

Insights From A Real-Time Survey During COVID-19 On The Dynamics Of Work-Life Balance, Well-Being, And Perceived Stress Of South Indian IT Professionals Contributors :

Vani K.V.¹, Dr. Vijaya Majumdar², Dr. Aarti Jagannathan³, Dr. Aaditi Lakshmana⁴, Dr. Vijaya Majumdar⁵

¹Department of Life Science, Swami Vivekananda Yoga Anusandhana Samsthana, Bangalore, Karnataka, India.

²Department of Life Science, Swami Vivekananda Yoga Anusandhana Samsthana, Bangalore, Karnataka, India

³Department of Psychiatric Social Work, National Institute of Mental Health and Neurosciences (NIMHANS), Hosur Road, Bangalore, Karnataka, India Third Author

⁴Centre for Classical Homeopathy, Bangalore, Karnataka, India Fourth Author

⁵Professor, Division of Life Science, Swami Vivekananda Yoga Anusandhana Samsthana, Bangalore, Karnataka, India-560105, vijaya.majumdar@svyasa.edu.in

Abstract:

BACKGROUND: The COVID-19-imposed work-from-home (WFH) policy was an unprecedented work-culture challenge amongst Indian IT (Information Technology) professionals, witnessing the ferocious second wave of COVID-19. Hence, an online survey was conducted to assess WFH's real-time consequences amidst the pandemic on employees' mental health attributes (work-life balance, well-being, and perceived stress) and the related lifestyle factors in IT professionals from South India.

Methods and Materials: An online survey between May and June 2021 (second wave) accumulated 855 responses from the major IT hubs of South India. The variables included were the WHO Well-being Index-5, the Perceived Stress scale-4, and self-reported responses regarding work-life balance (WLB) and lifestyle changes (substance use, physical activity, dietary choices, and sleep quality) during and before the pandemic.

Results: Participants (aged 20-60) exhibited low well-being (48.77%) and high stress (72.93%) with no significant change in self-reported scores of WLB (before COVID-19, mean =3.88 (SD=1.1) vs. during COVID-19, mean =3.87 (SD=1.19), P=0.803). The latter could be justified by the almost sustained status of sleep quality scores (before covid-19, 3.48 (0.9) vs. during covid-19, 3.44 (1.02), P=0.218) and trends of positive behavioral adaptations [healthy dietary choices (43.7%) along with sedentary to physical activity transitions (22%)], negating the effect of increased working hours.

Conclusions: The observed decline in mental health indicators, such as low well-being and stress, among Indian IT professionals raises concerns about potential health risks. Meanwhile, findings on healthy lifestyle changes during the pandemic support the development of worksite and online wellness programs to improve mental and physical health outcomes further.

Keywords: COVID-19; Home-based working; Mental wellbeing; IT professionals; Work-life balance; Lifestyle changes

1. INTRODUCTION

The outbreak of the COVID-19 pandemic in late 2019 triggered an unprecedented global crisis, encouraging the World Health Organization (WHO) to declare it a public health emergency on January 30, 2020 [1]. The virus was declared a pandemic because of its rapid spread, compelling nations to control it worldwide [2]. The far-reaching consequences of the COVID-19 pandemic on global health go beyond the immediate risks of infection, substantially impacting both physical and mental well-being [3]. Across the globe, governments have imposed lockdown measures to curb the spread of the virus, which has significantly transformed the functioning of societies [3]. Remote work was embraced as it was crucial to protect public health and contain the spread of the virus [4] which led to a shift in work dynamics from office-centric to home-based [5].

One of the most critical shifts occurred in the professional sphere, as work dynamics shifted from office-centered to home-based [5]. This measure reshaped the traditional work from an office culture to a remote one, posing distinctive challenges and providing opportunities. Numerous challenges, including

familiarization with new work dynamics and mixed patterns of the individual- and work-related aspects, hindered and facilitated WFH during the COVID-19 outbreak [5], [6]. In an early report using 2225 usable responses from 53 countries in mid-September 2020, Ralph et al. highlighted the pandemic's negative impact on software developers' well-being and productivity [7]. The IT sector in India is the largest employment sector, contributing to about 10% of the country's gross domestic product [8], which witnessed a tremendous psychological burden imposed by sudden social isolation and shifts in work culture, particularly the imposed mandatory work-from-home (WFH) [9]. When the country was witnessing a ferocious second wave of COVID-19 in early 2021, we recognized that adequate real-time data was lacking on the plausible mental health sequelae and lifestyle changes for Indian IT professionals [10].

Therefore, we deemed it essential to collect real-time data during India's second wave of COVID-19 (April to May 2021) through a cross-sectional online survey. This aimed to understand the mental health impact on IT professionals regarding key health-related attributes (work-life balance, well-being, and perceived stress) and how they relate to lifestyle factors during the unprecedented WFH period caused by COVID-19. The study hypothesized that the insights gained could help shape future work-related policy frameworks for the IT sector, even after the pandemic and the shift toward hybrid work models.

