

Article

Evaluating the Impact of Remote Work on Employee Health and Sustainable Lifestyles in the IT Sector

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Abstract

This study comprehensively evaluates the impact of remote work intensity on employee well-being, productivity, and sustainable practices within the IT sector, utilizing a cross-sectional online survey of 1003 employees. Findings reveal that remote work consistently boosts self-rated health, enhances perceived productivity, and promotes the adoption of sustainable workplace practices, with these benefits largely consistent across gender and most age groups. However, its effect on perceived stress is complex and significantly age-dependent, showing increased stress for younger employees (under 25) while mid-career professionals (26–35) experience stress reduction. Perceived stress did not emerge as a statistically significant mediator in the remote work-productivity relationship, suggesting that positive effects on productivity are primarily driven by direct mechanisms such as increased autonomy and flexibility. This research contributes to the Job Demands-Resources and Self-Determination Theory by illuminating how digital work demands and psychological needs are experienced heterogeneously across demographics in the remote context. Practical implications emphasize the need for differentiated stress management strategies tailored to younger employees, as well as a broader promotion of remote work, to enhance sustainable behavior within organizations. Methodologically, the study highlights the value of utilizing large, non-probability datasets, along with carefully constructed proxy scales, and proposes the future integration of AI-powered analytics for deeper insights.

Keywords: remote work; employee well-being; sustainable lifestyle; IT sector; perceived stress; productivity; HR; technostress; work-life balance; organizational support



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1. Introduction

1.1. Research Context and Background

In the contemporary business environment, the importance of striking a balance between professional responsibilities, personal well-being, and sustainability principles is increasingly recognized. The expanded availability of digital technologies and the proliferation of remote work models following the recent global health crisis have prompted both organizations and employees to re-examine conventional frameworks of work time and location. Concurrently, intensifying pressures related to productivity and market competitiveness have been linked to elevated levels of stress, which may contribute to

long-term adverse effects on the physical and mental health of employees. Furthermore, the promotion of sustainable lifestyles within the corporate context extends beyond environmental initiatives to encompass a commitment to human resource management, aiming to foster enduring habits that support employee health and well-being.

Research indicates that employees who are afforded greater autonomy in organizing their work, coupled with clear boundaries between their professional and private lives, report higher levels of satisfaction, lower rates of burnout, and enhanced motivation and engagement [1–3]. Such an approach not only reduces employee turnover and the associated replacement costs but also enhances the organization's reputation as a socially responsible employer [4]. Concurrently, sustainability entails reducing the carbon footprint associated with commuting, promoting digital collaboration tools, and ensuring the responsible use of resources [5]. Balancing work and well-being while promoting environmentally friendly practices can create a synergy between individual health, organizational efficiency, and societal sustainability.

This paper systematically examines the multidimensional impact of remote work intensity on four key outcomes: perceived stress, self-assessed health, work productivity, and the adoption of sustainable practices among employees in the IT sector. The primary objective is to formulate evidence-based recommendations for achieving a lasting equilibrium between work, well-being, and sustainability [6], acknowledging the complex and sometimes contradictory effects that different demographic groups may experience.

1.2. Data Access and Variable Measurement

1.2.1. Data Context and Measurement Approach

The survey utilized in this research was not exclusively designed for the topic “Evaluating the Impact of Remote Work on Employee Health and Sustainable Lifestyles in the IT Sector.” This survey was part of a broader investigation into remote work, specifically examining the impact of the COVID-19 pandemic on employees in the IT sector. Nevertheless, the justification for its use is based on the significant sample size ($n > 1000$) and the quality of the data, which was affirmed in a previously published study using the same dataset [7].

The use of pre-existing, large-scale datasets, even if they require variable transformation, is warranted in the context of several key limitations within the current state of research on remote work:

First, the field is saturated with studies that rely on self-report data. While necessary for measuring subjective experiences such as stress or satisfaction, such data are susceptible to recall and reporting biases [8]. Utilizing a large sample, as in this case, represents a valid strategy for increasing statistical power and mitigating some of these issues, even when employing proxy measures.

Second, the literature is dominated by cross-sectional studies, which provide a point-in-time assessment but cannot establish causal relationships [8]. Actual longitudinal studies, featuring multiple waves of measurement, are scarce but are crucial for understanding the long-term effects of remote work [9,10]. Therefore, the cross-sectional design of this study is typical for this field, and its limitations, rather than being overlooked, should be explicitly stated to provide an impetus for future research.

Third, there is a pronounced lack of standardized and validated measurement scales for key constructs related to remote work [11,12]. Many studies rely on ad-hoc instruments or adapted measures, which complicates the comparison of results and the generalizability of findings [12]. In this light, the approach used in this paper—forming composite scales from existing items—is not an anomaly but rather a reflection of the current state of the field. The methodological contribution of this work, therefore, is not only in testing a substantive model but also in demonstrating the utility of carefully constructed proxy variables from

large secondary datasets, which presents a valuable approach for other researchers facing similar constraints.

Accordingly, the current state of research in this area is characterized by several key limitations that justify the use of existing, large-scale datasets, even when they necessitate the transformation of variables.

1.2.2. Operationalization of Variables and Measurement Fidelity

Five key variables were defined: **Stress_Score**, **Productivity_Score**, **Sustainability_Score**, **Remote_Intensity**, and **SelfRatedHealth**. The internal consistency of the composite scales, confirmed by a Cronbach's alpha coefficient ($\alpha \geq 0.746$), provides a solid initial foundation for their reliability. However, the validity of these measures can be further reinforced by theoretically linking them to established constructions and scales from the recent literature.

- **Stress_Score:** This variable is defined as a “reconstructed PSS-like scale of perceived stress” (Perceived Stress Scale), based on the summation of items from the survey questionnaire (Q24_1-7). This represents a conceptually grounded approach. Its validity can be substantiated through comparison with external benchmarks. For instance, a recent study developed and validated a brief, 5-item “Short Remote Work Stress Scale” (SRWSS), which includes items such as Imbalance, Overworking, Miscommunication, Inactivity, and Insecurity [13]. The items used in our study (Q24_1-7) encompass similar domains of stressors—such as technostress, social isolation, and work-life interference—that have been identified as critical in the broader literature [14].
- **Productivity_Score:** This measure is based on the self-assessment of various aspects of productivity. This is a common yet controversial approach. The literature reveals a profound dichotomy between subjective (self-report) and objective measures of productivity. Studies relying on self-assessments frequently report an increase in productivity during remote work [15]. Conversely, studies using objective data from IT firms, such as analyzing system logs or tracking the number of completed tasks, sometimes indicate a decline in productivity. For example, it has been shown that working from home during the pandemic led to a productivity drop of 8% to 19% [16]. It is therefore crucial to explicitly position the **Productivity_Score** as a measure of **perceived** productivity. Perceived productivity is a valid psychological construct, as it influences job satisfaction, motivation, and employee behavior, making it a valuable dependent variable irrespective of objective output [17].
- **Sustainability_Score:** The use of selecting the “Work from Home” option as a proxy for environmentally friendly practices is an innovative yet indirect approach [18]. Its precision requires careful framing. The literature on Pro-Environmental Behavior (PEB) offers a more robust conceptual framework [19]. PEB encompasses a wide range of discretionary actions, including conserving energy, reducing waste, and recycling [20]. The proxy used here primarily captures the structural environmental benefit of remote work—the reduction in emissions from the absence of commuting (low-carbon production) [21]—but not the discretionary PEBs that employees may (or may not) engage in at home. **This is a critical limitation of our measure.** It is also essential to note that remote work can have adverse “rebound effects,” such as increased household energy consumption and greater reliance on digital infrastructure, which this proxy does not capture [22,23]. Acknowledging these nuances is critical for the correct interpretation of the results and for ensuring the transparency of our methodological approach.
- **Remote_Intensity:** The calculation of this variable as the proportion of remote work within a standard work month represents a clear and continuous measure. This

