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Digitalization of work and the impact on the biopsychosocial health of the most vulnerable groups

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Abstract

It is relevant to examine the relationships between work modalities, such as remote, hybrid, and entirely in-person, and various aspects, such as work environment quality, leadership dynamics, colleague interactions, productivity, mental health, lifestyle habits, work-life balance, and organizational trust.The main objectives are to characterise the types of work formats (hybrid, total face-to-face, and remote work) from an organisational, interpersonal, and individual perspective and to characterise the psychosocial environment and the psychosocial risks associated with these three work formats. The study involved a total of 8,387 participants, of whom 66.5% are female (n= 5462) and 33.5% are male (n= 2748), aged between 18 and 78 (M= 44.43, SD= 10.80). Regarding remote work, 71.5% of the participants are in total presential work (n = 5966), 16.3% are in a hybrid situation (n = 1362), and 12.2% are working remotely (n = 1020). The Healthy Workplaces Ecosystems Tool (EATS) was used. In general, the hybrid work format and remote work are often associated with a more positive perception of the work environment and the adoption of a healthier lifestyle. Professionals who work remotely tend to have a better perception of their work environment, greater satisfaction with their pay, a healthier diet, and more physical activity. However, it is also these workers who show higher consumption of tobacco, alcohol, and substances and more screen time. Professionals in a hybrid work format have a more positive perception of health and a lower impact of chronic illness. However, they show greater presentism and higher stress levels. Professionals working face-to-face reported higher levels of

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burnout, greater absenteeism, m and a perception of a less healthy working environment in all its dimensions. We found that some factors that explain the psychosocial environment and psychosocial risks at work are similar in the different formats, such as the relevance of age and the dimenions of the work environment associated with leadership commitment, but specificities are also identified for each of the work formats. Workplace health promotion must, therefore, extend beyond reactive measures to incorporate proactive, system-level interventions that enhance organizational culture, support autonomy, and promote equitable access to health. In this context, occupational health policies should align with the principles of the World Health Organization's Healthy Workplaces Model, emphasizing the interconnectedness of physical, psychosocial, and organizational dimensions of work. By integrating these principles into organizational structures and practices, employers can sustainably enhance employee well-being, productivity, and resilience in an evolving work environment.

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*Keywords: psychosocial*l risks at work; psychosocial environment; vulnerable groups, digitalization; occupational health; well-being**.**

1. Introduction

It is relevant to examine the relationships between work modalities, such as remote, hybrid, and entirely in-person, and various aspects, such as work environment quality, leadership dynamics, colleague interactions, productivity, mental health, lifestyle habits, work-life balance, and organizational trust.

Work Environment, Leadership, Colleague Relationships, and Productivity

Hybrid and remote work arrangements have been found to affect workplace dynamics. Recent research suggests that hybrid work models tend to yield higher employee satisfaction and engagement compared to fully remote or entirely in-person setups. For instance, a 2024 report by Great Place to Work Australia found that organizations offering flexible work arrangements experienced improved employee engagement and satisfaction, particularly among Millennials and Gen Z, who value work-life balance and autonomy.

However, hybrid work environments can present challenges in building trust and social support among colleagues. A study by [1] highlighted that hybrid workers often have limited positive work relationships, citing issues such as a lack of trust, reduced social support, and delayed feedback.

Leadership plays a crucial role in mitigating these challenges. Transformational leadership, characterized by supportive and engaging behaviors, has been shown to enhance work engagement in remote settings. [2] emphasized that perceived supervisor support positively influences work engagement among remote workers.

Hybrid work tends to strike a balance between autonomy and structure, thereby enhancing job satisfaction and engagement [3]. However, social interactions can suffer in remote and hybrid settings, which can negatively impact team cohesion and support [4]. Transformational leadership, which emphasizes employee support and communication, is vital in maintaining engagement in these contexts [2].

Mental Health, Burnout, and Lifestyle Habits

Hybrid work arrangements have been associated with improved mental health outcomes and healthier lifestyle habits. A 2023 survey by the International Workplace Group found that hybrid workers reported increased sleep duration, more regular exercise, and better dietary habits compared to pre-pandemic times.