2. METHODS

2.1 Participants

The study focused on IT professionals from South India, aged 20 to 60, working remotely full-time during the COVID-19 pandemic, and in their most economically and technically productive years. The Institutional Ethical Committee of Swami Vivekananda Yoga Anusandhana Samsthana (S-VYASA), Bangalore, India, approved the study RES/IEC-SVYASA/189/2021 on 13/01/2021, along with CTRI registration number-CTRI/2021/03/032369, ensuring ethical standards in participant recruitment and data collection. The sample was recruited using the snowball method, a non-probability sampling technique. The necessary sample size was determined with online sample size calculators (<https://www.calculator.net/sample-size>). The diversity in age, gender, and educational background helps the study capture a wide range of perspectives and experiences among IT professionals working from home during the pandemic.

2.2 Study design

The web-based survey was conducted from May 2021 to June 2021 and captured the evolving context of the second wave of the COVID-19 pandemic. The survey link was shared with potential participants by two companies that assisted with the survey by distributing the survey form to their employees. One company provided a Google Form link for data collection, while the other requested a Microsoft Form. The survey link included key information such as the study's objectives, eligibility criteria, estimated time commitment, and a declaration of voluntary participation and consent. Duplicate entries and responses from individuals who were not IT professionals were excluded, resulting in a final dataset of participants from major IT hub cities in South India (Bengaluru, Hyderabad, Chennai, and Mysuru).

2.3 Measures

The survey instrument, a questionnaire, was carefully developed to identify challenges faced by IT professionals working from home during the pandemic, highlighting changes in their lifestyles and well-being. The survey was distributed via Google and Microsoft Forms, including essential information aligned with the study's objectives. The questionnaire included 41 questions in English, organized into sections: demographics and anthropometric data, health indicators, self-reported comorbidities such as diabetes and hypertension, lifestyle factors (substance use, physical activity, diet, and sleep quality), work-related well-being, and mental health. Concerning lifestyle factors, participants were asked about their behaviors both during and retrospectively before the pandemic. Responses were recorded for choices such as diet (including cereals, pulses, fruits, vegetables, nuts/milk and dairy products, sweetened beverages, eggs, chicken, meat, fish, sweets, ice cream, chocolate, pastries, frozen and ready-to-cook foods, fried foods) and physical activity (yoga, gym, cycling, jogging, walking). Dietary responses from all unhealthy habits were combined to generate scores reflecting poor nutritional choices. A few standalone questions, based on recent reports, assessed participants' perceptions of their substance use frequency and sleep quality. Demographic details included age, gender, educational qualifications, marital status, and questions about how the COVID-19 pandemic affected their work-life balance, stress levels, lifestyle, and mental and physical health. It also covered work-related aspects like working hours and screen time. One question, "Were you able to balance work and personal life?" was used to evaluate self-perceived work-life balance,

with responses on a Likert scale: 5=always, 4=often, 3=sometimes, 2=rarely, and 1=never, asked separately for before and during the pandemic.

The survey includes two validated scales - the Perceived Stress Scale-4 (PSS-4) and the Well-being Index (WHO-5). Self-perceived stress was measured using the 4-item Perceived Stress Scale (PSS-4), with a score range of 0 to 16. Based on previous reports, a stress score of six was used to identify subjects with high stress in this cohort [11]. The Well-being Index (WHO-5) was another validated measure included in the survey to assess participants' overall well-being. The WHO-5 scale, consisting of five items, scores from 0 to 100, with higher scores indicating better well-being. The use of established, validated scales with reported internal consistency, Cronbach's alpha of 0.83 to 0.92 for WHO-5 well-being and 0.77 for PSS-4, ensured a reliable assessment of mental well-being and stress levels. [12] Furthermore, a self-reported history of diabetes, hypertension, and musculoskeletal pain was documented.

Sample size

The sample size of n=666 was determined using an online sample size calculator (<https://www.calculator.net/sample-size>) based on assumptions of alpha = 5%, confidence level = 99%, margin of error = 5%, and an estimated population proportion of approximately 40% for the primary survey outcomes (poor score on the WHO well-being index). Additionally, accounting for a non-response rate of 25%, the final calculated sample size was n=833.

Statistical Analysis

The statistical analyses were conducted using SPSS software version 28. The survey ensured anonymity to promote honest responses. For demographic variables, descriptive statistics such as frequencies and percentages were reported. Because of the ordinal nature of the variables, non-parametric tests, specifically the Wilcoxon signed-rank test and McNemar's test, were appropriately used to evaluate significant differences between the before and during COVID-19 periods. Additionally, linear regression analyses examined the relationships between demographic and lifestyle factors (dietary intake, physical activity, sleep quality, screen time, etc.) and the study outcome variables: work-life balance, well-being, and PSS scores. The associations were considered significant if the P-value was less than 0.05.

