Article

Is Smart Working Beneficial for Workers' Well-being? A Longitudinal Investigation of Smart Working, Workload and Hair Cortisol/Dehydroepiandrosterone Sulfate during the COVID-19 Pandemic

Alessandra Falco [1,*,†], Damiano Girardi [1,†], Achim Elfering [2], Tanja Peric [3], Isabella Pividori [3], and Laura Dal Corso [1]

1 FISPPA Section of Applied Psychology, University of Padua, Padua, Italy
2 Institute of Psychology, University of Bern, Bern, Switzerland
3 Department of Agricultural, Environmental and Animal Sciences, University of Udine, Udine, Italy
* Correspondence: alessandra.falco@unipd.it; Tel.: 0039 049 8276588
† These authors contributed equally to this work

Abstract: Building on the job demands-resources (JD-R) and the allostatic load (AL) models, in this study we investigated the role of smart working (SW) in the longitudinal association between workload/job autonomy (JA) and a possible biomarker of work-related stress (WRS) in the hair, namely the cortisol to dehydroepiandrosterone sulphate (DHEA(S)) ratio, during the COVID-19 pandemic. Overall, 124 workers completed a self-report questionnaire (i.e., psychological data) at Time 1 (T1) and collected a strand of hair (i.e., biological data) three months later (Time 2, T2). Results from moderated multiple regression analysis showed that smart working at T1 was negatively associated with hair cortisol/DHEA(S) ratio at T2. Additionally, the interaction between workload and SW was significant, with workload at T1 being positively associated with hair cortisol/DHEA(S) ratio at T2 among smart workers. Overall, this study indicates that SW can be conceived as a double-edged sword, with both positive and negative consequences on employee well-being. Furthermore, our findings suggest that hair cortisol/DHEA(S) ratio is a promising biomarker of WRS. Practical implications that organizations and practitioners can adopt to promote organizational well-being are discussed.

Keywords: smart working; COVID-19; workload; hair cortisol; Dehydroepiandrosterone Sulfate; biomarker; work-related stress; organizational well-being.

---

1. Introduction

In recent years, technological advances and globalization have deeply affected the nature of work, fostering working long hours and making it more difficult to psychologically and physically detach from one's professional obligations *[1]*. Specifically, the emergence of technologies such as emails, smartphones, and virtual meeting has facilitated the diffusion of alternative work arrangements, which provide workers with more flexibility in executing job tasks—in terms of time, space, and procedures—while, at the same time, contributing to blurred boundaries between work and private life *[2]*. Although the adoption of flexible work arrangements was ever-increasing in the pre-pandemic era *[2]*, the COVID-19 crisis has determined a keen acceleration in this trend, as flexible work arrangements has become a broadly used practice to contain the spread of SARS-CoV-2 (e.g., by reducing physical proximity and close social contacts with colleagues or customers) *[3]*.

In the literature, different forms of alternative work arrangements are described *[4–6]*—each with its own peculiarities—including for example telecommuting, remote work, telework, and smart working. In their extensive review of the literature, Allen and colleagues defined telecommuting as "working some portion of time away from the conventional workplace, often from home, and communicating by way of computer-based technology" (p.43) [4]. The authors also noted that remote work usually identifies more broadly "any form of work not conducted in the central office, including work at branch locations and differing business units" (p.44) [4]. Additionally, according to the International Labour Organization, telework "refers to employees who use information and communications technologies to perform their work remotely", usually from home—or from another location of their choice—on a regular or permanent basis (p.8) [6].

In Italy, smart working (SW) identifies a form of flexible work arrangement that implies an organization by phases, cycles, and objectives, the possible use of technological tools for carrying out the work activity, as well as the absence of constraints in time or place, thus enabling remote working (Law 81/2017). Interestingly, SW was originally proposed to enhance competitiveness and foster work–life balance (Law 81/2017; see also [7]) However, to date research has shown conflicting results, with SW being associated with both positive and negative consequences for workers' well-being, before and during the COVID-19 pandemic [8–12].