Regarding burnout, a study by [5] demonstrated that hybrid work, coupled with work autonomy, significantly reduces perceived burnout among employees. The study suggests that the flexibility inherent in hybrid models enables employees to manage stress more effectively and maintain their well-being.

Flexible work models, particularly hybrid ones, have been linked to lower burnout rates and improved lifestyle habits, including increased sleep and physical activity [5,6]. Autonomy appears to mediate these benefits by allowing workers to better self-regulate stress and balance demands.

A study by [7] revealed that a substantial proportion of participants reported experiencing frequent exhaustion (43.7%), irritability (34.5%), and sadness (30.5%) over the past four weeks. Regression analyses indicated that higher levels of burnout symptoms were significantly associated with lower levels of leadership engagement, a less favorable psychosocial work environment, limited access to personal health resources, poorer health behaviors, and

lower salary satisfaction. Conversely, burnout symptoms were positively associated with increased worker involvement, greater enterprise community engagement, higher perceived stress, and prolonged screen time during work hours. Additionally, female respondents reported higher levels of burnout symptoms compared to their male counterparts. Burnout was also found to harm sickness-related absenteeism, presenteeism, and overall quality of life. These findings provide valuable insights into the factors contributing to burnout and highlight the importance of cultivating a supportive work environment. They emphasize the crucial need for implementing effective workplace policies and interventions that promote mental health, mitigate stress, and prevent burnout among employees.

Work-Life Balance and Personal Life Reconciliation

Hybrid work models provide employees with greater flexibility to balance their personal, family, and professional responsibilities. The Great Place to Work Australia's 2024 Insights Report indicated that flexible work arrangements contribute to better work-life balance, which is particularly valued by younger generations.

However, the transition back to full-time office work can disrupt this balance. An article from AP News highlighted that employees, especially those with caregiving duties, experience strain when returning to the office after extended periods of remote work. The loss of flexibility can lead to increased stress and challenges in managing personal responsibilities.

Work-life balance is reportedly improved under hybrid work models, especially for employees with caregiving duties or household responsibilities [3]. Conversely, forced returns to office environments may disrupt this balance [8].

In a study developed by [9], Workers engaged in hybrid work arrangements tend to exhibit a more favorable perception of healthy work environment ecosystems. In contrast, those in exclusively face-to-face roles report more negative assessments. Regardless of work modality, perceived resources for mental health (PRMH) are primarily influenced by the psychosocial work environment, levels of professional engagement, and individual stress management competencies. Nevertheless, each working model presents distinct characteristics that should be carefully considered in the development and implementation of strategies aimed at fostering healthy work environment ecosystems. Adapting these strategies to the evolving diversity of work arrangements is essential for the effective promotion of mental health and the prevention of psychosocial risks in the workplace.

Trust and Responsibility in Organizational Contexts

Trust between employees and leadership is pivotal in remote and hybrid work settings. A study by [10] found that psychological safety, which is essential for effective teamwork, is more challenging to maintain in remote environments due to the reduced frequency of spontaneous interactions.

Positive leadership behaviors, such as transparent communication and empathy, are crucial in fostering trust and a sense of belonging among remote workers. [11] emphasized that leaders who prioritize employee well-being can enhance vigor and engagement, even in physically distant work settings.

Trust in leadership is a crucial factor in the effectiveness of remote and hybrid work. Psychological safety tends to decline in remote settings unless actively supported through transparent communication and inclusive practices [10]. Leaders must foster trust and connection to prevent isolation and disengagement [11].The main objectives are to characterise the types of work formats (hybrid, total face-to-face, and remote work) from an organisational, interpersonal, and individual perspective and to characterise the psychosocial environment and the psychosocial risks associated with these three work formats.

Method

Study design and participants

The sample consists of 8,387 participants, of whom 66.5% are female (n= 5462) and 33.5% are male (n= 2748), aged between 18 and 78 (M= 44.43, SD= 10.80).

Regarding remote work, 71.5% of the participants are in total presential work (n = 5966), 16.3% are in a hybrid situation (n = 1362), and 12.2% are working remotely (n = 1020).