3. Results

The two-month online survey aimed to explore changes in the work and lifestyle of IT employees during the second COVID-19 lockdown and the following period. Eight hundred eighty responses were collected, representing samples from three major IT hub cities in South India. After careful data cleaning, which involved removing 25 duplicate entries and responses from individuals with professions other than IT, a final dataset of 855 participants was obtained.

3.1 Demographic characteristics

The survey encompassed a diverse age range, with 44.5% of respondents falling within the 26-35 age group, followed by 34.6% in the 18-25 age category (Table 3.1). Gender distribution revealed that 58.4% of respondents were male, while 41.6% were female. Educational qualifications varied, with 57.3% of respondents being graduates, 27% holding diplomas, 9.4% being postgraduates, and 4.8% having above postgraduate qualifications. Most participants were single (54.9%), followed by those married (44.3%). Divorced and widowed individuals constituted a smaller percentage (<1%). During COVID-19, most respondents, or 28.7%, reported a screen time of 10 to 12 hours daily. Additionally, 12.6% spent less than 8 hours, 28.7% spent 8 to 10 hours, 20.9% spent 12 to 14 hours, and 9.1% spent 14 hours or more daily. Concerning WFH, 71.6% reported working from home during COVID-19, compared to 28.4% who had worked from home before the onset of the COVID-19 pandemic. Overall, WHO well-being scores were mean=13.49 (SD=6.16), with the prevalence of low well-being at 48.77%.

Table 3.1: Summary of Socio-demographic variables of the survey participants.

Variable, n=855		N (%)
Age groups in years, n (%)	18-25	296 (34.6)
	26-35	381(44.5)
	36-45	134 (15.7)
	46-55	44 (5.1)
Gender, n (%)	Male	499 (58.4)
	Female	356 (41.6)
Education, n (%)	Above Post-Graduation	41 (4.8)
	Post-graduation	80 (9.4)
	Graduate	490 (57.3)

	Diploma	231 (27)
	Undergraduate	13 (1.5)
Marital status, n (%)	Single	469 (54.9)
	Married	379 (44.3)
	Divorced	6 (0.7)
	Widow	1 (0.1)
Work from home (WFH), n%	WFH started during COVID-19	612 (71.6)
	WFH before COVID-19	243 (28.4)
Average screen time spent per day during COVID-19, n (%)	Less than 8 hours	108 (12.6)
	8 to 10 hours	245 (28.7)
	10 to 12 hours	245 (28.7)
	12 to 14 hours	179 (20.9)
	14 and above	78 (9.1)
Stress Levels		
Perceived Stress Score, mean (SD)		6.79 (2.59)
High perceived stress, n (%)		625 (72.93)
Well-being score		
WHO Well-being index-5, mean (SD)		13.49 (6.16)
Low well-being, n (%)		417 (48.77)
Diabetes, n (%)		16 (1.87)
Hypertension, n (%)		13 (1.52)

Categorical variables are reported as n (%), and continuous variables are expressed as mean (SD). Low well-being was defined as a WHO Well-being index score of <13.

3.2 Lifestyle-related Behavioral Factors

In Table 3.2, the descriptive insights on food and lifestyle reveal that 71% (607) of survey participants identified as non-vegetarians, while 29% (248) preferred a vegetarian diet. Regarding changes in dietary habits during remote work, 48.2% (412) reported no change, 33.8% (289) experienced an increase, and 18% (154) noted a decrease. Additionally, during moments of stress, 37.7% mentioned no change in dietary intake, 25.1% reported an increase, and 37.2% reported a reduction. Musculoskeletal pain was experienced by 43.4% during COVID-19. Concerning perceptions about changes in body weight during remote work, 41.8% noted stability, 45.6% reported weight gain, and 12.6% observed weight loss. In terms of alcohol, tobacco, and related substances, 13.2% reported no changes, 3.5% (30) saw an increase, and 11.7% experienced a decrease. Notably, a significant 71.6% (612) of respondents emphasized that their abstinence from alcohol or tobacco remained unaffected by working from home.

Table 3.2: Summary of behavioural perceptions linked to work from home

Variable		Frequency (Percentage)
Overall food intake during WFH	No change	412 (48.2)
	Increased	289 (33.8)
	Decreased	154 (18)
Stressful eating*	No change	322(37.7)
	Food intake increased	215(25.1)
	Food intake decreases	318(37.2)
Body weight due to WFH	No change	357(41.8)
	Weight Gain	390(45.6)
	Weight Loss	108(12.6)
Change in substance use (alcohol, tobacco) due to WFH	No changes	113(13.2)
	Increased	30(3.5)
	Decreased	100(11.7)
	Not applicable	612(71.6)
Musculoskeletal pain during COVID-19	Yes	371(43.4)
	No	484(56.6)

