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Typologies of workload among IT employees in Austria

Tipologije delovne obremenitve med zaposlenimi v IT v Avstriji

Abstract

Background: The IT industry is characterized by high demands, rapid innovation, and tight deadlines, which can significantly affect employee well-being and organizational success. This study aims to explore workload typologies among IT professionals in Austria, with a focus on the impact of personnel responsibilities and gender. A few sentences to place the question addressed in a broader context and highlight the purpose of the study. Methods: Utilizing the Copenhagen Psychosocial Questionnaire, we analyzed a stratified sample of 200 IT employees based on gender and leadership roles. The analysis included Ward's cluster and discriminant analysis to identify three distinct workload typologies: resilient, moderate (semi)-resilient, and non-resilient. Results: The analysis revealed significant disparities across the identified workload typologies in all five COPSOQ domains. Specifically, personnel in leadership roles were more likely to fall into the non-resilient cluster (18.9%, p = .008). A notable gender difference was observed, as females in leadership positions were disproportionately represented in the non-resilient cluster (35.7%, p = .137). Conclusions: The study highlights the need for targeted interventions to mitigate workload challenges and occupational stress within the IT sector. Incorporating typology-based approaches into organizational strategies may enhance support for employee resilience and stress management, addressing the specific needs of different employee groups.

Keywords: workload management, work-related health, COPSOQ in IT-sector

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Povzetek

Ozadje: Za panogo IT so značilne visoke zahteve, hitre inovacije in kratki roki, kar lahko bistveno vpliva na dobro počutje zaposlenih in uspeh organizacije. Namen te študije je raziskati tipologije delovne obremenitve med strokovnjaki IT v Avstriji, s poudarkom na vplivu odgovornosti zaposlenih in spola. Ob prikazu namena študije je obravnavano vprašanje umeščeno v širši kontekst. Metode: Z uporabo kopenhagenskega psihosocialnega vprašalnika (COPSOQ) smo analizirali stratificiran vzorec 200 zaposlenih v IT glede na spol in vodstvene vloge. Analiza je vključevala Wardovo grozdno in diskriminantno analizo za opredelitev treh različnih tipologij delovne obremenitve: odporne, zmerno odporne in neodporne. Rezultati: Analiza je pokazala velike razlike med opredeljenimi tipologijami delovne obremenitve na vseh petih področjih kopenhagenskega vprašalnika. Natančneje, osebje na vodilnih položajih je pogosteje spadalo v skupino, ki ni odporna (18,9 %, p = .008). Opazna je bila razlika med spoloma, saj so bile ženske na vodilnih položajih nesorazmerno bolj zastopane v skupini neodpornih (35,7 %, p = .137). Zaključki: Študija poudarja potrebo po ciljno usmerjenih ukrepih za zmanjšanje izzivov delovne obremenitve in poklicnega stresa v sektorju IT. Vključevanje pristopov, ki temeljijo na tipologiji, v organizacijske strategije lahko izboljša podporo za razvijanje odpornosti zaposlenih in obvladovanje stresa, tako da upošteva posebne potrebe različnih skupin zaposlenih.

Ključne besede: upravljanje delovne obremenitve, zdravje, povezano z delom, COPSOQ v sektorju IT

1. Introduction

In the complex and fast-paced environment of the information technology (IT) industry, managing workload—characterized by constant deadlines and rapid innovation—is critical to employee well-being and organizational effectiveness. If left un-checked, work-related stress can negatively affect mental health and work performance (Harms et al., 2017; Hassard et al., 2018). While not all stress is harmful, research shows that chronically high levels of stress, without adequate coping mechanisms, can lead to burnout, reduced productivity, and serious health problems (Fisher et al., 2019). Understanding workload typologies is therefore essential for developing tailored interventions to mitigate these outcomes. Despite the growing recognition of occupational stress, little is known about how distinct workload typologies manifest among IT professionals in Austria. This lack of clarity hampers the development of tailored interventions aimed at improving stress resilience and mental health in this sector.

Despite the critical role of IT professionals in today's digital landscape, existing re-search on workplace stress often overlooks the unique stressors faced by this group. High demands, rapid change, and the intensity of the IT industry create stress profiles that are distinct from those in other fields (; Monica & Nithyashree, 2020; Robertson et al., 2015; RPHSR et al., 2023). Addressing this gap (Rademaker et al., 2023), this study aims to create workload typologies specific to Austrian IT workers, investigating how factors such as personnel responsibilities and gender shape their stress resilience.