Instruments

The Healthy Work Environment Ecosystems Tool (EATS) [12] comprises 62 items distributed across nine dimensions, aligned with the Healthy Workplaces model developed by the World Health Organization [4, 12]. In the present study, eight of these dimensions were utilized: (1) Ethics and Values (8 items, α = .91); (2) Leadership Commitment (6 items, α = .95); (3) Employee Involvement (7 items, α = .89); (4) Psychosocial Risk Factors – Leadership and Work Content (12 items, α = .91); (5) Psychosocial Work Environment Related to Well-being and Mental Health (5 items, α = .86); (6) Physical Environment (5 items, α = .92); (7) Community Involvement (12 items, α = .90); and (8) Personal Health Resources (4 items, α = .83). All items are rated on a 5-point Likert-type

scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores in each domain indicate a more favorable perception of a healthy work environment, except for the dimension concerning the psychosocial work environment related to well-being and mental health, where higher scores reflect a more negative perception of that domain.To assess individuals' perceived stress and stress management capacity, the 4-item version of the Perceived Stress Scale (EPS) [12] was employed, demonstrating acceptable internal consistency in the present study ($\alpha = .77$). The EPS also uses a 5-point Likert-type scale from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating more positive perceptions of stress management abilities.

Procedure

This study was approved by the Ethics Committee of Prof. Fernando Fonseca Hospital, EPE (Reference No. 031/2021). For data collection, organizations from various sectors, regions, and sizes across the country were contacted. A convenience sampling strategy was used, incorporating medium and large-sized organizations from the public, private, and social sectors.

Organizations that agreed to participate received a link to the survey, which was then disseminated to their employees internally. The link provided access to detailed information about the study, including its purpose, researcher contact information, and assurances of confidentiality, anonymity, and the voluntary nature of participation. Participants could only proceed to the questionnaire after electronically signing the informed consent form. The questionnaire was administered via an online platform. The initial page included a description of the study objectives and the informed consent statement. Upon agreement, participants were granted access to complete the survey. Data analysis, including descriptive statistics and mean comparisons, was conducted using IBM SPSS Statistics, version 22.

Results

The sample is composed of 8,387 participants, of whom 66.5% are female (n= 5462) and 33.5% are male (n= 2748), aged between 18 and 78 (M= 44.43, SD= 10.80). Concerning generations, 48.9% belong to Generation X (n= 4086), 35.4% belong to Generation Y (n= 2956), 8.0% belong to Generation Z (n= 667), and 7.7% belong to the baby boom generation (n= 639). Regarding marital status, the majority of participants (59.3%, n = 4952) are married, while 40.7% (n = 3399) are single or divorced. Regarding compulsory schooling, the majority of participants (72.4%) had completed compulsory schooling (n = 5333), 22.9% had a degree (n = 1689), and 4.6% had postgraduate training (n = 339). Finally, regarding remote work, 71.5% of the participants are in total presential work (n = 5966), 16.3% are in a hybrid situation (n = 1362), and 12.2% are in remote work (n = 1020).

All the dimensions showed statistically significant differences. Participants who are in total presential work have higher values in the dimension of psychosocial risks related to mental health. On the other hand, those who work remotely have higher scores in ethics and values, leadership commitment, involvement, psychosocial environment, physical environment, community involvement, personal health resources, and stress management. Participants in hybrid situations have higher scores in remote work conditions.

Table 1 presents a comparison of the groups related to format work across each variable.

	$\bar{x}$ (SD)	$\bar{x}$ (SD)	$\bar{x}$ (SD)	Significance test and Effect size
	Presential total	**Remote work**	**Hybrid**	
Ethics& Values	3.15 (1.10)	**3.50 (0.98)**	3.31 (0.98)	**F (2, 8343) = 54.286, p<.001, η=.013**
Leadership Commitment	2.99 (1.14)	**3.38 (1.03)**	3.15 (1.04)	**F (2, 8343) = 58.566, p<.001, η= .014**
Engagement	3.48 (1.04)	**3.87 (0.89)**	3.70 (0.91)	**F (2, 8335) = 80.269, p<.001, η=.019**
Psychosocial environment	3.14 (1.03)	**3.54 (0.93)**	3.39 (0.93)	**F (2, 8345) = 95.035, p<.001, η=.022**