WFH refers to work-from-home. *Perception of changes in food intake when stressed

3.3 Dietary factors

Table 3.3 indicates that about 43.7% of respondents increased their intake of cereals, pulses, fruits, vegetables, and nuts during COVID-19, with a statistically significant McNemar test result ($p < 0.05$). Similarly, 24.6% began consuming milk and dairy products during the pandemic, a change that is statistically significant at $p < 0.01$. Conversely, the pandemic caused substantial decreases in the consumption of sweetened beverages (59.3%), eggs, chicken, meat, or fish (11.2%), sweets, ice cream, chocolate, pastries, etc. (47.2%), and fried foods (35.2%), all supported by p -values < 0.01 . Notably, while 40.3% stopped eating frozen and ready-to-cook foods during COVID-19, this change did not reach statistical significance ($p > 0.05$).

Table 3.3: Comparison of dietary choices between before and during COVID-19 for (n=855): McNemar's test

Dietary Choices Before-COVID-19	Response	Dietary Choices during COVID-19		Total	McNemar's Chi-square	p-value
		No	Yes			
Cereals, pulses, fruits, vegetables, and nuts	No	85(56.3%)	66(43.7%)	151	4.898	0.027
	Yes	42(6.0%)	662(94.0%)	704		
Milk and milk products	No	205(75.4%)	67(24.6%)	272	12.500	**
	Yes	31(5.3%)	552(94.7%)	583		
Sweetened beverages (Pepsi, Coke)	No	620(95.2%)	31(4.8%)	651	52.112	**
	Yes	121(59.3%)	83(40.7%)	204		
Eggs, chicken, meat, fish	No	262(89.7%)	30(10.3%)	292	11.011	**
	Yes	63(11.2%)	500(88.8%)	563		
Sweets, ice cream, chocolate, pastries, etc.	No	436(91.2%)	42(8.8%)	478	82.841	**
	Yes	178(47.2%)	199(52.8%)	377		
Frozen and ready-to-cook food	No	673(94.7%)	38(5.3%)	711	3.760	0.052
	Yes	58(40.3%)	86(59.7%)	144		
Fried food	No	425(94.0%)	27(6.0%)	452	76.899	**
	Yes	142(35.2%)	261(64.8%)	403		

3.4 Physical activity

Table 3.4 explains that 8.2% of non-Yoga practitioners and 30.7% of non-walkers/joggers began practicing during COVID-19. Conversely, 62.4% of those who used to go to the gym stopped. Overall, there was a 22% increase in respondents becoming physically active during the pandemic. Among those already active, 55% maintained their activity levels during COVID-19.

Table 3.4: Comparison of responses for physical activity/choices before and during the COVID-19 period (n=855): McNemar's test

Before-COVID-19 Response		During-COVID-19 Response		Total	McNemar's Chi-square statistic	p-value
No	Yes	No	Yes			
Overall Physical Activity	No	146	512	658	15.584	**
	Yes	104	85	189		
Yoga	No	669	60	729	13.600	**
	Yes	25 (24.0%)	79 (76.0)	104		
Gym	No	629	34	663	33.752	**
	Yes	103	62	165		

Walking/Jogging	No	No	Yes	316	15.815	**
	Yes	219	97	530		
Sports	No	No	Yes	679	~	~
	Yes	167	~	167		
Cycling	No	No	Yes	779	0.000	1.000
	Yes	747	32	68		

* Indicates significant at $P < 0.05$ ** Indicates significant at $P < 0.01$

3.5 Association of demographic, lifestyle, and mental health parameters:

Table 3.5 presents the mean, standard deviation (SD), and median values for the continuous indicators of health and work-related factors, Sleep Quality, Work-Life Balance (WLB), Working Hours per Day, and Physical Activity Time before and during COVID-19. The Wilcoxon signed rank test showed a significant increase in working hours per day during COVID-19 compared to before [9.97 (SD = 1.44) vs. 9.20 (SD = 1.17), $P < 0.001$]. However, no statistically significant differences between the two periods before and during COVID-19 were found in sleep quality and work-life balance ($P > 0.05$). Notably, there was a significantly higher mean score for physical activity time before COVID-19, 5.92 (SD=7.23) hours, than during COVID-19, 3.56 (SD=4.94) hours ($P < 0.01$).