With respect to its diffusion, SW was less common in Italy than in other European countries before the pandemic [13], but during the COVID-19 crisis the number of smart workers understandably increased from 570,000 in 2019 to 6,580,000 in 2020 (+1054%) [14]. With the progress of the vaccination campaign and the gradual easing of some protective measures, smart workers became 4.07 million in 2021 and 3.6 million in 2022. Interestingly, a slight increase to 3.63 million is expected in 2023 [15], which suggests that SW is here to stay as part of the "new normal" [3].

Given the growing spread of the phenomenon and considering its relevant consequences at a psychophysical (i.e., motivation, health, and well-being), social, and economic level [7,16,17], this study aimed at investigating the longitudinal association between SW and work-related stress (WRS), in terms of both perceived aspects of the job and the strain response, during the COVID-19 pandemic. Specifically, building on the job demands–resources (JD-R) model [18,19], we first hypothesized that workload and job autonomy (JA)—as perceived aspects of the job, in terms of job demands/resources, respectively—predict the strain response in the individual over time (i.e., three months later). Next, we focused on the role of SW in the aforementioned relationships. Considering its complex nature, we conceptualize SW as a broader work "context" of work conditions, including at least one characteristic of SW that shapes remote employees' work experience [3,9]. Accordingly, we hypothesized SW to predict the strain response in the individual over time. We also hypothesized that SW affects the longitudinal association between workload/JA and the strain response, as postulated by the JD-R. Specifically, since smart workers may encounter difficulties in managing their daily workload and invest more effort in their work, we expected SW to enhance the positive association between workload and the strain response over time. Similarly, considering that smart workers may benefit more from JA because they may be better able to use discretion to organize their work effectively, we also expected that SW would enhance the negative association between JA and the strain response over time.

Additionally, to better understand the psycho-physiological mechanisms underlying the relationship between job demands/resources, the strain response, and more serious, long-term consequences of WRS (e.g., depression, cardiovascular disease) [20], as well as to reduce common method bias (CMB) [21], in this study we combined psychological and biological measures to determine perceived aspects of the job and the strain response, respectively. In doing so, we draw on the allostatic load (AL) model, which offers an integrative framework to understand the long-term impact of chronic/prolonged psychosocial stress on workers' physical and mental health through cumulative physiological dysregulation [22,23]. The allostatic load, in fact, indicates the cumulative effects of everyday life events involving both ordinary and extraordinary challenges [24]. The possibility to know the allostatic load is beneficial in the assessment of the individual condition. A possible approach in determining allostatic load is the use of biomarkers *[25]* and several studies have focused on them, including steroids as cortisol and dehydroepiandrosterone sulfate (DHEA(S)) *[24,26]*. Specifically, in this study we focused on the cortisol to (DHEA(S)) ratio in hair as a promising stress biomarker *[27,28]* that can indicate allostatic load/chronic stress during the observation period between baseline and follow-up (see the method section for a detailed discussion).

Summarizing, in this study we longitudinally investigated the role of smart working in the association between workload/JA and cortisol/DHEA(S) ratio, as a possible biomarker of WRS. By doing so, we contribute to the literature in at least two ways. First, by conceptualizing SW as a "context" that shapes the remote workers' work experience *[3]*, we aim to investigate whether and how two well-known job demands/resources among in person workers (i.e., workload and JA) can contribute to smart workers' health and well-being. Besides possible theoretical advancements, this may have also practical implications for organizations and managers, who can foster smart workers' well-being and productivity by designing remote work appropriately to match their specific needs and expectations. Next, previous studies largely showed that SW may have both beneficial and adverse consequences for worker health and well-being *[29–32]*. However, past research was largely based on self-reported, cross-sectional data *[29,31]* and did not consider physiological mechanisms associated with SW over time *[33]* (although with some exceptions) *[34]*. By using a multi-method, longitudinal research design we aim to provide a sound contribution to the field. In the following sections of the article, we describe in detail the theoretical rationale underlying our hypotheses. First, we outline the theoretical background of the study, briefly describing the JD-R and the AL model. Next, we concentrate on the study hypotheses and their theoretical underpinnings, with a focus on the role of SW. Finally, in the method section we describe in detail the cortisol/DHEA(S) ratio in hair as a possible biomarker of WRS.