RPT_mental health	**3.00 (0.90)**	2.82 (0.91)	2.84 (0.90)	**F (2, 8345) = 31.033, p<.001, η=.007**
Physical Environment	3.20 (1.28)	**3.55 (1.04)**	3.30 (1.05)	**F (2, 8347) = 43.920, p<.001, η= .010**
Teleworking	3.10 (1.04)	3.60 (1.06)	**4.18 (0.77)**	**F (2, 3829) = 419.531, p<.001, η=.180**
Community	3.89 (0.79)	**4.02 (0.60)**	4.00 (0.57)	**F (2, 8347) = 22.310, p<.001, η= .005**
Health Resources	2.64 (1.03)	**2.99 (0.98)**	2.92 (0.91)	**F (2, 8344) = 84.264, p<.001, η= .020**
Stress Management	3.31 (0.67)	**3.35 (0.69)**	3.20 (0.639	**F (2, 8346) = 18.260, p<.001, η= .004**

Table 2 presents a comparison of burnout, health satisfaction, chronic illness, presenteeism, absenteeism, lifestyle habits, work satisfaction, and remuneration satisfaction about remote work.
There were statistically significant differences for all dimensions. Participants who were in total presential work had higher values for burnout and absenteeism. Meanwhile, those who remote work had higher scores for eating habits, sleeping habits, physical activity habits, smoking, alcohol consumption, use of psychotropic medication, screen time both at work and during leisure time, satisfaction with the work environment, and remuneration. Lastly, participants in the hybrid system had higher scores for health satisfaction, level of capacity due to chronic illness, presentism, and stress levels.

Table 2. Group comparison (burnout, health satisfaction, chronic illness, presenteeism, absenteeism, lifestyle habits, work, and remuneration satisfaction)

	$\bar{x}$ **(SD)**	$\bar{x}$ **(SD)**	$\bar{x}$ **(SD)**	**Significance test and Effect size**
	Presential total	**Remote work**	**Hybrid**	
Burnout	**1.94 (1.16)**	1.73 (1.23**)**	1.75 (1.13)	**F (2, 8345) = 23.452, p<.001, η= .006**
Health satisfaction	3.54 (1.00)	3.67 (0.93)	**3.71 (0.89)**	**F (2, 4382) = 8.426, p<.001, η= .004**
Chronic illness (capacity level)	6.57 (3.49)	6.76 (3.10)	**7.37 (2.99)**	**F (2,1788) = 4.076, p=.017, η= .005**
Presenteeism	2.72 (2.69)	2.46 (2.31)	**3.65 (3.24)**	**F (2, 5799) = 41.781, p<.001, η= .014**
Absenteeism	**1.61 (0.87)**	1.49 (0.75)	1.52 (0.75)	**F (2, 8329) = 12.470, p<.001, η= .003**
Eating habits	2.72 (1.33)	**2.78 (1.34)**	2.11 (1.33)	**F (2, 8347) = 124.230, p<.001, η= .029**
Stress levels	3.16 (1.02)	3.22 (0.99)	**3.46 (0.94)**	**F (2, 8347) = 50.207, p<.001, η= .012**
Sleeping habits	2.83 (1.04)	**3.04 (0.98)**	2.85 (1.00)	**F (2, 8347) = 18.263, p<.001, η= .004**
Physical activity habits	2.81 (1.13)	**2.90 (1.13)**	2.86 (1.12)	**F (2, 8347) = 3.392, p=.034, η= .001**

Smoking	0.51 (1.02)	**0.88 (1.07)**	0.52 (1.00)	**F (2, 8321) = 59.128, p<.001, η= .014**
Alcohol consumption	1.34 (1.15)	**1.71 (1.25)**	1.57 (1.11)	**F (2, 8018) = 47.786, p<.001, η= .012**
Alcohol consumption (> 2 drinks)	0.54 (0.88)	**1.08 (1.15)**	0.68 (0.94)	**F (2, 8340) = 151.459, p<.001, η= .035**
Consumption of amphetamines or other substances	0.09 (0.43)	**0.44 (0.55)**	0.09 (0.38)	**F (2, 8344) = 285.185, p<.001, η= .064**
Use of psychotropic drugs	0.68 (1.34)	**0.98 (1.35)**	0.70 (1.37)	**F (2, 8344) = 22.128, p<.001, η= .005**
Screen time (work)	1.99 (0.94)	**2.61 (1.05)**	2.49 (0.83)	**F (2, 8338) = 293.246, p<.001, η= .066**
Screen time (leisure)	1.40 (0.68)	**1.76 (0.83)**	1.46 (0.69)	**F (2, 8340) = 118.017, p<.001, η= .028**
Work environment	6.14 (2.50)	**6.89 (2.22)**	6.70 (2.19)	**F (2, 8176) = 60.355, p<.001, η= .015**
Satisfaction with remuneration	2.16 (1.17)	**2.52 (1.14)**	2.27 (1.11)	**F (2, 8176) = 42.287, p<.001, η= .010**