This study investigates whether individuals with personnel responsibilities are more likely to exhibit non-resilient stress management patterns compared to their peers. Furthermore, it evaluates whether this trend is more pronounced in women than in men, offering insight into potential gender disparities in stress resilience within the IT sector.

The study addresses the following research questions:

- What distinct workload typologies can be identified among IT professionals in Austria?
- To what extent is personnel responsibility associated with non-resilient stress patterns?
- Are female IT professionals with personnel responsibility more likely to exhibit non-resilient stress responses than their male counterparts?

By identifying these workload typologies and their influencing factors, the study provides a foundation for interventions designed to improve employee well-being and productivity. The findings are particularly relevant to IT companies and professionals striving to manage complex workloads and maintain a healthy work-life balance in a high-intensity industry. Ultimately, this research not only addresses a critical gap in the academic literature but also offers practical guidance for supporting the IT workforce.

Beyond its relevance for organizational development, this study also holds implications for psychotherapists working with clients in high-demand sectors. Understanding distinct workload typologies among IT professionals can inform therapeutic interventions by highlighting occupation-specific stress profiles and resilience patterns. This may support more targeted approaches in therapy, particularly in addressing stress-related exhaustion, boundary management, and gender-specific vulnerability factors in leadership roles.

2. Materials and methods

This investigation seeks to elucidate the extent to which distinct workload typologies can be identified among IT employees in Austria, aiming to uncover

patterns and categorizations within the occupational stress experienced by this demographic.

Using a prospective research design, the study targeted a sample from the Austrian IT industry. A stratified sampling approach was implemented to ensure balanced representation across levels of personnel responsibility and gender. Participants were recruited through professional IT networks and direct outreach to IT companies in Austria. Inclusion criteria required participants to be employed in the IT sector, reside in Austria, be fluent in German (to complete the survey), and provide informed consent. Exclusions applied to non-IT professionals, freelancers without organizational ties, and individuals under 18, resulting in a homogenous sample reflective of the target population. While gender was included in the stratification process, it was not treated as a primary variable.

Sample size estimation, performed using G*Power® 3.1.9.6 (Faul et al., 2007), suggested an optimal sample of 150 participants, assuming a balanced allocation ratio (1:1), a moderate effect size ($d \approx 0.50$, $\eta^2 = .06$), and adequate statistical power. Ultimately, 260 individuals initiated the survey, but 56 (21.5%) did not complete it. Additionally, four responses were excluded due to unrealistically rapid completion times (under two minutes), leaving a final dataset of 200 participants. Of these, 153 (76.5%) identified as male, 46 (23.0%) as female, and one (0.5%) as diverse, with a median age of 39.5 years. Participants were divided into two groups based on personnel responsibility: 126 (63%) reported having no such responsibilities, while 74 (37%) indicated they held these roles. Gender stratification was maintained in this categorization.

The abbreviated German version of the Copenhagen Psychosocial Questionnaire (COPSOQ) was used, tailored by omitting specific items (B1:6, B3:8, B5:6, B6:3, B6:7) for conciseness and incorporating additional items as per FFAW guidelines (e.g., substituting B2:3 with B2:5 and B2:4 with B2:6). The survey, administered online in German using Lime Survey, comprised 85 questions, predominantly measured on a five-point Likert scale for consistency, except for one item (B12) using an 11-point scale.

The survey items corresponded to five COPSOQ domains:

- Demands (German: Anforderungen) [+]
- Influence (German: Einfluss und Entwicklungsmöglichkeit) [-]
- Interpersonal Relations (German: Soziale Beziehung und Führung) [-]
- Work Interface (German: Weitere Skalen) [+]
- Conflicts (German: Beschwerden, Outcomes) [-]

Survey responses were transcribed from Lime Survey into an SPSS matrix for analysis using IBM SPSS® 27.0.1. Descriptive and inferential statistical analyses

were conducted with a significance threshold of $\alpha = 0.05$, marking p-values ≤ 0.05 as significant. Effect sizes were assessed using Cohen's d to evaluate the magnitude of observed effects. Descriptive statistics were summarized using means (M), standard deviations (SD), and percentages, while Cronbach's α-values for the COPSOQ domains ranged from .80 to .93, confirming strong internal consistency. Standardization of items into Z-scores prepared the data for cluster analysis.