Table 3.5: Comparison of parameters related to work-life balance and its modulators before and after COVID-19 – Wilcoxon Ranked Test

Indicators	Timeline	Mean (SD)	p-value
#Sleep Quality	Before Covid 19	3.48 (0.9)	0.218
	During Covid 19	3.44 (1.02)	
#Work-life balance	Before Covid 19	3.88 (1.1)	0.803
	During Covid 19	3.87 (1.19)	
Working hours per day (hours)	Before Covid 19	9.20 ± 1.17	0.000**
	During Covid 19	9.97 ± 1.44	
Physical activity time per week (hours)	Before Covid 19	5.92 ±7.23	0.000**
	During Covid 19	3.56 ±4.94	

Variables are presented as mean (standard deviation). * Indicates significant at $P < 0.05$, ** Indicates significant at $P < 0.01$, # Refers to variables measured as Likert

As shown in Table 3.6, work-life balance was positively associated with sleep quality scores ($\beta=0.29$, 95% CI=0.27 to 0.41, $P < 0.001$), diagnosis of diabetes ($\beta=0.06$, 95% CI=0.02 to 1.05, $P=0.04$) and before covid-19 pandemic scores of work-life balance $\beta=0.31$, 95% CI=0.27 to 0.39, $P < 0.001$, age, and female gender were negatively associated with work-life balance.

WHO-5 well-being index was positively associated with self-reported sleep quality, $\beta=0.31$, 95% CI=5.93 to 8.98, $P < 0.001$; and Work-life balance, $\beta=0.24$, 95% CI=3.65 to 6.30, $P < 0.001$, but negatively associated with sedentary lifestyle, $\beta=-0.15$, 95 CI=-11.45 to -5.04, $P < 0.001$. The Perceived Stress Scale (PSS) exhibited negative associations with age ($\beta=-0.14$, 95 CI=-0.07 to -0.02, $P < 0.001$) and sleep quality ($\beta=-0.20$, 95% CI=-0.69 to -0.34, $P < 0.001$) and positive associations with female gender ($\beta=0.11$, 95% CI=0.21 to 0.98, $P < 0.001$).

Table 3.6: Association between demographic and lifestyle variables and indices of mental health.

	Work-Life Balance			WHO-5 well-being			Perceived Stress Score (PSS)		
	β	95.0% CI for β	P value	β	95.0% CI for β	P value	β	95.0% CI for β	P value
Demographic and anthropometric variables									
Age, years	-0.02	-0.02 to 0.00	0.02	-0.39	-0.39 to 0.05	0.128	-0.07	-0.07 to 0.02	0.00**
Female gender	-0.35	-0.35 to 0.03	0.02*	-6.29	-6.29 to 0.06	0.07	0.11	0.21 to 0.98	0.00**
BMI, Kg/m2	-0.02	-0.02 to 0.01	0.99	-0.34	-0.34 to 0.01	0.88	0.07	0.00 to 0.07	0.06
Education, years	-0.04	-0.04 to 0.05	0.90	-1.54	-1.54 to 0.02	0.27	-0.04	-0.04 to 0.20	0.17
Staying with family	-0.02	-0.02 to 0.05	0.44	-1.17	-1.17 to 0.03	0.34	-0.09	-0.09 to 0.10	0.96
Health indicators									
Sleep quality scores	0.29	0.27 to 0.41	0.00*	0.31	5.93 to 8.98	**	-0.69	-0.69 to 0.34	**
Alcohol use and	-0.06	-0.06 to 0.00	0.79	-1.30	-1.30 to 0.00	0.89	-0.34	-0.34 to 0.00	0.04*
Unhealthy dietary choices	-0.22	-0.22 to 0.06	0.24	-1.89	-1.89 to 3.83	0.50	-0.52	-0.52 to 0.17	0.31
Sedentary lifestyle	-0.50	-0.50 to 0.19	0.00*	-11.45	-11.45 to 0.15	**	-0.07	-0.07 to 0.69	0.11
Comorbidities									
Hypertension	-0.81	-0.81 to 0.28	0.48	-17.34	-17.34 to 0.00	0.23	-1.93	-1.93 to 1.02	0.54
Diabetes	0.02	0.02 to 1.05	0.04*	-14.89	-14.89 to 0.04	0.49	-0.06	-0.06 to 2.49	0.06
Work-related factors									
Working hours	-0.43	-0.43 to 0.22	0.00*	-2.29	-2.29 to 0.00	0.94	-0.23	-0.23 to 0.29	0.82
Work-life balance #during/before				0.24	3.65 to 6.30	**	-0.54	-0.54 to 0.23	0.00
Screen time	-0.09	-0.09 to 0.04	0.52	-3.93	-3.93 to 0.12	0.001	-0.12	-0.12 to 0.20	0.63

β refers to standardised beta coefficient; CI refers to confidence interval; * For work-life balance, the variable included in the model was Work life balance before COVID-19; for WHO Well-being and Perceived stress score, the variable included in the model is Work life balance during COVID-19; * refers to P value <0.05, and ** refers to P value <0.001