Table 3 presents the results of the linear regression analyses for 3 different work formats: presential, remote work and hybrid work. In the final Model 1 for presential work, the model explained variance slightly increased to 65.9%, $F(11, 5726) = 4.114$, $p < .001$. Key variables that remained significant included personal health ($\beta = .089$, $p < .001$), work ($\beta = .089$, $p < .001$), leadership commitment ($\beta = .244$, $p < .001$), engagement ($\beta = .335$, $p < .001$), and ethics & values ($\beta = .070$, $p < .001$). Additionally, stress management ($\beta = 0.017$, $p = 0.180$) and eating habits ($\beta = –0.031$, $p < 0.001$) also showed associations with the outcome. Interestingly, smoking ($\beta = –.018$, $p = .024$) was negatively associated, while alcohol consumption ($\beta = .007$, $p = .448$) and physical activity ($\beta = –.012$, $p = .132$) did not show significant effects. In the final Model 2 for remote work, the model the explained variance slightly increased to 69.0%, $F(11, 882) = 2.812$, $p < .001$. Key variables that remained significant included ethics & values ($\beta = .112$, $p < .001$), leadership commitment ($\beta = .234$, $p < .001$), engagement ($\beta = .239$, $p < .001$), personal health resources ($\beta = .099$, $p < .001$), and work environment ($\beta = .130$, $p < .001$). Additionally, stress management ($\beta = .079$, $p = .009$) and sleeping habits ($\beta = –.046$, $p = .029$) emerged as significant predictors. Notably, smoking ($\beta = –.056$, $p = .003$) was negatively associated, while alcohol consumption ($\beta = .001$, $p = .967$) and physical activity ($\beta = .011$, $p = .560$) did not show significant effects. In the final Model 3 for hybrid work, the model explained variance slightly increased to 71.3%, $F(11, 1302) = 0.855$, $p = .592$. Variables that remained significant included ethics & values ($\beta = .079$, $p = .002$), leadership commitment ($\beta = .290$, $p < .001$), engagement ($\beta = .228$, $p < .001$), risk factors at work – mental health ($\beta = –.067$, $p = .001$), community ($\beta = .084$, $p = .001$), personal health resources ($\beta = .032$, $p = .073$), and work environment ($\beta = .125$, $p < .001$). However, health-related behaviors like smoking ($\beta = –.013$, $p = .351$), alcohol consumption ($\beta = .001$, $p = .470$), and physical activity ($\beta = –.006$, $p = .809$) were not significantly associated with the outcome.

Table 3. Regression (3 format of work)

		Non-standard coefficients		Standardized coefficients	
		B	*Standardized error* *β*	*t*	*p*
Model 1 - **Presential**					
Model 1	(Constant)	0.513	0.094	5.487	<.001
	Sex	-0.061	0.019	-3.288	.001
	Age	-0.005	0.001	-6.775	<.001
	Chronic Illness (Yes or No?)	-0.001	0.018	-0.061	.951
	Ethics & Values	0.070	0.015	4.609	<.001
	Commitment of Leadership	0.244	0.014	16.912	<.001
	Engagement	0.335	0.009	36.107	<.001