Cluster analysis was performed using the Ward method, which minimizes the sum of squared deviations and is well-suited for metric distance measures. Preliminary single-linkage analysis confirmed no outliers, ensuring the representativeness of the dataset. The determination of optimal clusters considered the sequence of fusion steps, providing a substantive basis for the derived typologies.

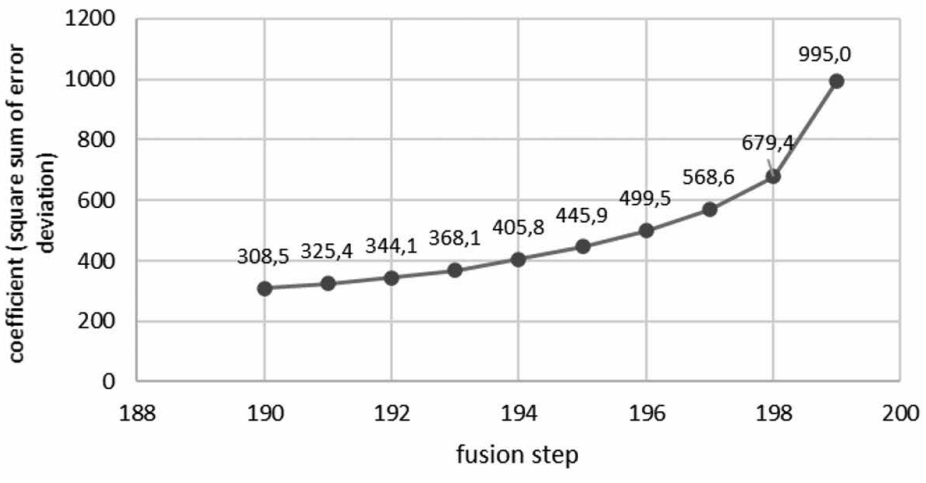
Finally, discriminant analysis validated the cluster-derived typologies, further enhancing their distinctiveness and ensuring the reliability of the results. By applying this methodological approach following the cluster analysis, the typological distinctions inferred from the clustering process were robustly confirmed. This enabled a precise and reliable identification of workload typologies among IT employees in Austria, while also providing insights into the patterns of occupational stress within this specific population.

3. Results

The step diagram derived from the Ward cluster analysis illustrates that a minimum of two clusters is necessary to effectively classify individuals when considering the in-flection point within the functional area. This analysis aimed to identify work demand typologies that exhibit maximal heterogeneity between clusters while maintaining high similarity within each cluster.

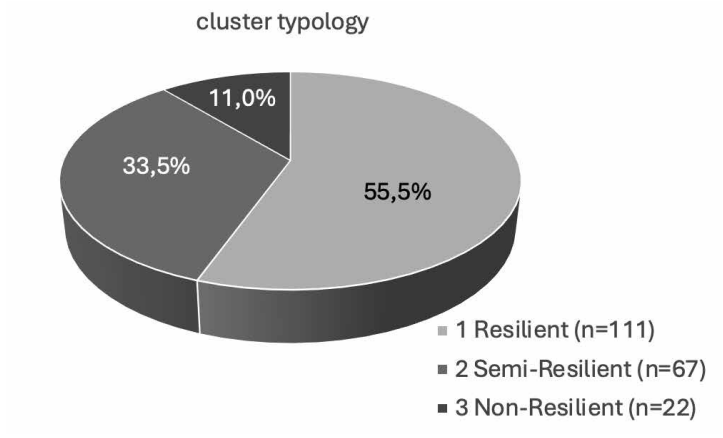
In alignment with Ward's methodological framework, the critical criterion for determining the optimal number of clusters is the pronounced increase in the error sum of squares (ESS)—a measure of heterogeneity—between successive fusion steps. This increase is visually represented as an inflection point, commonly referred to as the „elbow criterion," in the plot of ESS against the number of clusters as seen in Figure 1.