1.1. Job demands/resources and the allostatic load model

The JD-R [18,19,35] is a flexible theoretical model that synthesize knowledge from previous theories of WRS and motivation, thus providing a thorough understanding of employee well-being and performance [19]. A core assumption of the JD-R model is that job characteristics can be classified either as job demands or job resources. The former are those "physical, psychological, social, or organizational aspects of the job that require sustained physical and/or psychological effort and are therefore associated with certain physiological and/or psychological costs " (p. 274) [35] and include, among others, workload and interpersonal conflict [19]. Job resources, including for example job autonomy and social support [19], are "those physical, psychological, social, or organizational aspects of the job that are functional in achieving work goals, reduce job demands and the associated physiological and psychological costs, or stimulate personal growth, learning, and development" (p. 274) [35]. According to the health impairment process of the JD-R, the frequency and/or severity of job demands require effort from workers and deplete their physical, emotional, and cognitive resources, possibly leading over time to exhaustion and psychophysical strain (i.e., psychological and physical symptoms related to WRS) [36–38]. Similarly, a lack of job resources thwarts the achievement of one's goals at work, which may lead to exhaustion/psychophysical strain over time [38].

However, as previously noted by Schaufeli and Taris [38], the JD-R model is a general, descriptive model that outlines the relationship between classes on constructs, such as job demands/resources and health/motivation, without focusing on the underlying psychological or physiological mechanisms. Interestingly, physiological costs are mentioned in the definition of both job demands and resources, but research on the physiological processes involved in the long-term association between chronic/prolonged stressful situations at work, psychophysical strain (e.g., the health impairment process of the JD-R model), and more serious, long-term consequences of WRS (e.g., depression, cardiovascular disease) [20] is still limited [35,39]. Hence, we also build on the AL model [22,40]—that has previously been applied to WRS [20] and integrated with the JD-R model [41–

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 10 March 2023 doi:10.20944/preprints202303.0199.v1

43]—to provide theoretical support for the associations hypothesized in this study. According to the AL model, the exposure to stressful situations (at work) triggers the secretion of so-called primary mediators, which include for example stress hormones (e.g., cortisol) [44,45] and pro-/anti-inflammatory cytokines. When a worker faces chronic or repeated stressful conditions, and when recovery is incomplete [46], primary mediators are activated chronically or repeatedly. Over time, this may lead to secondary mediators (e.g., increased blood pressure) and, eventually, allostatic overload and psychological or physical diseases, including for example depression or cardiovascular disease [20]. Summarizing, the AL model offers an integrative framework to understand the impact of chronic/prolonged psychosocial stress—including WRS—on workers' physical and mental health through cumulative physiological dysregulation [22,23].

1.2. The current study

In the literature on WRS and organizational well-being, workload and JA are identified as central job demands and resources in the general working population *[37,47–49]*. Futhermore, workload and JA play a pivotal role in several theoretical models such as the Demand–Control–Support model *[50,51]*, the Effort–Reward Imbalance model *[52]*, the Health and Safety Executive's Management Standards *[53]*, the Job Characteristics Model *[54]*, the Vitamin Model *[55]*, as well as the JD-R model *[18]*. Generally, two related facets of workload are identified in the literature, namely quantitative and qualitive workload *[56,57]*. While the former refers to the amount of work to be carried out in a given time, the latter reflects the "difficulty or complexity of the job, for which the worker is not trained or does not have enough resources to deal with" (p.2) *[58]*. Consistent with the health impairment process of the JD-R model, workload—both quantitative and qualitative—requires effort to meet one's job requirements, and drains individuals' physical and mental resources suh as energy, concentration, or time *[47]*. Being constantly exposed to high workload, coupled with inadequate recovery opportunities *[46]*, leads to the progressive depletion of resources without adequate replenishment, and may results in psychophysical strain over time *[46,59]*. Empirical research, both cross-sectional and longitudinal, provides evidence of a relationship between workload and negative individual outcomes of WRS, including psychophysical strain and exhaustion *[37,47,48]*. Overall, in line with the health impairment process of the JD-R, and consistent with previous empirical results, we hypothesized that workload at T1 will be positively associated with hair cortisol/DHEA(S) ratio at T2.