4. DISCUSSION

The COVID-19 outbreak prompted interventions such as quarantine, isolation, and social distancing, which led employees worldwide to work remotely, especially from home. This study examines the real-time effects of these changes on lifestyle behaviors and health variables among Indian IT professionals, focusing on mental health and behavioral outcomes during the second wave of COVID-19. A direct result of WFH was an increased workload, with average working hours rising from 9.2 to 9.98 hours, supported by recent data. Despite concerns about maintaining work-life boundaries, most individuals managed to sustain a work-life balance during the pandemic (WLB scores before COVID-19, 3.88 (1.1) vs. during COVID-19, 3.87 (1.19), $P=0.803$). This resilience may be partly due to physiological factors, as there was no significant change in sleep quality (before COVID-19, 3.48 (0.9) vs. during COVID-19, 3.44 (1.02), $P=0.218$). Additionally, 22% of participants made efforts to shift from a sedentary lifestyle to a more active one. Interestingly, reports from Brazil and China indicated increased productivity and job satisfaction among software professionals during the COVID-19 pandemic. ID-19 pandemic [6], [13]. Another alarming observation from the survey is the overall poor scores of WHO Well-being, which had already been projected to be a drastic consequence of remote work from home [14]. Findings of a pre-COVID report on IT professionals by Iyer et al. [15] indicate a dip in the average well-being scores during COVID-19 (Pre-COVID study, 16.4 vs. present study, 13.49). The moderate prevalence of low well-being (48.77%) amongst IT professionals also warrants their screening for psychological illnesses, including depression and anxiety [16]. If extrapolated based on an earlier report, there is an indication of approximately a 3-unit annual increase in the scores of depression in participants with the status of low well-being [17]. The notion is further justified by a massive rise in the global prevalence of anxiety and depression in the first year of the COVID-19 pandemic itself, as per the scientific brief released by the World Health Organization.

As expected, there was a significant rise in the prevalence of high perceived stress, with 76.28% of the surveyed population showing this, compared to 56% documented before COVID-19 in India (Mani & Ramesh, 2022). Furthermore, the meta-analysis combined prevalence estimates of 60.7% among healthcare professionals and the general population in India, indicating that IT professionals have relatively worse psychological health (Singh et al., 2021). It is observed that the survey-based findings require clinical attention, given the reported links between perceived stress and various health issues, including immune dysfunction and increased vulnerability to infectious diseases (Cohen & Williamson, 1991), as well as cardiovascular risk. Overall, these findings indicate pandemic-induced precipitation of IT professionals' already existing high-stress job profiles [18]. The gender-wise exhibition of increased stress ($\beta=0.11$) and reduced work-life balance ($\beta=-0.08$) by women compared to men could be underlined by societal and cultural factors, variations in their stress-coping mechanisms, and differences in their perceptions and responses to challenges [19]. Previous studies indicate that, amidst the pandemic, women in the software industry encountered difficulties while working from home, multitasking both household responsibilities and professional demands [20]. Another contemporary study on 934 IT professionals reported that 95% of IT professionals suffered from burnout, with women being more prone to burnout than males [21]. There were also contrary findings that gender does not affect stress [22]. The positive association between stress and substance use highlights the potential reliance on substances as a coping mechanism [23]. Stressful circumstances during the pandemic may contribute to unhealthy coping strategies, impacting sleep quality and overall well-being. As reported earlier, the 36-45-year-old age group showed resilience in handling stress during the pandemic, but were worried about getting easily infected [24].

Mechanistically, the observed implications of WFH on the studied psychological indices could be attributed to psychological stress-related physiological changes. Notably, these physiological changes are known to reflect in concomitant behavioral processes (e.g., increases in behavioral risk factors such as smoking, poor diet, and reduced medication compliance). However, the survey's responses showed mixed lifestyle and behavior change patterns. There were unexpected positive trends for habits related to tobacco and alcohol consumption, with an 11% reported decrease in consumption. However, these findings align with the parallel trend of a reduction in smoking consumption during the pandemic, as observed in a systematic review of 58,052 participants by Almeda & Gómez-Gómez (2022). Reduced substance use could be attributed to the fear of becoming infected by COVID-19. A significant sector of the population in the survey (71.6%) also retained its abstinence from substance abuse, highlighting the resilience and persistence of healthy habits despite the upheavals imposed by the adversities. Along similar lines, we also find increased adoption of healthy dietary choices, which could be associated with the

influence of the timely advisory guidelines provided by the WHO [25]. However, as mentioned earlier, the study found contradictory findings regarding support for increased snacking and adverse eating habits followed by weight gain during the pandemic [26]. Parallel reports on the Indian population support an increase in awareness concerning dietary habits (decrease in sweetened beverage consumption), specifically in terms of consumption of immune-boosting foods [27]. The reduction in consumption of junk food could be an outcome of the motivation to manage weight during the pandemic. The survey also reflected this, where 45.6% of respondents reported increased weight gain.