Figure 1.
Scree Plot regarding steps to determine the ideal number of clusters



According to Bühl (2012), the transition from two to three clusters reveals a notable increase in ESS, indicating that a two-cluster solution would yield highly homogeneous subgroups. However, to achieve a more nuanced differentiation, a three-cluster solution was adopted, from which three distinct workload typologies emerged as illustrated in Figure 2.

Figure 2.
Typology of workload in three clusters (n=200)



The characterization of these clusters is consistent with contemporary literature on resilience and seeks to describe the identified types in terms of their specific patterns, profiles, and manifestations (Baker et al., 2021; Bal et al., 2020; Hartmann et al., 2020; Robertson et al., 2015; Troy et al., 2023; Youssef & Luthans, 2007).

3.1. Cluster „Resilient“

This cluster comprises individuals with high resilience, characterized by a positive outlook, emotional stability, and effective problem-solving skills. Resilient individuals adapt well to adversity, demonstrating persistence and the ability to learn from challenges. Resilience involves actively engaging with and overcoming difficulties, often resulting in personal growth and increased capability (Baker et al., 2021; Bal et al., 2020; Troy et al., 2023).

3.2. Cluster “Moderate (semi) Resilient”

While not a widely established term in the academic literature, it is used here to describe individuals who demonstrate moderate adaptability and coping abilities. Members of this cluster include individuals with moderate resilience who require considerable effort to address challenges. While they demonstrate some coping skills, they may struggle with complex or prolonged stressors. These individuals show resilience in certain areas but face significant difficulties in others (Fisher et al., 2019; Hartmann et al., 2020; Robertson et al., 2015).

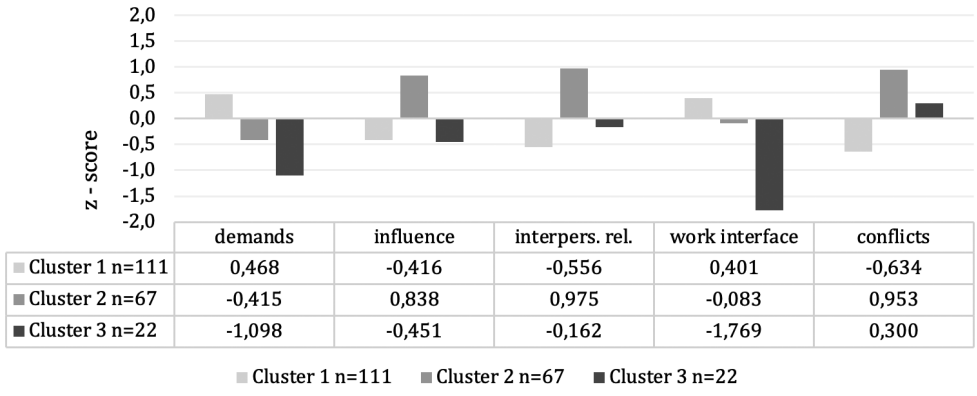
3.3. Cluster “Non-Resilient”

This cluster is characterized by individuals exhibiting limited coping mechanisms and impaired recovery from adversity. They often lack adaptive coping mechanisms, exhibit low flexibility, and have a pessimistic outlook. Insufficient social support and difficulties in emotional regulation exacerbate their challenges (Baker et al., 2021; Bal et al., 2020; RPHSR et al., 2023).

In order to be able to label and describe the three identified clusters (according to the typological distinctions), the expressions of workloads across these clusters were examined using Welch's-ANOVA in a method-uniform manner due to the heterogeneous variances ($p < .05$) observed within in the third (interpersonal relation) and fourth (work interface) domains. The analysis showed the following results, as illustrated in Figure 1:

Figure 3

Expression (z-scores) of the COPSOQ scales in the three identified workload clusters (n=200)



	demands	influence	interpers. rel.	work interface	conflicts
Cluster 1 n=111	0,468	-0,416	-0,556	0,401	-0,634
Cluster 2 n=67	-0,415	0,838	0,975	-0,083	0,953
Cluster 3 n=22	-1,098	-0,451	-0,162	-1,769	0,300

The evaluation of the variance in expressions revealed significant disparities across the three clusters on all five scales, with p's < .001. This substantiates the suitability of the tripartite cluster categorization. Subsequent pairwise comparisons employing the Games-Howell post-hoc test further verified these distinctions between clusters (p's < .05). The only exception was noted on the second scale (influence), where no significant difference emerged between cluster 1 and cluster 3 (p = .979).