Hypothesis 1 (H1). Workload at T1 will be positively associated with hair cortisol/DHEA(S) ratio at T2.

Job autonomy has been conceptualized as the "extent to which a job allows freedom, independence, and discretion to schedule work, make decisions, and choose the methods used to perform tasks" (p.1323) *[60]*. As a job resource, JA is functional in accomplishing tasks effectively and achieving one's goals at work, thus contributing to prevent psychophysical strain and exhaustion over time *[38]*. Similarly, JA plays a central role for employee health and well-being because greater autonomy correspond to more opportunities to cope effectively with stressful situations at work *[61,62]*. For example, when workers are allowed to control their work, they may be flexible in adapting to unexpected situations, or they may develop new strategies to overcome temporary challenges or difficulties, and complete their tasks as required *[63,64]*. Furthermore, JA may help workers to improve other valuable resources at work such as self-efficacy and perceived control *[65]*, which can protect them from negative consequece of WRS *[66–68]*. In line with this reasoning, past cross-sectional and longitudinal research has shown JA to be negatively associated with psychophysical strain ad exhaustion *[69–71]*. Hence, we hypothesized that JA at T2 will be negatively associated with hair cortisol/DHEA(S) ratio at T2.

Hypothesis 2 (H2). Job autonomy at T1 will be negatively associated with hair cortisol/DHEA(S) ratio at T2.

The next three hypothesis concenrns the role of SW in the longitudinal relationship between workload/JA and cortisol/DHEA(S) ratio. Smart working implies a radical change in physical and psychosocial working conditions, with potentially relevant effects on individuals' well-being, productivity, and overall quality of working and private life *[29,30]*. Although previous research has shown SW to have both favorable and adverse consequences *[29–32,72]*, recent reviews suggest an overall beneficial impact *[30]*, particularly for some professionals such as for example knowledge workers (i.e., "employees who have to acquire, create and apply knowledge for the purposes of their work", p.51) *[72]*). Similarly, empirical research suggests positive outcomes of SW among specific workers profiles: for example, remote working improved depressive symptoms among working women with young children *[73]*, and the extent of remote working was positively associated with job performance among those who hold complex jobs or jobs involving low levels of interdependence *[74]*. A possible explanations is that SW helps workers to maintain or replenish resources such as time, physical/psychological energies, or capacities, thus contributing to prevent resource depletion, exhaustion, and negative health consequences over time *[75,76]*. For example, SW may avoid or reduce office interruptions, thus preserving the level of concentration necessary to complete one's tasks *[77]*. Other potentially beneficial aspects of SW include reduced commuting time, especially for those who frequently work remotely (e.g., more than three days per week) *[78]*, increased opportunities for leisure, particularly among teleworkers without children *[79]*, the possibility to work according to one's own biorhythms *[32]* as well as the adoption of health behaviors *[33]*, including an improved sleep pattern *[80]*, increased physical activity *[81]* as well as healthier eating *[82]*. Overall, in the light of previous theoretical reasoning and empirical evidence, we tentatively hypothesize that SW will be negatively associated with hair cortisol/DHEA(S) ratio over time.

Hypothesis 3 (H3). SW at T1 will be negatively associated with hair cortisol/DHEA(S) ratio at T2.