	Risk Factors at Work– Mental Health	-0.033	0.011	-3.037	.002
	Physical Environment	0.019	0.008	2.277	.023
	Community	0.020	0.011	1.740	.082
	Personal Health Resources	0.090	0.009	9.825	<.001
	Work Environment	0.089	0.004	20.146	<.001
	Stress Management	0.017	0.013	1.341	.180
	Eating habits	-0.031	0.007	-4.365	<.001
	Stress levels	-0.002	0.009	-0.176	.861
	Sleeping habits	0.004	0.009	0.441	.659
	Physical Activity Habits	-0.012	0.008	-1.506	.132
	Smoking	-0.018	0.008	-2.264	.024
	Alcohol Consumption (> 2)	0.007	0.010	0.759	.448
	Consumption of amphetamines or other substances	0.005	0.025	0.187	.852
	Use of psychotropic drugs	-0.006	0.006	-0.898	.369
	Screen time (work)	0.032	0.009	3.693	<.001
	Screen time (leisure)	-0.008	0.012	-0.655	.512
Model 2 **Remote work**					
Model 2	(Constant)	0.414	0.252	1.644	.101
	Sex	0.008	0.038	0.206	.836
	Age	-0.007	0.002	-3.756	<.001
	Chronic Illness (Yes or No?)	0.017	0.045	0.371	.711
	Ethics & Values	0.132	0.035	3.797	<.001
	Commitment of Leadership	0.171	0.033	5.177	<.001
	Engagement	0.284	0.025	11.463	<.001
	Risk Factors at Work– Mental Health	-0.060	0.024	-2.532	.012
	Physical Environment	0.008	0.019	0.446	.656
	Community	0.049	0.031	1.561	.119
	Personal Health Resources	0.099	0.021	4.719	<.001
	Work Environment	0.130	0.011	11.758	<.001
	Stress Management	0.079	0.030	2.600	.009
	Eating habits	-0.034	0.018	-1.869	.062
	Stress levels	-0.040	0.022	-1.819	.069
	Sleeping habits	-0.16	0.022	-0.739	.460
	Physical Activity Habits	0.011	0.018	0.583	.560
	Smoking	-0.056	0.019	-2.976	.003
	Alcohol Consumption (> 2)	0.001	0.019	0.042	.967
	Consumption of amphetamines or other substances	-0.075	0.050	-1.497	.135
	Use of psychotropic drugs	0.035	0.015	2.309	.021
	Screen time (work)	0.015	0.020	0.751	.453
	Screen time (leisure)	0.007	0.027	0.268	.789
Model 3 **Hybrid work**					
Model 3	(Constant)	0.395	0.189	2.085	.037
	Sex	0.030	0.031	0.972	.331
	Age	-0.004	0.001	-2.715	.007
	Chronic Illness (Yes or No?)	-0.051	0.032	-1.559	.119
	Ethics & Values	0.079	0.026	3.066	.002
	Commitment of Leadership	0.290	0.024	12.267	<.001
	Engagement	0.228	0.020	11.485	<.001
	Risk Factors at Work– Mental Health	-0.067	0.019	-3.472	<.001
	Physical Environment	-0.002	0.015	-0.130	.897
	Community	0.084	0.026	3.228	.001
	Personal Health Resources	0.032	0.018	1.795	.073
	Work Environment	0.125	0.009	13.501	<.001
	Stress Management	0.038	0.025	1.536	.125
	Eating habits	0.003	0.013	0.221	.825
	Stress levels	-0.022	0.017	-1.306	.192
	Sleeping habits	0.004	0.017	0.229	.819
	Physical Activity Habits	-0.016	0.014	-1.119	.263
	Smoking	-0.013	0.014	-0.933	.351
	Alcohol Consumption (> 2)	0.012	0.016	0.722	.470
	Consumption of amphetamines or other substances	0.019	0.042	0.438	.662
	Use of psychotropic drugs	0.002	0.011	0.182	.856

Screen time (work)	0.010	0.018	0.555	.579

Discussion

The results enable the characterisation of work formats (hybrid, total face-to-face, and remote work) from an organisational, interpersonal, and individual perspective, as well as the identification of the psychosocial environment and psychosocial risks associated with these three work formats.

In general, the hybrid work format and remote work are associated with a more positive perception of the work environment and the adoption of a healthier lifestyle [7].

Professionals who work remotely tend to have a better perception of their work environment, greater satisfaction with their pay, a healthier diet, and more physical activity. However, it is also these workers who show higher consumption of tobacco, alcohol, and substances and more screen time.

