL pattern rather than to establish intervention efficacy or to supersede the primary analysis.

This distinction is important when interpreting the findings. The overall 12.9 percentage-point difference represents the marginal comparison between the intervention and control groups, whereas the simultaneous-effects analyses showed that this difference was not distributed uniformly across the study population. Persistent distinctiveness was observed across some characteristics, while collinear ineffectiveness or interactive alterations were observed in others [20]. These exploratory patterns may help identify contexts in which the intervention-outcome relationship warrants further investigation, but they should not be interpreted as statistically confirmed subgroup effects. The stratified approach also allowed these patterns to be examined without fitting a highly parameterized regression model relative to the available number of outcome events, taking into account events-per-variable considerations [21].

Among individual and clinical characteristics, the intervention-control pattern differed according to age, sex, mental health history, and physical comorbidities. Among residents aged ⩽29 years, satisfactory QoWL was 78.0% in the intervention group compared with 53.8% in the control group, whereas both groups showed 70.0% satisfactory QoWL among residents aged >29 years, consistent with collinear ineffectiveness in the latter stratum. Persistent distinctiveness was observed across sex strata, with a larger descriptive difference among women (75.0% vs. 55.6%) than among men (76.0% vs. 69.0%). Similarly, the between-group pattern remained evident among residents without a history of mental health disorders (78.4% vs. 58.3%) but was attenuated among those with such a history (70.8% vs. 70.0%). These findings do not establish effect modification but suggest that the relationship between PSG participation and QoWL may vary across resident characteristics and provide hypotheses for prospective evaluation [20].

Occupational context showed similarly heterogeneous patterns. Satisfactory QoWL remained more frequent in the intervention group across clinical, surgical, and critical-care services, with the largest descriptive difference observed in critical care (77.8% vs. 53.8%), whereas identical proportions were observed in the small paraclinical stratum (50.0% in both groups). Patterns also differed across occupational exposures. The intervention-control difference was absent among residents reporting physical exposure but remained evident among those without such exposure. Conversely, larger descriptive differences were observed among residents reporting chemical or biological exposure. These patterns further suggest that the relationship between peer support and QoWL may depend partly on the occupational context in which the intervention is implemented [16,20].

Workplace violence was particularly informative. Satisfactory QoWL was markedly lower among residents reporting workplace violence in both study groups than among those reporting no violence. Nevertheless, within both strata, satisfactory QoWL remained numerically more frequent in the intervention group: 92.9% vs. 82.1% in the absence of workplace violence and 60.6% vs. 42.9% in its presence. This finding is consistent with the previous stage of this research program, in which workplace violence was independently associated with more than fourfold higher odds of unsatisfactory QoWL (OR 4.17, 95% CI: 2.09-8.33) [15]. Taken together, these findings suggest that peer support may coexist with a more favorable QoWL pattern even in adverse psychosocial environments, while also showing that such support does not remove the broader unfavorable association between workplace violence and QoWL. Peer-based interventions should therefore complement, rather than replace, organizational measures addressing workplace violence and other adverse working conditions [15,16].

Mindful attention provided a different perspective because it was evaluated as a process-related characteristic rather than as an intervention outcome. Persistent distinctiveness was observed across low, medium, and high mindful-attention strata, with satisfactory QoWL numerically higher in the intervention group at each level. At the same time, satisfactory QoWL increased across mindful-attention levels in both groups. These findings should not be interpreted as evidence that the PSG increased mindful attention or that mindful attention mediated the relationship between PSG participation and QoWL. Rather, they suggest that mindful attention may represent one of several individual characteristics relevant to residents' occupational experience, consistent with contextual approaches emphasizing how individuals interact with workplace demands [13]. Prospective studies would be required to evaluate whether mindful attention modifies or mediates the relationship between peer support and QoWL.

Taken together, the findings support considering peer support within a broader organizational framework rather than as an isolated individual-level intervention. PSGs provide structured opportunities for residents to discuss occupational and extra-occupational experiences with peers, potentially facilitating shared recognition, social support, and collective reflection [3,6,23]. Previous physician-focused interventions similarly suggest that peer-based approaches may contribute to selected aspects of professional well-being [22,23]. However, the present findings also illustrate that occupational experiences associated with violence, environmental exposures, institutional resources, and working conditions cannot necessarily be modified through peer interaction alone. PSGs may therefore be better understood as a complementary component of broader occupational-health strategies [15,16].