approach is fully aligned with the latest research, which is moving away from a binary distinction (office vs. remote work) and instead examining “Remote Work Intensity” (RWI) [24]. Available studies indicate that there is often a non-linear or “dose-response relationship” between RWI and outcomes, with a hybrid model frequently emerging as the “sweet spot” [25]. The **Remote_Intensity** variable used is therefore excellently positioned to test for such curvilinear effects.

- **SelfRatedHealth:** This is a single-item, binary measure of general health status. Although multi-item scales are often preferred in research, single-item self-rated health is a widely used and validated predictor of morbidity and mortality in epidemiological studies [26]. Its use is justified, particularly in a large-scale survey not primarily focused on health. The literature links remote work with mixed outcomes for physical health, including musculoskeletal issues due to poor ergonomics [26] and changes in physical activity levels [27]. This variable provides a holistic, albeit coarse, measure of the combined effect of these factors.

To further strengthen the argument for the validity of the measures used, it is recommended to create a table that visually demonstrates the content validity of the adapted scales by comparing them with concepts from the relevant literature (Table 1). Such an approach proactively addresses potential critiques from reviewers regarding measurement quality.

Table 1. Comparison of Proxy Variables with Validated Measurement Constructs from Literature.

Your Variable	Operationalization	Corresponding Constructs from Literature	Supporting Sources
<i>Stress_Score</i>	Sum of items from the “Disadvantages of Remote Work” section (e.g., isolation, blurred boundaries, pressure to be available).	Technostress creators: Techno-overload, techno-invasion, techno-insecurity. Social isolation: Loss of informal communication and sense of belonging. Work-life conflict: Difficulty in separating work and private roles.	[13,14]
<i>Productivity_Score</i>	Sum of five items measuring self-assessed aspects of productivity (e.g., speed, concentration).	Perceived productivity: An individual’s subjective assessment of their effectiveness and achievements. Differentiated from objective productivity (measured by output).	[15–17]
<i>Sustainability Score</i>	Count of selected “Work from Home” options as a proxy for environmentally friendly practices.	Structurally induced sustainable behavior: Reduction of carbon footprint due to the absence of commuting. Limitation: Does not capture discretionary Pro-Environmental Behavior (PEB) or “rebound effects” (e.g., increased household energy use).	[19–23]
<i>Remote_Intensity</i>	Proportion of remote workdays relative to total working days.	Remote Work Intensity (RWI): A continuous measure enabling the testing of non-linear (“dose-response”) relationships and the identification of an “optimal point” (hybrid model).	[24,25]
<i>SelfRatedHealth</i>	Binary codification of the response to a question about general health status.	Self-Rated Health (SRH): A global, single-item measure that is a validated predictor of objective health outcomes (morbidity, mortality) in epidemiology.	[26,27]

Source: Authors’ operationalization of constructs.

The creation of such a table not only defends the methodological approach but also demonstrates a thorough command of literature, transforming a potential weakness (the use of proxy variables) into evidence of a thoughtful and theoretically grounded research design.

1.3. Deepening of Theoretical Foundations

This research is grounded in three foundational theoretical frameworks: the **Self-Determination Theory** (SDT) [28], the **Job Demands–Resources** (JD-R) model [29], and **Social Exchange Theory** (SET) [30]. These frameworks provide insights into how remote

work can both support and hinder the fulfillment of basic psychological needs, depending on the context, age, and level of organizational support. **Importantly, we use these theories not just to frame the general impact of remote work, but to specifically explain and predict the heterogeneity of effects across different demographic groups.**

Previous studies suggest that remote work has positive outcomes for productivity and job satisfaction [31]. Still, they also highlight increased risks of stress, digital overload, and compromised mental health, particularly among younger employees [32]. However, most available research either focuses on isolated outcomes or employs qualitative methods. Quantitative research that integrates multiple dimensions and analyzes them across demographic differences remains limited, especially in developing countries [33]. Based on these insights, this research aims to contribute to a deeper understanding of how remote work can be strategically leveraged not only to enhance organizational efficiency but also to promote employee well-being and advance sustainable development goals, in line with the 2030 Agenda [34].

It is crucial to recognize that these theories are not static frameworks; instead, they are actively evolving and adapting to explain the new phenomena of the digital work environment.

1.3.1. The Job Demands-Resources (JD-R) Model

The fundamental premise of the JD-R model is that every job possesses specific risk factors, categorized into two main components: job demands and job resources. Job demands (e.g., pressure, task complexity) consume energy and can lead to exhaustion and health problems. Job resources (e.g., autonomy, support) help in coping with demands and foster personal growth and motivation [35]. In the context of remote work, this model has been explicitly extended to encompass the following digital demands and resources.

- **Digital Job Demands:** These demands transcend general work pressure to include specific techno stressors. Examples include techno-overload (the feeling of having to work faster and longer due to technology), techno-invasion (the blurring of boundaries between work and private life due to constant connectivity), techno-complexity (stress arising from the complexity of new technologies), and hyper connectivity [36]. Research indicates that job burnout is a key mediator linking these digital demands to adverse outcomes for employee well-being [37].
- **Digital Job Resources:** Similarly, resources extend beyond general flexibility. Specific digital resources include technology-enabled autonomy (e.g., flexibility in choosing the time and place of work), collaboration via digital tools, and increased efficiency through technology [38]. Organizational support, which encompasses both technical and emotional assistance, is a crucial resource that serves as a buffer against the adverse effects of digital demands [39].

This framework, therefore, provides a strong basis for our hypotheses that remote work can simultaneously reduce certain demands (e.g., commuting) while introducing new ones (e.g., technostress), a balance that may be experienced differently across age groups.

1.3.2. Self-Determination Theory (SDT)

SDT postulates that three innate psychological needs are essential for optimal human functioning, motivation, and well-being: the need for **autonomy**, **competence**, and **relatedness** [40]. The remote work context creates a unique arena where the satisfaction of these needs is simultaneously fostered and threatened.

- **Autonomy:** The need to feel like the originator of one's own actions. Remote work inherently increases autonomy by granting employees greater control over their schedule and work environment. However, this autonomy can be drastically undermined

by practices of digital surveillance and micromanagement, which employees perceive as a signal of distrust [41].