Remote work has become a significant labor alternative, particularly following the COVID-19 pandemic, leading to substantial transformations in the work experience of workers. Evidence suggests that professionals who work remotely tend to report more positive perceptions of their work environment, greater satisfaction with their pay, as well as healthier habits, such as better diet and more physical activity [13]. This configuration may be related to the flexible schedules and autonomy provided by remote work, which contributes to a better work-life balance.

However, these benefits coexist with worrying aspects. Studies have also shown that remote workers have higher rates of alcohol, tobacco, and other substance abuse, as well as spending more time in front of screens [14]. These factors may be related to social isolation, the absence of clear boundaries between work and rest time, and the reduction of face-to-face psychosocial support mechanisms. Thus, although remote work offers perceived advantages in terms of physical and organisational aspects, it requires policies to minimise its adverse effects on mental health and risk behaviours.

Professionals in a hybrid work format have a more positive perception of health and a lower impact of chronic illness. However, they show greater presentism and higher stress levels.

The hybrid work model, which combines remote and on-site work, has gained prominence as a flexible alternative to traditional work arrangements. Research suggests that professionals operating under this format report a more favorable perception of their overall health and experience a reduced impact of chronic conditions [15]. These outcomes are likely associated with the increased autonomy and flexibility inherent in hybrid models, which can facilitate healthier lifestyle choices and improved work-life balance.

Nonetheless, hybrid workers also exhibit elevated levels of presenteeism and stress. Presenteeism—attending work despite being unwell—can undermine productivity and exacerbate long-term health issues. Furthermore, the constant navigation between remote and in-office environments may lead to ambiguity in role expectations and workload boundaries, which can contribute to psychological strain [16]. Thus, while hybrid work can enhance perceived health outcomes, it also requires proactive organizational strategies to mitigate stress and promote sustainable work practices.

Professionals working face-to-face reported higher levels of burnout, greater absenteeism, and a perception of a less healthy work environment in all its dimensions.

Professionals working in face-to-face settings have been shown to report elevated levels of burnout, increased absenteeism, and a more negative perception of the workplace environment across physical, psychological, and organizational dimensions. These findings align with the broader literature on occupational health, which highlights how constant in-person demands, exposure to workplace stressors, and limited flexibility can undermine employee well-being [17]. The absence of autonomy and reduced opportunities for rest or detachment from stressful environments may further contribute to emotional exhaustion and decreased job satisfaction.

Moreover, traditional face-to-face work arrangements often intensify work-related stress due to commuting, rigid schedules, and a lack of control over the work environment. These factors have been consistently associated with higher rates of absenteeism and adverse health outcomes, as employees may resort to taking leave to recover from chronic stress or illness [18]. As such, while physical presence can facilitate social interaction and task coordination, it also demands careful management to avoid overburdening employees and deteriorating workplace climate.

Comparing the factors that best explain the psychosocial environment and psychosocial risks at work in the different work formats, we concluded that in the case of total face-to-face work, what best explains the psychosocial environment is the Commitment of Leadership and the Engagement of professionals, as well as the other dimensions of the work environment except for the physical environment—sociodemographic variables related to age and gender (men and younger professionals with better results). Lifestyle factors, including eating habits, work-related activities, and screen time, also contribute to the psychosocial risks associated with work.

When comparing the main determinants of the psychosocial environment and psychosocial risks across different work arrangements, evidence suggests that in fully face-to-face work contexts, leadership commitment and employee engagement are the most significant explanatory factors. These elements are particularly influential in shaping various dimensions of the psychosocial work environment, including organizational climate, interpersonal relationships, and mental well-being; however, they appear to have a limited influence on the physical work environment [19]. The presence of supportive leadership and a culture that fosters professional involvement can buffer the effects of work-related stress and promote more resilient organizational Dynamics [9].

Additionally, sociodemographic variables—particularly age and gender—appear to contribute to psychosocial outcomes. Findings indicate that male and younger employees tend to report more favorable perceptions of the psychosocial environment, potentially reflecting generational and gendered differences in coping strategies and work expectations [20]. Moreover, lifestyle factors such as dietary habits, substance use, and screen time during work hours also emerge as relevant predictors of psychosocial risk, highlighting the interplay between personal behaviors and workplace mental health. This highlights the importance of integrative organizational interventions that consider both structural and individual-level factors in fostering healthy work environments.