To statistically corroborate these typologies, multivariate discriminant analysis (Backhaus et al., 2016) was employed. This method provided strong support for the three-cluster model, aligning well with the theoretical typologies.

Delving into the specifics, the discriminant function analysis provides a quantitative basis for this decision. The derived coefficients of the canonical discriminant functions manifested in a substantial eigenvalue of 1.93 for Function 1, indicating a strong correlation at r = .81 (Wilks' Lambda .19, p < .001). Similarly, Function 2 displayed a noteworthy eigenvalue of 0.85, with r = .68 (Wilks' Lambda .54, p < .001). These statistics not only reaffirm the distinctiveness of the clusters but also ensure the methodological rigor in their delineation, suggesting an adequate discriminant capacity for differentiating between the three cluster groups as depicted in Table 1:

Table 1

Correlations within groups between discriminant variables and standardized canonical discriminant functions

Domain (scaling direction)	Standardized canonic discriminant function coefficients		Structural matrix	
	Function		Function[1]	
	1	2	1	2
Conflicts (-)	.41	.28	.77*	.21
Interpersonal relations (-)	.41	.24	.66*	.43
Demands (+)	-.44	.33	-.44*	.31
Work interface (+)	-.39	.84	-.39	.75*
Influence (-)	.23	.23	.44	.45*

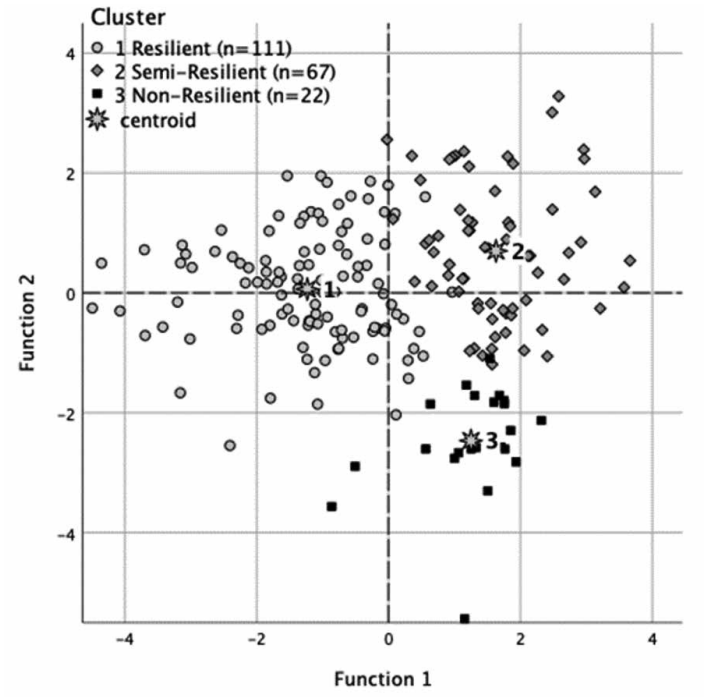
[1] The variables are sorted according to their correlation extent within the structural matrix in the two discriminant functions.

In accordance with the results, the domains *conflicts*, *interpersonal relations*, and *demands* are significant for Function 1 (x-axis), while the domains *work interface* and *influence* are pivotal for Function 2 (y-axis).

Transitioning to a graphical depiction, as illustrated in the coordinate system of Figure 2, the group centroids—representing the prototypical central points of the three clusters—are discernibly distributed. Here, negative values on the x-axis signify a resilient approach to work-related stress, and the y-axis serves as a gauge for differentiating among groups burdened by work demands.

Figure 4

Bivariate scatterplot of the canonical discriminant function within the three-level typology of workloads with the corresponding group centroids (n=200)



To bridge the findings to a deeper exploration of the relationship between the management of work stress and demographic variables such as personnel responsibility and gender, Chi-square tests were conducted as delineated in Table 2. It should be noted that one individual who identified as diverse and did not have personnel responsibilities was excluded from this part of the analysis.