The present study results on physical activity engagement per week before and during COVID-19 (before COVID-19, 5.92 (7.23) vs. during COVID-19, 3.56 (4.94) hours, respectively) align with the primary trend of decreased physical activity during the pandemic [28]. Therefore, individuals may have found maintaining their pre-pandemic exercise routine challenging due to the closure of gyms, recreational spaces, and restrictions on outdoor activities. Parallely, the survey also exhibited a 22% transition from sedentary to physical activity amongst pre-COVID sedentary people, aligning with the recognized importance of healthy living, including physical activity during the period of quarantine, isolation, and social distancing recommended by the World Health Organization (WHO). Amidst the logistical challenges, we find an increased focus on health, reflected by 8.2% of non-Yoga practitioners practicing yoga during COVID-19 and a significant portion (30.7%) of non-walkers/joggers initiating physical activities. However, the comparatively limited interest in yoga could be due to remote work situations; instead, walking/jogging was more commonly opted for to mitigate the risk of contracting COVID-19.

4.1 Limitations of the Study

Despite offering valuable insights, this study has several limitations. The regional focus on South India restricts generalizability, and the survey's duration from May to June 2021 captures a specific pandemic timeframe, potentially missing evolving dynamics. The study's cross-sectional design allows for identifying correlations between different variables but falls short of establishing causation. The reliance on self-reported data introduces the possibility of response bias, where participants may provide socially desirable answers or misrepresent their experiences. Acknowledging these limitations, the findings of this study provide valuable insights into the work-from-home situation that is persisting post-pandemic.

5. Conclusion

Overall, there was a precipitation of adverse mental health, indicated by moderate to high dominance of low well-being and stress in the Indian IT sector. Clinically, these findings set the alarm for the high likelihood of progression of the population towards several health sequelae, spanning depression to cardiovascular diseases. As of mid-2024, discussing the effects of COVID-19 becomes redundant; on the contrary, the observed physiological resilience and positive behavioural adaptations amidst the stressful pandemic indicate chances of successful implementation and scale-up of rigorously conducted worksite- and online coach-guided fitness programs to aid in halting further mental and physical health deteriorations.

Acknowledgments

The authors have no acknowledgments.

Declaration of generative AI and AI-assisted technologies in the writing process

The authors have not used the AI tool except Grammarly for English checking.

Conflict of interest

The authors declare that they have no conflict of interest.

Funding

The authors report no funding.

REFERENCES

- [1] D. Cucinotta and M. Vanelli, "WHO Declares COVID-19 a Pandemic," *Acta Biomed.*, vol. 91, no. 1, pp. 157–160, 2020, doi: 10.23750/ABM.V91I1.9397.
- [2] Y. R. Guo et al., "The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak- A n update on the status," *Mil. Med. Res.*, vol. 7, no. 1, Mar. 2020, doi: 10.1186/s40779-020-00240-0.
- [3] T. Lancet, "Editorial India under COVID-19 lockdown," *Lancet*, vol. 395, no. 10233, p. 1315, 2020, doi: 10.1016/S0140-6736(20)30938-7.
- [4] C. Birimoglu Okuyan and M. A. Begen, "Working from home during the COVID-19 pandemic, its effects on health, and recommendations: The pandemic and beyond," *Perspect. Psychiatr. Care*, vol. 58, no. 1, pp. 173–179, 2022, doi: 10.1111/ppc.12847.
- [5] Y. Xiao, B. Becerik-Gerber, G. Lucas, and S. C. Roll, "Impacts of Working from Home during COVID-19 Pandemic on Physical and Mental Well-Being of Office Workstation Users," *J. Occup. Environ. Med.*, vol. 63, no. 3, pp. 181–190, 2021, doi: 10.1097/JOM.0000000000002097.