This study has several strengths, including the prospective evaluation of a structured PSG intervention, complete follow-up of all 117 participants, the use of validated instruments, and the integration of individual, clinical, and occupational characteristics into the analysis. The quasi-experimental design also allowed the intervention to be evaluated under routine residency conditions. Nevertheless, the non-randomized sequential allocation should be considered when interpreting the between-group findings, particularly because differences in age and perceived poor workspace distribution were observed between groups. These characteristics, together with other unmeasured factors, may have contributed to the observed QoWL patterns.

The final sample exceeded the prospectively calculated target; however, the observed 12.9 percentage-point difference in satisfactory global QoWL was smaller than the 20 percentage-point difference assumed in the sample-size calculation and did not reach statistical significance. In addition, some strata in the exploratory simultaneous-effects analyses included small numbers of participants; therefore, these findings should be interpreted cautiously and require confirmation in larger samples [21].

QoWL and occupational exposures were self-reported and may therefore be influenced by perception, recall, or social-desirability bias. In addition, the study was conducted among resident physicians from a single private tertiary-care hospital selected following a previous QoWL assessment [15], which should be considered when extrapolating the findings to other institutional settings.

Despite these considerations, the study provides an exploratory evaluation of structured peer support within the occupational context of medical residency. The numerically higher proportion of satisfactory global QoWL among PSG participants, together with the heterogeneous patterns observed across individual and occupational strata, provides a basis for further investigation. Future studies using randomized or otherwise rigorously controlled longitudinal designs and larger samples could determine whether the patterns identified in the present study represent reproducible intervention effects.

Conclusions

Medical residents who participated in the PSG intervention showed a higher proportion of satisfactory global QoWL than those in the control group, although the between-group difference did not reach statistical significance. Exploratory simultaneous-effects analyses further indicated that this pattern was not uniform across individual and occupational characteristics, highlighting the relevance of the context in which peer-support interventions are implemented.

Workplace violence was associated with substantially lower satisfactory QoWL in both study groups, reinforcing the importance of addressing organizational and psychosocial working conditions alongside peer-based support. PSGs may therefore represent a complementary strategy within broader occupational-health initiatives, but they should not be considered a substitute for institutional measures aimed at ensuring safe and supportive working environments. Further controlled studies with larger samples are needed to determine whether the patterns observed in this study translate into reproducible effects on QoWL.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