- **Competence:** The need to feel effective and capable in mastering challenges. This need can be satisfied through access to online training and information enabled by technology. Conversely, it is directly threatened by technostress, information overload, and technical malfunctions that impede task completion and create a sense of powerlessness [42].
- **Relatedness:** The need to feel a sense of belonging and meaningful relationships with others. This is the need most jeopardized in the context of remote work. A reduction in face-to-face contact and the loss of spontaneous, informal interactions lead to feelings of social and professional isolation, which has been proven to be detrimental to well-being and job performance [43]. This represents a critical point of failure for many remote work models.

Grounded in Self-Determination Theory, remote work can increase autonomy and competence while simultaneously threatening relatedness; this configuration of basic need support and thwarting provides the theoretical basis for our hypotheses regarding productivity, health, and stress [41].

1.3.3. Social Exchange Theory (SET)

SET views interpersonal relationships within an organization as a series of reciprocal exchanges. When employees perceive that the organization invests in them and treats them fairly, they feel an obligation to reciprocate with greater commitment, engagement, and discretionary effort [44]. In the context of remote work, where direct supervision is reduced, this theory is crucial for understanding the mechanisms of trust and proactive behavior.

- **The Currency of Exchange:** In remote work, the “currency” of exchange is altered. The organization offers resources such as flexibility, autonomy, and trust (e.g., by avoiding invasive surveillance). In return, employees reciprocate with intrinsic motivation, higher engagement, and discretionary behaviors that go beyond the formal job description, such as assisting colleagues or taking initiative [44].
- **The Breakdown of Exchange:** If employees perceive a lack of support (e.g., inadequate equipment, unfair performance evaluations, a sense of distrust), the social exchange is disrupted. This leads to reduced engagement, cynicism, and a decline in performance [45]. This mechanism is directly linked to the “manager-employee perception gap,” wherein managers often overestimate the level of support they provide, while employees perceive it as insufficient [7].

This perspective enables us to move beyond a simple cause-and-effect view by examining how organizational support systems—such as formal procedures, evaluation practices, self-management tools, blended training, supportive leadership, and a remote work culture—shape outcomes in contexts where face-to-face supervision is reduced [46].

The theoretical contribution of this paper, therefore, lies not only in the application of these theories but in participating in their evolution. The study can test how the newly conceptualized digital demands and resources (JD-R), the unique dynamics of need satisfaction (SDT), and the new forms of social exchange (SET) interact in predicting the dual outcomes of employee well-being and sustainability.

1.4. Research Gap, Objectives, and Hypotheses

The existing literature on remote work is characterized by two key limitations that this study aims to address. First, a pronounced lack of quantitative studies that simultaneously model the complex interplay between health, productivity, and sustainability outcomes. The existing definition of the research gap—that health and environmental effects are

studied separately and that holistic studies in the IT sector are lacking—provides a sound but broad initial framework. This gap can be defined with considerably more precision and conviction by leveraging insights from the available literature.

First, it is necessary to shift the focus from the assertion that these outcomes are studied “separately” to the proposition that they are often “in conflict.” This is not merely an issue of lacking integration but of the existence of inherent tensions. For instance, the primary benefit for sustainability (reduced commuting) is simultaneously a direct benefit for health (less stress, more time for exercise). However, the “rebound effects” that complicate the sustainability picture (e.g., higher household energy consumption) are linked to adverse health outcomes (more sedentary behavior, poorer ergonomics). This creates a direct conflict between objectives: what is beneficial for reducing one’s carbon footprint (staying at home) can be detrimental to physical health if not accompanied by appropriate interventions.

Second, the research gap can be quantified. Literature provides measurable data on individual relationships. For example, it is known that full-time remote work can reduce an individual’s carbon footprint by 54% [21]. Meta-analyses show that remote work has minor but beneficial effects on job satisfaction and performance [24], while a meta-analysis on physical activity indicates a significant reduction in light physical activity [27]. The specific research gap lies in the absence of studies that simultaneously model these quantified effects. For example, does the reduction in physical activity mediate the relationship between the intensity of remote work and adverse health outcomes? Is there a correlation between the decrease in the carbon footprint (a structural outcome) and the self-reported pro-environmental behavior of employees (a discretionary outcome)?

Third, there is under-researched causal direction: well-being as a precondition for sustainability. The literature suggests that employees who feel the organization cares for their well-being are more likely to engage in positive discretionary behaviors [47]. This could plausibly be extended to pro-environmental behavior. Creating a “green work climate” fosters employees’ environmental commitment, which in turn drives innovative green behavior [48].

The research gap can therefore be framed as testing the hypothesis that employee well-being is a necessary precondition for fostering a culture of discretionary sustainability within the context of remote work in the IT sector.

The primary objective of this research is to comprehensively evaluate the impact of remote work intensity (Remote_Intensity) on key outcomes encompassing employee well-being (perceived stress—Stress_Score, and self-rated general health—SelfRatedHealth), work productivity (Productivity_Score), and the adoption of sustainable practices (Sustainability_Score), based on the analysis of a large sample of IT employees ($n > 1000$). A unique contribution of this paper is the granular analysis of these relationships across key demographic variables, specifically gender and age groups, to reveal the nuanced and often contradictory effects that are obscured in aggregate analyses.

In addition to identifying direct effects, the study also aims to:

- Examine the role of perceived stress as a mediator in the relationship between the intensity of remote work and the outcomes.
- Analyze demographic heterogeneity, particularly the influence of gender and age groups, on these relationships to identify specific dynamics of remote work effects.
- Contribute to the theoretical frameworks (JD-R, SDT, SET) by providing empirical evidence of their applicability and extension within the context of the digital work environment.

- Formulate practical recommendations for IT managers and policymakers aimed at optimizing remote work models to improve employee health and promote sustainable lifestyles, acknowledging the complex interactions and potential trade-offs.

Based on the theoretical frameworks (the JD-R model, the bio psychosocial approach), we formulate the following hypotheses:

H1a. *The intensity of remote work is negatively associated with perceived stress.*

H1b. *The intensity of remote work is positively associated with self-rated health.*

H1c. *The intensity of remote work is a positive predictor of self-assessed productivity.*

H1d. *The intensity of remote work is a positive predictor of the adoption of sustainable work practices.*

H2. *Perceived stress (**Stress_Score**) mediates the effect of remote work intensity on each of the dependent outcomes (**SelfRatedHealth**, **Productivity_Score**, **Sustainability_Score**).*

These hypotheses form the basis for empirically testing the stated objectives, allowing for a detailed analysis and interpretation of the impact of remote work on employee well-being and sustainable lifestyles in the IT sector.

2. Methodology

2.1. Research Design and Participants

This study is based on research focused on the diverse experiences of employees in the IT sector, ranging from the increased flexibility and comfort of “working from home” to the challenges of separating work and private life and social isolation. The research was conducted from March to October 2024 via an online survey among 1003 employees in the IT sector across 46 countries. A non-probability “snowball” sampling technique was used, combined with quota stratification along key dimensions.

2.2. Sampling

To recruit participants, a non-probability “snowball” technique with quota stratification was applied based on key demographic and professional characteristics (gender, age, education level, job type, and region). Initial contacts were selected from the authors’ professional networks and were then encouraged to forward the survey link to their colleagues.