Next, in this study we hypothesized that SW might affect the longitudinal association between job demands/resources, in terms of workload/JA, and hair cortisol/DHEA(S) ratio. First, smart workers may encounter difficulties in managing their daily workload due to technology-related problems (e.g., failures of network connections) *[83]* or lack of adequate technological equipment *[84]*, high email quantity and poor email quality *[85]*, or an excessive amount of virtual meetings, which might give rise to Zoom fatigue *[86–88]*. This may ultimately result in information overload *[89]* and reduced mastery over one's work flow *[90]*, feelings of being overwhelmed by technology (a dimension of technostress) *[91,92]* and impaired recovery experiences *[93]*. Additionally, smart workers may find it difficult to concentrate on their work because of demands or frequent interruptions from family domain *[8]*. As a result, they usually have to perform multiple tasks simultaneously—both work- and family-related—or switch from one task to another (i.e., multitasking) *[94]*. Overall, this suggests that smart workers may invest greater effort to accomplish their tasks, with higher psychological and physiological costs for the individual and, eventually, higher levels of psychophysical strain and exhaustion over time (i.e., the health impairment process of the JD-R model). Hence, we hypothesized that the positive association between workload at T1 and hair cortisol/DHEA(S) ratio at T2 will be stronger for smart workers.

Hypothesis 4 (H4). Smart working will moderate the positive association between workload at T1 and hair cortisol/DHEA(S) ratio at T2, which is expected to be stronger for smart workers.

The last hypothesis concerns SW and JA. By being less bounded by office routine and direct supervision, and also given the extensive adoption of new technologies, smart workers may benefit more from JA beacause they may be better able to use discretion to organize their work effectively *[95]*. For example, smart workers may decide to postpone a task to a more preferable time of the day (e.g., in the evening), or they may modify task schedule or method of execution (e.g., modifying daily tasks to make better use of new technologies or modifying technologies to perform a task more efficiently) *[96]*, thus mitigating fatigue and exhaustion, while fostering task performance *[95,97]*. Similarly, smart workers can take advantage of their autonomy to better manage demands from family domain or to engage in household or leisure activities, leading to an improved work-life balance and reduced need for recovery *[5,98]*. Therefore, we hypothesized that the negative association between JA at T1 and hair cortisol/DHEA(S) ratio at T2 will be stronger for smart workers, that is, JA contributes to prevent negative consequence of WRS (e.g., psychophysical strain) especially among smart workers.

Hypothesis 5 (H5). Smart working will moderate the negative association between JA at T1 and hair cortisol/DHEA(S) ratio at T2, which is expected to be stronger for smart workers.

2. Materials and Methods

2.1. *Participants and Procedures*

The study was carried out in Italy during the COVID-19 pandemic and involved a sample of workers from different organizations. Participants were recruited using a snowball procedure and were invited to take part in a longitudinal study about their work experience and biomarkers of WRS in the hair. Workers were motivated to participate by explaining to them the general aim of the research and its relevance. They were also informed that participation was voluntary and confidential, and that they could withdraw at any time. Two waves of data collection were conducted. The first wave (i.e., Time 1, T1) started in mid-March 2022, whereas the second wave (i.e., Time 2, T2) took place in mid-June 2022, with a three-months time-lag between measurement occasions. Briefly, participants were invited to complete an online questionnaire at T1, which was aimed at determining the psychological constructs under investigation. Participants were also informed that they would be required to collect a biological sample—namely a strand of hair approximately three cm long—three months later (i.e., T2).

Upon acceptance, participants were given a link to the informed consent form and the questionnaire, so that all participants provided written informed consent before filling out the self-report instrument. Additionally, participants were also provided with an alphanumeric identification code, which was necessary to match psychological and biological data collected over time. At T2, participants were provided with detailed instructions about the collection of biological samples (including a brief video tutorial), together with a link to a short online questionnaire aimed at collecting information useful for the analysis of the hair samples (e.g., hair treatment/washing frequency, state of pregnancy). Next, a hair strand measuring at least 3 cm was collected noninvasively from the vertex posterior of the head, cut as close to the scalp as possible. Hormones concentrations—in pg/mg—were determined from the first scalp-near 3 cm hair segment, which reflects the cumulative concentration of cortisol and DHEA(S) over the three-month period between the two measurement occasions. The project has been approved by the Ethical Committee for Psychological Research of the University of Padova.