Table 2

Classification Matrix - frequencies and proportions (row percentage) representing the three-cluster solution for the achieved accuracy regarding the assignment quality

Cluster No. Observed	Predicted			Total
	1	2	3	
1 (resilient)	108 (97.3%)	2 (1.8%)	1 (0.9%)	111 (100%)
2 (semi-resilient)	2 (3.0%)	65 (97.0%)	0	67 (100%)
3 (non-resilient)	0	1 (4.5%)	21 (95.5%)	22 (100%)
Total	110	68	22	200

The statistical test to assess the difference in distribution showed a significant result overall (n=199), c2 (2) = 9.386, *p* = .008, supporting a higher prevalence of non-resilient work stress patterns among individuals with personnel responsibilities (18.9%). This pattern is also suggested for male individuals in the IT sector, c2 (2) = 7.006, *p* = .028, with 15% under personnel responsibility representing the third non-resilient cluster. For female IT participants with personnel responsibilities, the representation in Cluster 3 was considerably higher at 35.7% within the sample; however, due to the comparatively low case number, it was not significant, c2 (cF) = 4.311, *p* = .137. The analysis of cluster distribution across age groups showed no significant result, c2 (cF) = 5.320, *p* = .719, indicating that the patterns of work stress and their processing cannot be associated with age. Table 3 is intended to illustrate this as follows.

Table 3

Frequencies and proportions (row percentage) of cluster distribution within responsibility by taking gender into account

Gender	Responsibility	Cluster			Total (100%)
		1 (resilient)	2 (semi-resilient)	3 (non-resilient)	
Male	no	49 (52,7%)	39 (41,9%)	5 (5,4%)	93
	yes	36 (60,0%)	15 (25,0%)	9 (15,0%)	60
	total	85 (55,6%)	54 (35,3%)	14 (9,2%)	153
Female	no	20 (62,5%)	9 (28,1%)	3 (9,4%)	32
	yes	6 (42,9%)	3 (21,4%)	5 (35,7%)	14
	total	26 (56,5%)	12 (26,1%)	8 (17,4%)	46
Total	no	69 (55,2%)	48 (38,4%)	8 (6,4%)	125
	yes	42 (56,8%)	18 (24,3%)	14 (18,9%)	74
	total	111 (55,8%)	66 (33,2%)	22 (11,1%)	199

The discriminant function analysis provides a sophisticated quantitative underpinning for the classification of work stress patterns into three distinct clusters, as depicted in the study results. The high eigenvalues for both functions signify a strong relationship with the cluster groups, indicating that the variables used in the analysis serve as potent discriminators. The strong negative correlations with ‚Conflicts' and ‚Interpersonal relations' and a positive correlation with ‚Demands' for Function 1 (x-axis) suggest these factors are particularly relevant in characterizing the resilient end of the spectrum. Conversely, ‚Work interface' and ‚Influence' positively correlate with Function 2 (y-axis), delineating a different aspect of the work stress experience, likely related to the organizational environment and individual agency.

4. Discussion

Practical results of the study reveal the relationship between work stress in the IT industry and factors such as personnel responsibility and gender. Chi-square tests revealed a clear trend: individuals in supervisory roles were more likely to fall into the inflexible (non-resilient) stress pattern cluster, which also can be observed in other studies (Kelly & Hearld, 2020; Harms et al., 2017; Karatepe et al., 2018). These findings align with prior research, corroborating earlier evidence on the adverse effects of leadership-related stress (Boyer-Davis, 2018). A particularly noteworthy finding of this study is, gender differences emerge within the context of personnel responsibilities. For males, there is a significant 15% prevalence in the non-resilient cluster, which speaks to the stressor‘s impact perhaps linked to the roles they occupy. Contrastingly, for females with personnel responsibilities, an even higher representation of 35.7% in the non-resilient cluster was observed. However, the significance of this finding is dampened by the smaller female sample size, leading to a non-significant p-value. Therefore, only limited conclusions can be drawn, as potential biases are indeed possible. In this regard, Bridges et al. (2023) advocate for gender inclusion strategies with organizational resilience strategies to counteract malignant tendencies. Regarding studies on leadership roles, a multitude of research (Arnold et al., 2016; Boyer-Davis, 2018; Kelly & Hearld, 2020) including the meta-analysis by Harms et al. (2017) [12], underscores the fact that individuals with personnel responsibilities tend to exhibit negative behaviors and are prone to illnesses.