2.2.1. Quota Stratification

The survey link was distributed until the defined quotas for each target category were met:

Territorial representation:

- United States (35–40%)
- European Union (25–30%)
- EU candidate countries (5–7%)
- Rest of the world (Asia, Latin America, Africa; 25–30%)

Area of professional engagement:

- Software development (40–50%)
- System architecture (10–15%)
- Project management (10–15%)
- Sales/commercial/marketing (20–25%)

- Administration/finance/resource management (5–10%)

These target proportions were derived from relevant industry and statistical sources.

2.2.2. Post-Stratification Weighting

After data collection, post-stratification weighting was applied to correct for minor discrepancies between the observed proportions (s_j) and the target proportions (π_j) in the sample across territorial strata j :

$$w_j = \frac{\pi_j}{s_j} \quad (1)$$

After the calculation, the weights w_j were normalized by the factor:

$$\frac{N}{\sum_j n_j w_j} \quad (2)$$

This ensures that the sum of weighted cases remains equal to the total number of respondents ($n = 1003$). The final weights were capped within the range [0.5, 2.0] to prevent the excessive amplification or reduction of individual strata, and the structural differences after weighting did not exceed $\pm 2.5\%$.

The results of this sampling and weighting provide an indicative basis for analyzing the impact of remote work on the well-being and productivity of employees in the IT sector, with the explicit caveat that this non-probability sampling method prevents the research from being representative of the global population.

2.3. Instruments and Measures

It is important to note that the authors did not participate in the design of the original questionnaire. Instead, for this research, we relied on secondary survey data already collected. Consequently, the measures of stress, health, productivity, and sustainability used in this study are author-adapted constructs, developed through post-hoc operationalization of the available items. This approach ensures methodological transparency while acknowledging that the measures are not standardized instruments but reconstructed scales tailored to the context of remote work in the IT sector. Similar strategies of reconstructing indices from available survey data have been applied in prior studies [49–51]. The key variables were operationalized through the following transformations (Table 2):

Table 2. Operationalization of Key Constructs.

Construct	Questionnaire Item	Transformation/Coding	Reliability
<i>Remote_Intensity</i>	Q7 “Number of days in the office”	(20 – Office_mid)/20, where <i>Office_mid</i> is the midpoint of the response interval (e.g., “1–5 times” → 3)	—
<i>Stress_Score</i>	Q24_1...Q24_7 (“remote work disadvantages”)	Sum of six items (0 = “Not at all” ... 4 = “To a large extent”); range 0–24	$\alpha = 0.876$
<i>Productivity_Score</i>	Q20_1...Q20_5 (aspects of productivity)	Sum of five items on a numerical scale (0–4); range 0–20	$\alpha = 0.612$
<i>Sustainability_Score</i>	Q23_01...Q23_10 (“Working from home”)	Number of items with selected option “1. Working from home”; range 0–10	$\alpha = 0.746$
<i>SelfRatedHealth</i>	Q21 “Yes/No”	Binary coding (Yes = 1, No = 0)	—

Source: Authors’ operationalization of constructs.

The *Stress_Score* was constructed as an adapted measure capturing perceived disadvantages of remote work, including digital overload, work–life invasion, and hyperconnectivity [50].

SelfRatedHealth was based on a single-item indicator, which is a widely used approach in epidemiological research [49].

Productivity_Score was developed by the authors as a composite index from five items on different aspects of productivity, drawing conceptually on recent work addressing subjective productivity in remote settings [51]. Although Cronbach's $\alpha = 0.612$ is below the conventional threshold of 0.70, the scale was retained for content validity, and robustness checks confirmed stability in inferences.

Sustainability_Score was designed as an adapted measure reflecting the number of work tasks performed from home, aligning with workplace pro-environmental behavior frameworks.

The items for all scales used in this study are provided in Appendix A for complete transparency.

2.4. Statistical Analysis

Descriptive statistics, correlations, and regression analyses were used to examine the relationships between remote work intensity, stress, health, productivity, and sustainability. Ordinary Least Squares (OLS) regression was applied to estimate direct effects, a standard approach for analyzing continuous outcomes in the social sciences [52].

To test the mediation hypothesis, we applied bootstrapping procedures with 5000 re-samples, which are widely recommended for robust estimation of indirect effects without assuming normality of the sampling distribution [53]. To increase robustness, HC3 heteroscedasticity-consistent standard errors were used for all linear models [54]. Additionally, subgroup analyses by gender and age were conducted to explore heterogeneity across demographic groups. Interaction terms were tested within hierarchical regression models, following the recommended procedures for moderation analysis [55].

All statistical analyses were conducted using SPSS 29 and Python (pandas, SciPy, statsmodels, pingouin), with results reported at the 0.05 significance level.

The analysis was conducted in the following steps:

1. **Descriptive statistics:** Means, standard deviations, and distributions for all variables.
2. **Correlational analysis:** Pearson's correlation coefficient for continuous variables; the ϕ -coefficient (phi) for two binary variables; and Cramer's V for contingency tables of larger dimensions.
3. **Regression analysis:**
 - Linear regression for the effect of **Remote_Intensity** on **Stress_Score**, **Productivity_Score**, and **Sustainability_Score**, controlling demographic and work characteristics (gender, age, education, region).
 - Logistic regression to predict SelfRatedHealth based on Remote_Intensity + controls (direct effect, H1b). The mediator Stress_Score is included only in the mediation models (H2) when estimating indirect effects (bootstrap, 5000 resamples).
4. **Mediation analysis:** A bootstrapped (5000 replications) test of the indirect effect **Remote_Intensity** $\rightarrow$ **Stress_Score** $\rightarrow$ **(dependent outcome)** using the Python libraries (statsmodels, pingouin) and IBM SPSS 29.

Results were interpreted at an $\alpha = 0.05$ level (two-tailed tests), presenting coefficients, 95% confidence intervals, and relevant effect size measures: β (standardized regression coefficient), OR (odds ratio for logistic models), and Nagelkerke R^2 (pseudo- R^2 for estimating explained variance). The statistical analysis (Table 3) was designed to test the previously stated hypotheses about the effects of remote work intensity on perceived stress, health status, productivity, and sustainable practices, as well as the role of stress as a mediator.

Table 3. Statistical Analysis Plan.