Overall, 150 workers were invited to take part in the study. One hundred and thirty-seven participants completed the questionnaire at T1, and 124 (90.5%) also collected hair samples at T2. There were no differences in main demographics or study variables between those who completed the study and those who dropped out of it (N = 13). The sample included 91 women (73.4%) and 33 men (26.6%) with a mean age of 39.9 years (SD = 13.6). With respect to work experience, 51 workers (41.1%) had been working in their current organization for less than 5 years, whereas 48 employees (38.7%) for more than 10 years. Seventy-eight workers (62.9%) had a permanent contract, whereas 46 (37.1%) had a temporary contract. Concerning marital and parental status, 72 workers (58.1%) were married or cohabitating, and 50 (40.3%) had children. Finally, concerning SW, 84 participants (67.7%) were in-person workers, whereas 40 (32.3%) were smart workers.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 10 March 2023 doi:10.20944/preprints202303.0199.v1

2.2. *Psychological Measures*

With respect to psychological data at T1, the questionnaire included the following self-report measures:

Workload was assessed using seven items reflecting both qualitative and quantitative workload **[37,56]**. Scale items were formulated to capture the general levels of workload (e.g., "Your job requires you to work constantly under pressure"). The scale was taken from the Qu–Bo Test, a self-report, standardized instrument developed for the Italian context **[99]**. The response scale ranged from 1 (strongly disagree) to 6 (strongly agree), and higher scores reflected higher workload. Cronbach's alpha was 0.85 in this study.

Job autonomy was determined using a scale taken from the Qu–Bo Test **[99]**. The scale included three items, formulated to capture the general levels of JA (e.g., "Your job allows you to autonomously decide the pace of work"). The response scale ranged from 1 (strongly disagree) to 6 (strongly agree). Higher scores referred to high levels of JA. Cronbach's alpha was 0.90.

Smart working was assessed by asking participants to indicate whether they worked in-person or remotely, in whole or in part (i.e., smart worker).

2.2. *Biological Measures*

In this study, we considered hair cortisol/DHEA(S) ratio as a possible biomarker of WRS. Specifically, cortisol, a biomarker of the hypo-thalamic-pituitary-adrenal (HPA) axis activity, helps the body in adapting flexibly to environmental challenges **[100]**. Likewise, DHEA(S) is a neuroactive steroid, potent modulator of neurogenesis, neuronal growth and differentiation, and neuroprotector that counteracts the effects glucocorticoids **[26,101]**. Therefore, using cortisol and DHEA(S) individually is certainly useful for understanding an individual's state but cortisol/DHEA(S) ratio, an index of the catabolic/anabolic balance, may be more informative and helpful than their absolute concentrations **[101]**. Cortisol and DHEA(S) have antagonistic effects on each other allowing us to monitor the effect of psychological processes on the long-term HPA axis activity. Interestingly, it has been proposed that the ratio between cortisol and DHEA(S) reflects an imbalance in the HPA axis associated with chronic stress **[102,103]**. An alterate ratio has been associated with psychological outcomes such as higher anxiety, mood disturbance, confusion and poorer cognitive performance **[26,104]**. Mental health may also be negatively affected by high cortisol/DHEA-S ratio. There is also convincing evidence that this ratio may serve as a robust indicator of immune function. A high cortisol/DHEA-S ratio has been observed in humans suffering from severe injuries and illnesses and can also be used to predict the risk of infection or death **[104]**. This ratio it also been considered as a possible biomarker of adverse psychosocial stress, including WRS **[27,28]**. The cortisol and DHEA(S) concentrations can be measured by a variety of matrices, each reflecting a specific timeframe of HPA axis activation. Measurements of these hormones in blood serum, saliva, and urine provide snapshot information of exposure, while retrospective determination can be achieved through a single strand of hair **[105]**. A strength of hair measurement is that, in line with the AL model, it allows to retrospectively assess cumulative hormones concentrations over several months (e.g., three months, such as in the current study), which reflect an individual's physiological activation in response to the exposure to chronic/prolonged stressful events over the same time-period **[106,107]**. Hair sampling is not invasive or painful, samples can be stored at room temperature for extended periods of time **[108]** and there is a low susceptibility to confounding factors (e.g., circadian and ultradian rhythmicity) **[108]**.