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References

1. Guzmán-Díaz G, Guerrero-Barrios S, Rodríguez-Alfaro SE, et al.: Mental health in postgraduate medicine: an urgency in the systematization of strategies. Rev Med Inst Mex Seguro Soc. 2024, 62:1-7. 10.5281/zenodo.12668169
2. Acosta-Fernández M, Aguilera-Velasco MÁ, Pozos-Radillo BE, Torres-López TM, Parra Osorio L: Experiences of Mexican resident physicians during their first year of education . Investig Educ Med. 2017, 6:169-79. 10.1016/j.riem.2016.09.012
3. Lugo GF0, Restrepo JMU, Álvarez MP, Trejos JAP, Gómez-Chiappe N: Listening and support groups in a teaching hospital as a model of intervention for healthcare workers during the COVID-19 pandemic. Rev Colomb Psiquiatr. 2023, 52(Suppl 1):S105-12. 10.1016/j.rcp.2021.10.012
4. Cantero DG, Duque PG, de la Fuente PS, et al.: Anxiety and coping strategies in residents of a hospital in Madrid. Educ Med. 2024, 25:100933. 10.1016/j.edumed.2024.100933
5. Riba MB, Parikh SV, Greden JF: Mental Health in the Workplace: Strategies and Tools to Optimize Outcomes. Springer, Cham; 2019. 10.1007/978-3-030-04266-0
6. Shapiro J, Galowitz P: Peer support for clinicians: a programmatic approach . Acad Med. 2016, 91:1200-4. 10.1097/ACM.0000000000001297
7. Russell B, Ahmadzadeh A, Haris K, et al.: Peer support programs for physicians and health care providers: a scoping review. Jt Comm J Qual Patient Saf. 2025, 51:589-600. 10.1016/j.jcjq.2025.05.003
8. West CP, Dyrbye LN, Erwin PJ, Shanafelt TD: Interventions to prevent and reduce physician burnout: a systematic review and meta-analysis. Lancet. 2016, 388:2272-81. 10.1016/S0140-673631279-X
9. Panagioti M, Panagopoulou E, Bower P, et al.: Controlled interventions to reduce burnout in physicians: a systematic review and meta-analysis. JAMA Intern Med. 2017, 177:195-205. 10.1001/jamainternmed.2016.7674
10. Fendel JC, Aeschbach VM, Schmidt S, Göritz AS: The impact of a tailored mindfulness-based program for resident physicians on distress and the quality of care: a randomised controlled trial. J Intern Med. 2021, 290:1233-48. 10.1111/joim.13374
11. Eskander J, Rajaguru PP, Greenberg PB: Evaluating wellness interventions for resident physicians: a systematic review. J Grad Med Educ. 2021, 13:58-69. 10.4300/JGME-D-20-00359.1
12. Gifford R, van Rossum TR, Fleuren B, Westra D: Let's talk about it: the utility of formalized support for medical residents. Int J Health Policy Manag. 2023, 12:7463. 10.34172/ijhpm.2023.7463
13. Bond FW, Hayes SC, Barnes-Holmes D: Psychological flexibility, ACT, and organizational behavior. J Organ Behav Manage. 2006, 26:25-54. 10.1300/J075v26n01_02
14. Sedaghati F, Stetsenko A, Ozsan McMillan I, Nagra H, Dana Z: Use of digital peer support for employee well-being: retrospective analysis across five large employers. JMIR Hum Factors. 2026, 13:90431. 10.2196/90431
15. Hernandez MAM, Rivas-Ruiz R, Velazquez-Cantor L, Ríos-Flores GG, Guzman JES: Quality of work life factors among medical residents: a comparative study of public and private hospitals in Mexico. Cureus. 2026, 18:115188. 10.7759/cureus.115188
16. Karasek RA: Job demands, job decision latitude, and mental strain: implications for job redesign . Adm Sci Q. 1979, 24:285-308. 10.2307/2392498
17. González R, Hidalgo G, Salazar J, et al.: Instrument for Measuring Quality of Working Life CVT-GOHISALO: Manual for Application and Interpretation. Editorial de la Luna, Mexico; 2010.
18. Moreno MP, Baltazar RG, Beltrán CA, Núñez FE: Reliability and the factorial validity of the instrument for measuring quality of work life "CVT-GOHISALO" (brief). Salud Uninorte. 2018, 34:68-75. 10.14482/sun.34.1.9711
19. López-Maya E, Hernández-Pozo MR, Méndez-Segundo L, et al.: Psychometric properties of the Mexican version of the Mindful Attention Awareness Scale (MAAS). Psychologia. 2015, 9:13-27.
20. Feinstein AR: Multivariable Analysis: An Introduction. Yale University Press, New Haven, CT; 1996. 10.2307/j.ctt2250wks
21. Peduzzi P, Concato J, Kemper E, Holford TR, Feinstein AR: A simulation study of the number of events per variable in logistic regression analysis. J Clin Epidemiol. 1996, 49:1373-9. 10.1016/S0895-435600236-3
22. Kiser SB, Sterns JD, Lai PY, Horick NK, Palamara K: Physician coaching by professionally trained peers for burnout and well-being: a randomized clinical trial. JAMA Netw Open. 2024, 7:245645. 10.1001/jamanetworkopen.2024.5645
23. Khan A, Kim D, Atwater R, Reddy R: Individual-focused interventions for physician burnout: a meta-analysis of mindfulness, coaching, and peer support. Medicina (Kaunas). 2025, 62:39. 10.3390/medicina62010039