Hypothesis/Objective	Primary Tests	Justification
H1a: <i>Remote_Intensity</i> ↓ <i>Stress_Score</i>	Linear regression: <i>Stress_Score</i> ~ <i>Remote_Intensity</i> + controls (gender, age, education, region)	<i>Stress_Score</i> is a continuous variable; the model allows estimation of the directional β coefficient and adjustment for confounders.
H1b: <i>Remote_Intensity</i> ↑ <i>SelfRatedHealth</i>	Logistic regression: <i>SelfRatedHealth</i> (0/1)~ <i>Remote_Intensity</i> + controls	<i>SelfRatedHealth</i> is a binary variable; the logit model yields ORs and allows inclusion of covariates.
H1c: <i>Remote_Intensity</i> ↑ <i>Productivity_Score</i>	Linear regression: <i>Productivity_Score</i> ~ <i>Remote_Intensity</i> + controls	<i>Productivity_Score</i> is a continuous variable; same approach as in H1a.
H1d: <i>Remote_Intensity</i> ↑ <i>Sustainability_Score</i>	Linear regression: <i>Sustainability_Score</i> ~ <i>Remote_Intensity</i> + controls	<i>Sustainability_Score</i> is an index (0–10); a linear model is appropriate for summary indices.
H2: Stress as mediator	Bootstrap mediation test (5000 samples): indirect effect <i>Remote_Intensity</i> → <i>Stress_Score</i> → outcome	Bootstrap provides a 95% CI for the indirect effect without assuming normality; tests path a (<i>Remote</i> → <i>Stress</i>) and path b (<i>Stress</i> → outcome).
Effect size and reliability	Standardized β , OR with 95% CI, Nagelkerke R^2 , Cronbach's α , partial η^2	Provides insight into practical importance of effects and construct validity, not just statistical significance.
Multiple testing	Alpha level maintained at 0.05; hypotheses are independent and theory-driven, so family-wise error rate is not adjusted	Each hypothesis refers to a different dependent variable or path—avoiding test overlap.

Source: Authors' statistical analysis plan.

The arrows in the table indicate the direction of the predicted effect of **Remote_Intensity** on a given dependent variable.

- ↓ (downward arrow) signifies a **negative association**—an increase in remote work intensity predicts a decrease in the variable's value (e.g., higher **Remote_Intensity** ↓ lower **Stress_Score**).
- ↑ (upward arrow) signifies a **positive association**—an increase in remote work intensity predicts an increase in the variable's value (e.g., higher **Remote_Intensity** ↑ higher **Productivity_Score** or **Sustainability_Score**).

Unlike H1a–d, which test **direct** effects, H2 is a **mediation** hypothesis. It consists of two paths:

- **Path a** (**Remote_Intensity** → **Stress_Score**): A negative association is expected, which is already covered in H1a.
- **Path b** (**Stress_Score** → final outcome): The direction in which stress affects **SelfRatedHealth**, **Productivity_Score**, or **Sustainability_Score** (e.g., higher stress ↓ health, ↓ productivity, ↓ sustainable practices).

As a mediator, **Stress_Score** “transfers” the effect of **Remote_Intensity** onto the dependent variables; thus, H2 is not limited to a single arrow and tests the **indirect effect** by combining these two paths.

Notes: All models were checked for assumptions of normality of residuals, homoscedasticity, and multicollinearity ($VIF < 5$). Missing data for variables in Table 1 were handled with the listwise deletion method (case loss < 4%). To increase robustness, linear regressions were repeated using robust standard errors, as per the HC3 algorithm. Analyses were performed in Python 3.11 (pandas, SciPy, statsmodels, pingouin) and IBM SPSS 29.

2.5. Research Ethics

The research was conducted in accordance with the Declaration of Helsinki [56]. All participants provided informed consent before completing the survey, with a guarantee of anonymity and the option to withdraw at any time. The collected data were de-identified before analysis, and no personal identifiers were accessible to the research team.

3. Results

This section presents the empirical findings of the study, beginning with descriptive statistics to outline the sample's characteristics. It then moves to the results of the hypothesis testing, detailing the direct effects of remote work intensity on the primary outcomes. Finally, it explores the heterogeneity of these effects across demographic groups and examines the potential mediating role of stress.

3.1. Descriptive Statistics

An initial analysis of the key variables provides a foundational understanding of the data distribution. As shown in Table 4, the average remote work intensity was approximately 56% of total working time (Mean = 0.559, SD = 0.333), indicating significant variation in remote work arrangements among the participants. The mean perceived stress level was moderate (Mean = 9.995, SD = 6.208), while self-assessed productivity was high (Mean = 19.70, SD = 5.478). The majority of respondents (71.4%) rated their general health positively. The distribution of these key variables is further illustrated in the boxplot in Figure 1.

Table 4. Descriptive statistics of the key research variables.

Variable	<i>n</i>	Mean	SD
<i>Remote_Intensity</i>	1002	0.5591	0.3334
<i>Stress_Score</i>	1002	9.9950	6.2081
<i>Productivity_Score</i>	1002	19.7046	5.4778
<i>Sustainability_Score</i>	1002	3.9022	2.4650
<i>SelfRatedHealth</i> (0/1)	953	0.7135	0.4523

Source: Authors' calculation based on survey data. Notes: All models were checked for assumptions of normality of residuals, homoscedasticity, and multicollinearity (VIF < 5). Missing data for variables in Table 1 were handled with the listwise deletion method (case loss < 4%).

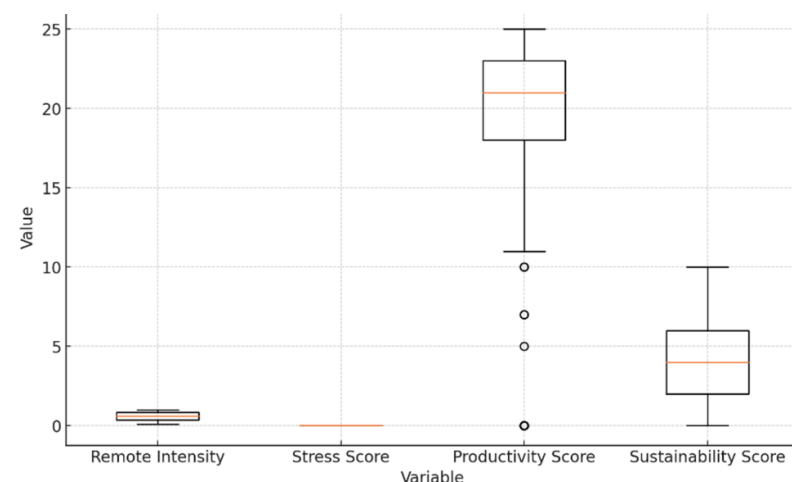


Figure 1. Boxplot of key study variables (authors' visualization based on survey data).

In summary, the descriptive statistics paint a picture of a workforce with considerable variation in remote work arrangements. While self-assessed productivity is high and the majority of employees report good health, the moderate level of perceived stress and the room for improvement in sustainable practices highlight key areas for further investigation. These initial findings provide the necessary context for the inferential analyses that follow.

3.2. Direct Effects of Remote Work Intensity (H1a–H1d)

The analysis of the direct effects of remote work intensity yielded several significant findings, largely confirming our initial hypotheses and highlighting a consistent positive

impact on employee well-being and behavior. As detailed in Table 5, a higher intensity of remote work was a significant positive predictor of self-rated health (OR = 5.27, $p < 0.001$), perceived productivity ($\beta = 7.830$, $p < 0.001$), and the adoption of sustainable practices ($\beta = 3.912$, $p < 0.001$). These results provide strong empirical evidence in favor of hypotheses H1b, H1c, and H1d.

Table 5. Empirical Results of Direct Effects.