Surprisingly in this study, age does not appear to be a significant factor in stress tolerance in this industry, challenging the assumption that age and experience equate to better stress management (Hsu, 2018; Mauno et al., 2013). Instead, there is growing evidence that gender and leadership roles may be more decisive in influencing stress response patterns (Arnold et al., 2016). Additionally, external stressors such as high turnover intention and psychological workload, described in the IT field by Nanda et al. (2020), may further intensify these patterns. The findings call for a reevaluation of how stress is dealt with in the workplace, particularly in leadership positions, and highlight the importance of considering gender-related stressors.

These findings also underscore the necessity for psychotherapeutic practitioners to understand the occupational context of their clients. Job-specific stress patterns, as identified in this study, can be critical in differentiating between situational and dispositional causes of psychological distress. Particularly in schema therapy or integrative approaches, such contextual information enhances case conceptualization and improves treatment efficacy.

From a psychodynamic perspective, chronic exposure to occupational stress—particularly in leadership roles—may reactivate early relational patterns or defense mechanisms, such as overcompensation, perfectionism, or emotional withdrawal. In schema therapy or integrative approaches, such contextual information enhances case conceptualization by linking present stressors to maladaptive modes (e.g., demanding parent, detached protector), thereby improving treatment efficacy.

Understanding the symbolic function of work and its affective meaning for the individual—whether it represents control, self-worth, approval, or existential structure—can guide deeper therapeutic interventions and help transform stress into a point of access to underlying psychological themes.

5. Conclusion

The implications of these insights extend beyond theoretical considerations and offer practical guidance for workplace interventions. The findings of this study offer a foundation for both practical application and future scientific exploration. For those implementing workplace strategies, evidence suggests that support systems need to be sensitive to different groups, particularly to better support those with personnel responsibilities and who are at greater risk of inflexible (non-resilient) stress responses. From a practical perspective, organizations are encouraged to implement targeted resilience strategies—especially for individuals in supervisory roles—such as stress-regulation training, coaching programs, or peer-based support networks.

5.1. Practical Implications

To enhance the validity of future studies, expanding and diversifying sample sizes is crucial. Prioritizing a balanced gender ratio could be achieved through collaborations with IT companies or international data collections. Qualitative approaches like interviews or focus groups can provide deeper insights into individual and organizational factors affecting resilience, particularly for exploring gender-specific experiences. Longitudinal studies are recommended to identify causal relationships, capturing changes over time and assessing long-term effects of interventions (Rutter, 2023). Future research should also examine cultural differences in workplace resilience, as cross-country comparisons can clarify the universality or specificity of findings.

Based on the study results, organizations could implement measures like gender-sensitive stress management programs tailored to employees‘ diverse needs, training for leaders to foster resilience, and flexible working models for

employees with significant responsibilities. Tailored strategies should address specific groups: mentoring programs and support networks for women in leadership, targeted support for men in stressful roles, and preventive stress management for non-managerial employees. Leadership development should be a priority, with training programs that promote a resilient and inclusive work culture. Workshops on gender-specific stress management and leadership integration could help leaders better support their teams and foster sustainable workplaces (Holman et al., 2018; Lazarus, 2020). In developing targeted interventions, insights from applied organizational behavior (Griffin et al., 2020) and proactive stress management (Schwarzer & Reuter, 2023) should be integrated to strengthen coping strategies among employees.

5.2. Cultural context and transferability

The transferability of the results from Austria to other cultural contexts can be argued based on universal industry demands (IT as a sector characterized by globally standardized work requirements), standardized measurement tools (the internationally validated COPSOQ), and fundamental psychological principles (such as those of resilience). However, cultural differences should be specifically examined in future studies to further validate the applicability of the findings.

Taken together, the current findings provide a comprehensive overview of job stress patterns in the IT industry and may inform strategies to improve employee resilience and well-being by tailoring interventions to the unique needs identified in each cluster.

Future research could build on this typology-based approach by conducting longitudinal studies to assess the long-term impact of organizational interventions on stress resilience. Additionally, integrating qualitative methods—such as interviews or diary studies—may yield deeper insights into subjective coping strategies within each cluster.

Finally, expanding the research across sectors or countries would help to validate the generalizability of the proposed workload typologies and inform cross-cultural comparisons in occupational health research.

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