Regarding hybrid work, we found that the overall positive assessment of the organisation, leadership commitment, and professional engagement best explain the psychosocial environment, along with other dimensions of the work environment, except for the physical environment and health resources. Younger professionals are associated with a better psychosocial environment.

In the context of hybrid work arrangements, the psychosocial environment appears to be most strongly influenced by a generally positive appraisal of the organization, leadership commitment, and professional engagement. These factors play a central role in shaping key psychosocial dimensions such as social support, role clarity, and perceived fairness while having less influence over the physical environment and access to health-related resources [21]. A favorable organizational climate in hybrid settings appears to reflect adaptive leadership practices and a culture that values flexibility and mutual trust, both of which are crucial for maintaining employee well-being and motivation when working across diverse locations.

Furthermore, age-related patterns indicate that younger professionals tend to report more positive psychosocial experiences within hybrid models. This may be attributed to younger workers' greater digital fluency, adaptability to change, and preference for work-life integration, which aligns with the flexible nature of hybrid work [22]. These findings underscore the importance of tailoring organizational strategies to diverse demographic profiles, as well as enhancing leadership behaviors and engagement initiatives to foster resilient and inclusive work environments.

Concerning total remote work, we found that the overall positive assessment of the organisation, the Engagement of professionals, and the Commitment of leadership best explain the psychosocial environment. Additionally, the other dimensions of the work environment, except for the physical environment and community involvement, also play a role. Younger professionals are associated with a better psychosocial environment. Stress management skills, labour, and substance abuse also support the explanation of the psychosocial environments of professionals in total remote work.

In fully remote work arrangements, the psychosocial environment is primarily shaped by employees' overall positive evaluation of the organization and their levels of engagement, followed by the perceived commitment of leadership. These factors are crucial in fostering a sense of belonging and purpose in remote settings, where physical separation from the organizational infrastructure and peers can otherwise lead to isolation and disengagement [23]. While the physical work environment and community involvement appear to exert less influence in remote contexts, aspects such as organizational culture, autonomy, and communication quality gain prominence in explaining how employees perceive their psychosocial surroundings.

Moreover, younger professionals are consistently associated with more favorable psychosocial environments in remote settings, possibly due to their greater adaptability to digital tools and flexible work structures. Additionally, individual-level characteristics—including stress management capabilities, patterns of labor intensity, and substance use—also play a significant role in determining psychosocial outcomes. Professionals with effective coping strategies and healthier lifestyles tend to report better mental well-being and lower psychosocial risk, reinforcing the need for organizations to support not only structural work conditions but also personal development and wellness [22].

The transformation of work arrangements—ranging from fully remote to hybrid and traditional face-to-face formats—has profound implications for the psychosocial work environment and occupational health. Across these modalities, factors such as leadership commitment, professional engagement, and the overall organizational climate consistently emerge as key determinants of employee well-being. These elements not only shape workers' perceptions of their environments but also mediate risks associated with stress, burnout, and disengagement. Notably, the nature and salience of these determinants vary depending on the work format. In face-to-face settings, leadership and engagement are critical for mitigating high levels of burnout and absenteeism. In contrast, in hybrid models, a positive perception of the organization and adaptability among younger professionals are strongly associated with psychosocial resilience. In fully remote work, the role of self-regulation—such as stress management and health-related behaviors—becomes increasingly essential alongside structural organizational factors.

Integrating these insights into a comprehensive workplace health and safety policy framework requires a multidimensional approach. First, organizations must institutionalize participatory leadership and inclusive communication strategies to foster engagement and trust across all work formats [20]. Second, targeted health promotion programs should address both collective and individual-level risks, including mental health literacy, ergonomic interventions, and substance use prevention [1]. Third, policies must be adaptable to demographic diversity**,** recognizing that age, gender, and lifestyle factors interact with work arrangements to influence psychosocial outcomes.

Workplace health promotion must, therefore, extend beyond reactive measures to incorporate proactive, system-level interventions that enhance organizational culture, support autonomy, and promote equitable access to health. In this context, occupational health policies should align with the principles of the World Health Organization's Healthy Workplaces Model, emphasizing the interconnectedness of physical, psychosocial, and organizational dimensions of work. By integrating these principles into organizational structures and practices, employers can sustainably enhance employee well-being, productivity, and resilience in an evolving work environment.

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