Hypothesis	Model	<i>n</i>	95% CI (β /OR)	β /OR	<i>p</i> -Value
H1a *	OLS: <i>Stress_Score</i> ~ <i>Remote_Intensity</i> + controls	1002	[−0.435, 2.395]	$\beta = 0.980$	$p = 0.174$
H1b	Logit: <i>SelfRatedHealth</i> ~ <i>Remote_Intensity</i>	953	[1.212, 2.110]	OR = 5.27	$p < 0.001$
H1c	OLS: <i>Productivity_Score</i> ~ <i>Remote_Intensity</i> + controls	1002	[6.687, 8.973]	$\beta = 7.830$	$p < 0.001$
H1d	OLS: <i>Sustainability_Score</i> ~ <i>Remote_Intensity</i> + controls	1002	[3.423, 4.401]	$\beta = 3.912$	$p < 0.001$

Source: Authors' calculation based on survey data. Note: All models were checked for key statistical assumptions. The presence of heteroscedasticity was addressed by using robust standard errors (HC3). * For H1a, the 95% CI includes zero, which aligns with the non-significant *p*-value.

In contrast, the relationship with perceived stress proved to be more complex than anticipated. The regression model did not find a statistically significant negative association between remote work intensity and stress ($\beta = 0.980$, $p = 0.174$). In fact, supplementary tests, including a Spearman's rank correlation ($\rho = 0.136$, $p < 0.001$), suggested a subtle positive relationship. Therefore, hypothesis H1a was not supported, indicating that for the overall sample, remote work does not necessarily reduce, and may even slightly increase, perceived stress.

3.3. Deeper Analysis of Effects

To further explore these relationships, additional analyses were conducted to examine non-linear patterns and demographic heterogeneity.

3.3.1. Analysis by Quartiles of Remote Work Intensity

A one-way ANOVA was performed to investigate differences across quartiles of remote work intensity. The results revealed significant between-quartile differences for all three continuous outcomes: stress ($F(3, 998) = 8.218$, $p < 0.001$), productivity ($F(3, 998) = 51.647$, $p < 0.001$), and sustainability ($F(3, 998) = 106.836$, $p < 0.001$). Post-hoc tests indicated that while productivity and sustainable practices increased in a near-monotonic fashion from the lowest to the highest quartile of remote work, stress exhibited a non-linear pattern. As shown in Table 6, perceived stress peaked in the third quartile before declining slightly in the group with the highest remote work intensity.

Table 6. Mean Scores of Outcomes by *Remote_Intensity* Quartile.

Quartile	Stress_Score	Productivity_Score	Sustainability_Score
Q1	9.028	17.449	2.648
Q2	10.970	20.296	3.663
Q3	11.173	21.525	5.188
Q4	9.632	22.219	5.471

Source: Authors' operationalization of constructs.

3.3.2. Demographic Heterogeneity

The analysis of demographic factors revealed that while the effects of remote work were largely consistent across genders, age emerged as a critical moderator, particularly for stress. The positive impacts on health, productivity, and sustainability were observed for both males and females, and across all age groups.

However, the analysis uncovered a crucial interaction between remote work intensity and age in predicting stress. For the youngest employees (“25 and under”), a higher intensity of remote work was significantly associated with increased stress ($\beta = 9.81$, $p < 0.001$). Conversely, for mid-career professionals (“26–35”), it was significantly associated with a stress reduction ($\beta = -4.26$, $p = 0.0015$). For older employees, no statistically significant effect was found. This finding highlights that the experience of stress in remote settings is not universal and varies substantially across different life and career stages.

3.4. The Mediating Role of Stress (H2)

The study also tested the hypothesis (H2) that perceived stress mediates the relationship between remote work and its outcomes. A bootstrapping mediation test (5000 resamples) was conducted for the overall sample. The results did not support this hypothesis. A key condition for mediation, a significant effect of the independent variable on the mediator (Path ‘a’), was not met, as established in the direct effects analysis. Consequently, the indirect effect of remote work intensity on productivity and health through stress was not statistically significant. This suggests that the observed positive effects of remote work are likely driven by other, more direct mechanisms, such as increased autonomy, rather than through the pathway of stress reduction.

3.5. Summary of Key Findings

In summary, the results paint a clear yet nuanced picture. The data provide strong support for the hypotheses that remote work intensity positively influences self-rated health (H1b), perceived productivity (H1c), and sustainable practices (H1d). However, the expected negative relationship with stress was not confirmed (H1a rejected); instead, the effect was found to be complex and highly moderated by age. Finally, perceived stress did not function as a significant mediator for the main outcomes (H2 rejected), pointing towards more direct mechanisms driving the benefits of remote work. These findings set the stage for a detailed interpretation in the Discussion section.

4. Discussion

4.1. Synthesis of Key Findings

Our research provides new insights into the impact of remote work intensity on stress, health, productivity, and sustainability among IT sector employees. The results reveal a consistent pattern of positive effects on health, productivity, and sustainable practices, alongside a more complex relationship with stress, which varies substantially across age groups.

The finding that remote work does not significantly reduce stress at the aggregate level, and may even slightly increase it, highlights the duality of remote work as both a resource and a demand. While earlier studies emphasized that the elimination of commuting and reduced office pressures can alleviate stress [31,57], more recent research points to emerging stressors such as isolation, digital overload, and blurred work–life boundaries [58,59]. Our evidence is consistent with these latter perspectives, particularly for younger employees, among whom intensive remote work was associated with higher stress. For mid-career professionals, however, the opposite pattern was observed, with remote work intensity linked to stress reduction, suggesting that the balance of demands and resources evolves with career stage.

In contrast, the results for health, productivity, and sustainability were unambiguous. Remote work intensity was strongly and positively associated with self-rated health, which echoes previous studies demonstrating that increased flexibility and reduced commuting time contribute to better work–life balance and wellbeing [57,60]. The effect size observed

here was moderate, but consistent across genders and age groups, underscoring its robustness. Productivity showed a large positive effect, confirming findings that remote work can enhance performance through greater autonomy and fewer workplace distractions [60,61]. At the same time, our results diverge from research reporting neutral or negative impacts on productivity in contexts with weaker ICT infrastructure or poor management support [62], suggesting that organizational context remains a critical factor.

Sustainability outcomes were also strongly positive, with employees reporting a higher adoption of sustainable practices when working remotely. A growing body of evidence indicates that advances in digitalization facilitate the expansion of flexible work models, including remote work, by enabling new forms of workplace organization and resource allocation [63]. This finding is consistent with evidence documenting reduced carbon emissions from commuting and broader digitalization benefits [63,64]. At the same time, scholars have noted potential rebound effects such as increased household energy consumption, which suggests that the net environmental impact of remote work may depend on contextual variables beyond commuting alone. Nevertheless, the robust positive association found in this study demonstrates that remote work has the potential to play a key role in advancing corporate sustainability goals.

Finally, our results indicate that perceived stress does not function as a mediator between remote work intensity and productivity at the aggregate level. This suggests that the primary mechanism is direct, likely through enhanced autonomy and control over work routines, consistent with Self-Determination Theory. Similar conclusions have been reached by studies showing that independence, rather than reduced stress, explains much of the productivity benefit associated with remote work [65]. The only exception in our data was the youngest age group, for which the mediation pathway was partially supported, highlighting that age and career stage may condition the mechanisms through which remote work exerts its effects.