- [6] L. Bao et al., "How does working from home affect developer productivity?—A case study of Baidu during the COVID-19 pandemic," SpringerL Bao, T Li, X Xia, K Zhu, H Li, X YangScience China Inf. Sci. 2022 •Springer, vol. 65, no. 4, p. 15, Apr. 2022, doi: 10.1007/s11432-020-3278-4.
- [7] P. Ralph et al., "Pandemic programming: How COVID-19 affects software developers and how their organizations can help," *Empir. Softw. Eng.*, vol. 25, no. 6, pp. 4927–4961, 2020, doi: 10.1007/s10664-020-09875-y.
- [8] P. Banerjee and S. R. M. Gavaravarapu, "Wellness programmes in the workplace in India," *Lancet Public Heal.*, vol. 3, no. 11, p. e515, 2018, doi: 10.1016/S2468-2667(18)30199-3.
- [9] D. Sengupta and D. Al-Khalifa, "Pandemic imposed remote work arrangements and resultant work-life integration, future of work and role of leaders—A qualitative study of Indian millennial workers," *Adm. Sci.*, vol. 12, no. 4, p. 162, 2022.
- [10]D. Varshney, "How About the Psychological Pandemic? Perceptions of COVID- 19 and Work - Life of Private Sector Employees – A Qualitative Study," *Psychol. Stud. (Mysore).*, vol. 66, no. 3, pp. 337–346, 2021, doi: 10.1007/s12646-021-00605-y.
- [11]S. L. Warttig, M. J. Forshaw, J. South, and A. K. White, "New, normative, English-sample data for the short form perceived stress scale (PSS-4)," *J. Health Psychol.*, vol. 18, no. 12, pp. 1617–1628, 2013.
- [12]M. L. Lara-Cabrera, I. P. Mundal, and C. De Las Cuevas, "Patient-reported well-being: psychometric properties of the world health organization well-being index in specialised community mental health settings," *Psychiatry Res.*, vol. 291, p. 113268, 2020.
- [13]P. Ralph et al., "Pandemic programming: How COVID-19 affects software developers and how their organizations can help," *Empir. Softw. Eng.*, vol. 25, no. 6, pp. 4927–4961, 2020, doi: 10.1007/s10664-020-09875-y.
- [14]H. S. Randeve et al., "Exercise decreases plasma total homocysteine in overweight young women with polycystic ovary syndrome," *J. Clin. Endocrinol. Metab.*, vol. 87, no. 10, pp. 4496–4501, 2002, doi: 10.1210/jc.2001-012056.
- [15]S. Iyer, J. Kharche, P. Ashok, G. Godbole, and S. Vaidya, "Assessment and correlation of the World Health Organization 5 well-being index and blood pressure in software professionals," *Natl. J. Physiol. Pharm. Pharmacol.*, p. 1, Jan. 2018, doi: 10.5455/njppp.2018.8.0207808032018.
- [16]C. Winther and S. Dinesen, "The WHO-5 Well-Being Index : A Systematic Review of the Literature," pp. 167–176, 2015, doi: 10.1159/000376585.
- [17]F. Grant, C. Guille, and S. Sen, "Well-being and the risk of depression under stress," *PLoS One*, vol. 8, no. 7, p. e67395, 2013.
- [18]N. Ramesh, B. Joseph, P. R. Kiran, J. Kurian, and A. T. Babu, "Perceived professional stress levels among employees in an information technology company, Bangalore," *Natl. J. Community Med.*, vol. 7, no. 04, pp. 231–234, 2016.
- [19]S. W. Hayes, J. L. Priestley, B. A. Moore, and H. E. Ray, "Perceived stress, work-related burnout, and working from home before and during COVID-19: An examination of workers in the United States," *Sage Open*, vol. 11, no. 4, p. 215824402111058190, 2021.
- [20]A. Jasrotia and J. Meena, "Women, work and pandemic: An impact study of COVID-19 lockdown on working women in India," *Asian Soc. Work Policy Rev.*, vol. 15, no. 3, p. 282, Oct. 2021, doi: 10.1111/ASWP.12240.
- [21]A. Kumaresan et al., "Prevalence of burnout syndrome among Work-From-Home IT professionals during the COVID-19 pandemic," *Work*, vol. 71, no. 2, pp. 379–384, 2022, doi: 10.3233/WOR-211040.
- [22]A. Johri and P. V. Anand, "Life Satisfaction and Well-Being at the Intersections of Caste and Gender in India," *Psychol. Stud. (Mysore).*, 2022, doi: 10.1007/S12646-022-00667-6.
- [23]I. Romano et al., "Substance-related coping behaviours among youth during the early months of the COVID-19 pandemic," *Addict. Behav. Reports*, vol. 14, p. 100392, 2021.
- [24]E. Sterina, A. P. Hermida, D. J. Gerberi, and M. I. Lapid, "Emotional resilience of older adults during COVID-19: A systematic review of studies of stress and well-being," *Clin. Gerontol.*, vol. 45, no. 1, pp. 4–19, 2022.
- [25]C. De Faria Coelho-Ravagnani, F. C. Corgosinho, F. L. F. Z. Sanches, C. M. M. Prado, A. Laviano, and J. F. Mota, "Dietary recommendations during the COVID-19 pandemic," *Nutr. Rev.*, vol. 79, no. 4, pp. 382–393, Apr. 2021, doi: 10.1093/NUTRIT/NUAA067.
- [26]A. Sidor and P. Rzymiski, "Dietary Choices and Habits during COVID-19 Lockdown: Experience from Poland," *Nutrients*, vol. 12, no. 6, Jun. 2020, doi: 10.3390/NU12061657.
- [27]Z. Y. Motiwala, I. R. Khan, S. Ahmad, and A. J. Abedi, "Dietary Changes among the Indian Population during the Covid-19 Pandemic: A Cross-Sectional Study," *Indian J. Community Med.*, vol. 48, no. 1, pp. 137–141, 2023.
- [28]D. Rawat, V. Dixit, S. Gulati, S. Gulati, and A. Gulati, "Impact of COVID-19 outbreak on lifestyle behaviour: A review of studies published in India," *Diabetes Metab. Syndr. Clin. Res. Rev.*, vol. 15, no. 1, pp. 331–336, 2021.