In summary, our findings contribute to the literature by demonstrating that the positive outcomes of remote work on health, productivity, and sustainability are broad and consistent. In contrast, the effects on stress are heterogeneous and context-dependent. This nuanced picture underscores the importance of integrating both the benefits and challenges of remote work into future theoretical and practical frameworks.

4.2. Theoretical Implications

The results of this study extend and refine several theoretical frameworks. First, the strong positive associations between remote work intensity, productivity, and health provide empirical support for Self-Determination Theory (SDT), which posits that autonomy enhances intrinsic motivation and wellbeing. The evidence confirms that granting employees flexibility and control over their work environment can fulfill these basic psychological needs across age and gender groups.

Second, the Job Demands–Resources (JD-R) model is particularly relevant for interpreting the heterogeneous stress outcomes. While remote work reduces specific demands such as commuting, it simultaneously introduces new challenges, including technostress and social isolation. The age-based variation observed here suggests that the balance between demands and resources is dynamic and dependent on life and career stage. This finding adds nuance to JD-R theory by highlighting that the same work arrangement may act as a resource for one group and as a demand for another.

Third, the results support Social Exchange Theory (SET) in the domain of sustainability. By providing valued resources such as remote work opportunities, organizations may foster employee reciprocity in the form of greater engagement in environmentally responsible

practices. Thus, remote work can be understood not only as an operational choice but also as a mechanism to strengthen the psychological contract between employer and employee.

4.3. Practical Implications for IT Organizations

The findings offer several actionable insights for IT organizations. Management should recognize that while remote work improves productivity and health overall, its effects on stress are not uniform. Tailored support strategies are essential: younger employees may benefit from additional mentoring, social interaction opportunities, and more precise work–life boundaries, whereas mid-career employees may thrive under enhanced flexibility.

HR and wellbeing teams should prioritize investments in mental health support, stress management training, and ergonomic resources to mitigate technostress and physical strain from prolonged home-based work. CSR and sustainability departments should incorporate the demonstrated environmental benefits of remote work into broader corporate strategies, actively promoting its role in reducing carbon emissions and encouraging the adoption of digital tools.

4.4. Limitations of the Study

This study has several limitations that must be acknowledged. Its cross-sectional design prevents firm conclusions about causality. All measures relied on self-reports, which are vulnerable to recall and social desirability bias. The snowball sampling method, although supplemented with quota stratification and weighting, limits generalizability. Moreover, the scales for stress, productivity, and sustainability were reconstructed from available survey items rather than using standardized instruments. While internal consistency was tested, external validation is lacking, and the sustainability index does not fully account for rebound effects such as increased household energy use. Finally, subgroup analyses by age and gender were constrained by sample size, limiting statistical power for mediation tests within smaller cohorts.

4.5. Directions for Future Research: A Dual-Pathway Model with Advanced Analytics

Future studies should employ longitudinal designs to clarify causal relationships and explore how the effects of remote work evolve. Incorporating objective indicators such as logged productivity data, biometric health measures, or household energy consumption would complement self-reported outcomes and reduce bias. Researchers should also consider qualitative approaches, such as interviews and focus groups, to capture employees' subjective experiences more richly.

A promising avenue lies in developing dual-pathway models that account for both positive mechanisms (e.g., autonomy, flexibility) and negative mechanisms (e.g., isolation, technostress). Such models could be tested using advanced analytical tools, including structural equation modeling or machine learning techniques. Finally, as remote and hybrid work arrangements become mainstream, cross-cultural studies will be essential to determine whether these patterns are consistent across institutional and cultural contexts or whether local norms and infrastructures shape them.

A dual-pathway moderated mediation model emerges as a suitable theoretical framework, visually depicted in Figure 2.

This proposed conceptual model includes:

- **Independent Variable:** Remote Work Intensity (RWI).
- **Dual Mediators:** Perceived autonomy (the positive pathway) and social isolation/technostress (the negative pathway).
- **Dependent Variables:** Employee well-being, perceived productivity, and sustainable practices.

- **Key Moderators:** Organizational support and individual factors.
Based on this, key directions for future research include:
- **Longitudinal Studies and Clarification of Age-Related Effects on Stress:** Given the critical heterogeneity of the impact of stress across age groups that we discovered, it is essential to apply longitudinal research designs to examine causal relationships and a deeper understanding of the dynamic changes in stress, health, productivity, and sustainable practices as the intensity of remote work evolves.
- **Triangulation with Objective Metrics:** To overcome the limitations of relying on self-reported data, future studies should triangulate findings with objective metrics. For instance, instead of self-assessed productivity, system-logged data (e.g., commit counts or incident resolution times) could be used. Similarly, objective health data (e.g., from wearable devices) and actual household energy consumption bills could provide more precise insights.
- **Application of Advanced Analytical Tools, Including Generative AI:** Future research could leverage the potential of advanced analytical tools, including generative AI, for in-depth data analysis and the generation of new insights. This would allow for the automatic recognition of complex patterns, the synthesis of extensive literature, and the analysis of unstructured data for richer qualitative insights.
- **Qualitative Research:** Supplementing quantitative findings with qualitative research (e.g., interviews, focus groups) could provide a richer context and a deeper understanding of the subjective experiences and perceptions of employees regarding remote work and its impacts.

These proposed directions for future research will enable a more nuanced understanding of the complex impact of remote work on employee well-being and sustainable practices in the IT sector.

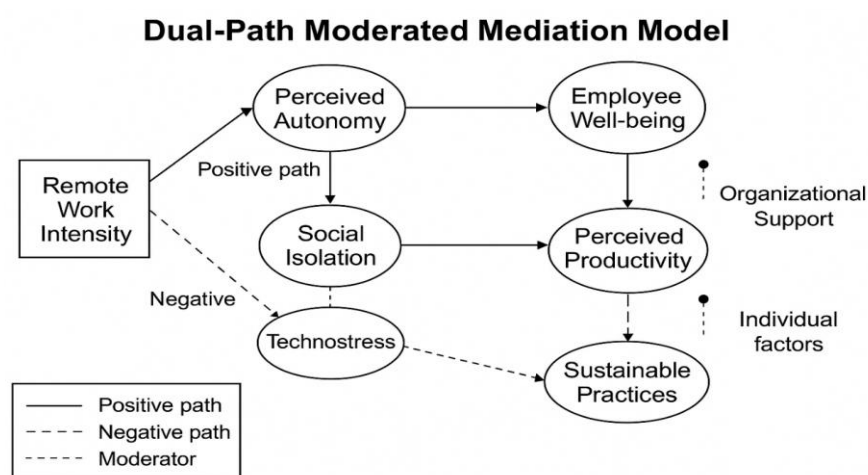


Figure 2. Visual representation of the proposed conceptual model.

5. Conclusions

This study systematically examined how remote work intensity relates to perceived stress, self-rated health, perceived productivity, and sustainable practices among IT-sector employees. The findings underscore the multidimensional nature of these relationships, revealing broad benefits alongside age-specific challenges.

Remote work is consistently associated with higher self-rated health, increased perceived productivity, and greater adoption of sustainability-related practices **across age groups, with slightly more substantial benefits observed among women**. These outcomes are consistent with self-determination and social-exchange perspectives: flexibility, auton-

omy, and visible organizational support appear to operate as **direct mechanisms** that foster positive appraisals and discretionary effort.

The impact on perceived stress is more complex. We observe **no aggregate reduction** in stress; instead, there is marked **heterogeneity by age**—younger employees report increased stress, whereas mid-career professionals exhibit reductions. This pattern aligns with the Job Demands–Resources (JD-R) model: reductions in some demands (e.g., commuting) can be offset by new digital demands (e.g., technostress, blurred boundaries, isolation) unless resources are commensurately strengthened. Moreover, perceived stress **did not mediate** the effect of remote work on productivity at the overall sample level, suggesting that positive effects occur primarily through direct channels (autonomy, competence support, trust) rather than through stress reduction.

From a sustainability standpoint, our measure primarily captures **structural gains** from not commuting; it **does not** measure discretionary pro-environmental behaviors and may be partially offset by **household rebound** effects. These scope conditions should be taken into account when interpreting the ecological implications.

Practically, the results support the continued promotion of remote work, paired with targeted stress management for younger employees (e.g., more precise boundaries, load management, mentoring), alongside sustained investments in autonomy-supportive practices and fair, trust-based performance evaluation. Future research should employ longitudinal designs, include objective metrics, and extend modeling to alternative mediators (e.g., autonomy, organizational support), potentially leveraging advanced analytics (including generative AI) to capture dynamic, multi-pathway effects.

In sum, effective remote-work management requires a **nuanced, theory-informed approach**: organizations that amplify its direct benefits while proactively addressing age-specific stress risks can enhance employee well-being and contribute meaningfully to broader sustainability goals.

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Informed Consent Statement: Informed consent was obtained from all participants involved in the study.

Data Availability Statement: The data presented in this study are available upon request from the corresponding author.

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Conflicts of Interest: Author Ranka Popovac was employed by the company Philip Morris International, Lausanne, Switzerland. The research in the paper “Evaluating the Impact of Remote Work on Employee Health and Sustainable Lifestyles in the IT Sector” was conducted in the absence of any commercial or financial relationships that could be interpreted as a potential conflict of interest. Authors Dragan Vukmirović, Tijana Čomić, Zoran G. Pavlović, the listed authors declare that the research was conducted in the absence of any commercial or financial relationships that could be interpreted as a potential conflict of interest.

Appendix A. Instruments and Scale Items

Purpose and translation note. To ensure transparency and reproducibility, this appendix reports the items, response options, and scoring rules for all key variables. The original questionnaire was administered in Serbian; the English wordings below were translated and checked by bilingual team members. The scoring and transformations match those used in the statistical analysis.

Appendix A.1. Remote Work Intensity (*Remote_Intensity*)

Question: “Out of (approximately) 20 working days per month, how many days, on average, do you come to the office?” (categorical intervals).

Response options: 0; 1–5; 6–10; 11–15; 16–20 days in the office.

Scoring: We computed the midpoint for each interval (*Office_mid*) and transformed it to a continuous index in [0, 1] using:

$$\text{Remote_Intensity} = (20 - \text{Office_mid})/20$$

Thus, 0 indicates fully in-office and 1 indicates fully remote. The transformation of office presence into telework intensity is shown in Table A1.

Table A1. Transformation of Office Attendance into Remote Work Intensity.

Response Category	Midpoint (<i>Office_Mid</i>)	Remote_Intensity
0 days	0	1.00
1–5 days	3	$(20 - 3)/20 = 0.85$
6–10 days	8	$(20 - 8)/20 = 0.60$
11–15 days	13	$(20 - 13)/20 = 0.35$
16–20 days	18	$(20 - 18)/20 = 0.10$

Source: Authors’ calculation based on survey data. Note: If a respondent selected a boundary category (e.g., “0 days” or “16–20 days”), the midpoint reflects the category centre (0 and 18, respectively).

Appendix A.2. Perceived Stress (*Stress_Score*)

Stem: “To what extent do the following aspects of working from home burden you?”

Response scale: 1 = Not at all; 2 = To a small extent; 3 = To a moderate extent; 4 = To a large extent; 5 = To a very large extent.

Item bank (7 items):

- Merging of work and private life
- Lack of interaction in work with colleagues
- Lack of socialization and informal gatherings with colleagues
- Lack of interaction with management
- Lack of in-person communication with clients
- “Estrangement”/reduced sense of belonging to your team
- Reduced sense of belonging to the company

Reliability and scoring: Following reliability analysis ($\alpha = 0.876$), one item with the lowest corrected item–total correlation was removed to optimise internal consistency. The final *Stress_Score* equals the sum of the retained six items after linear rescaling 1–5 $\rightarrow$ 0–4, yielding a 0–24 range. The identity of the removed item is documented in the analysis log and available upon request for replication.

Appendix A.3. Perceived Productivity (*Productivity_Score*)

Construct: Perceived (self-rated) productivity during remote work (not objective output).

Stem: “During remote work, to what extent did the following aspects of your productivity change?”

Response scale: 0 = Significantly decreased; 1 = Slightly decreased; 2 = No change; 3 = Slightly increased; 4 = Significantly increased.

Items (5):

- Speed/throughput in completing tasks
- Ability to focus/concentrate on deep work
- Volume of completed work
- On-time delivery/meeting deadlines
- Collaboration efficiency in remote settings

Reliability and scoring: Cronbach’s $\alpha = 0.612$. The index is the sum of the five items (0–20). To address the relatively low α while preserving content coverage, we conducted robustness checks (single-item proxy; HC3 robust SE), which did not change the main inferences.

Appendix A.4. Sustainability Practices (Sustainability_Score)

Instruction: “Which of the following were consequences of working from home? (Multiple choice—tick all that apply.)”

Items (10):

- Reduced fuel consumption for commuting to work
- Reduced use of paper and other office supplies
- Reduced consumption of plastic cups/bottles
- Using digital tools for meetings instead of traveling
- Increased recycling of household/office waste
- Reduced electricity consumption in the office
- Greater use of natural light instead of artificial light
- Reduced overall waste (e.g., food packaging)
- More online shopping that replaces store trips
- Reduced business air travel

Reliability and scoring: Cronbach’s $\alpha = 0.746$. Each selected option is coded 1; the Sustainability_Score is the sum of ticked items (0–10). Scope note: This is a structural proxy (e.g., no commuting) and does not capture discretionary pro-environmental behaviors at home; potential household rebound effects (e.g., higher electricity use) are not measured.

Appendix A.5. Self-Rated Health (SelfRatedHealth)

Question: “Generally speaking, how would you rate your health?”

Response options (five categories): Excellent; Very good; Good; Average; Poor.

Scoring: A binary indicator is used in the analysis: Good health = 1 (Excellent/Very good/Good); Not good = 0 (Average/Poor).

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