2.2.1. *Hair Collection*

In regard to biological data at T2, re-growth (first shaving at T1) hair was collected from the vertex posterior region of the head, since it has been found that this area has a greatest growth synchrony *[109]*. The collected hair strand represents the hair growth in the period

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 10 March 2023 doi:10.20944/preprints202303.0199.v1

between T1 and T2 based on an average hair growth 1 cm/moth *[109]*. Each sample was stored in a paper envelope at room temperature and protected from UV rays until processing.

2.2.2. Sample preparation

Twenty-five milligrams of hair were weighted, and each hair strand was washed twice using H_2O for 3′ and then, in agreement with Davenport et al. *[110]* twice with isopropanol for 3′. These stages allow to mini-mize the risk of extracting cortisol from outside the hair and ensure the removal of sweat and sebaceous secretions from the external surface of the hair. Steroids was extracted by incubating each specimen for 16 hours in methanol at 37 °C. Next, the liquid in the vial was evaporated to dryness at 37 °C under an airstream suction hood. The dried residue was then re-suspended in 1.2 ml of ELISA buffer (50 mM phosphate buffer, pH 7.4, 0.4% BSA, 0.5 M NaCl).

2.2.3. Hair hormone (cortisol and DHEA(S)) analysis

The concentrations of cortisol and DHEA(S) were measured using an in-house Enzyme-linked immunosorbent assay (ELISA) as described already for another hormone (progesterone) by Comin et al. *[111]*. In brief, microplates were coated with antirabbit-IgG antibody. After an overnight incubation, plates were washed 5 times with washing buffer. Aliquots of cortisol or DHEA-S standards, quality-control extract and hair test extracts were added to the microplate wells. The cross-reactivities of the anti- cortisol antibody with other steroids were as follows: cortisol 100%, cortisone 4.3%, corticosterone 2.8%, 11-deoxycorticosterone 0.7%, 17-hydroxyprogesterone 0.6%, dexamethasone 0.1%, progesterone, 17-hydroxypregnenolone, DHEAS, androsterone sulphate and pregnenolone <0.01%. The cross-reactivities of DHEA(S) antibody with other steroids are as follows: DHEA-S 100%, 5- Androsten-3-ol-17-one (Dehydroepiandrosterone, DHEA) 76.6%. Anti-cortisol or anti-DHEA(S) antibody diluted 1:32,000 and 1:80,000, respectively, in ELISA buffer was added along with the cortisol- or DHEA-S-peroxidase conjugate diluted 1:6,000 or 1:10,000, respectively, in ELISA buffer. Plates were incubated overnight, and then washed 5 times in washing buffer to remove any unbound cortisol or DHEA(S). The amount of bound conjugate was quantified by adding the chromogenic substrate. The plates were incubated for 30 min in darkness at room temperature (23 °C). The reaction was stopped with 2 M H2SO4. Absorbance was read at 450 nm using a plate reader (EnSight Multimode Plate Reader, Perkin-Elmer Life Science, Boston, MA, USA). The intra- and inter-assay coefficients of variation were 6.3% and 12.2%, and 9.9% and 15.2% for cortisol and DHEA(S), respectively. The sensitivities of the assays were 9.4 and 5.4 pg/mL for cortisol and DHEA(S), respectively. The relationships among hair cortisol and hair DHEA(S) and their respective standard curves (parallelism), determined through linear regressions, were linear with correlation coefficients of r = 0.99. The models were described by the equations y = 0.99x- 0.15, and y = 1.03x - 2.71 for cortisol and DHEA(S), respectively. The recovery rate was 99.8 ± 14.5% and 110.9 ± 4.1% (mean ± SD) for cortisol and DHEA(S), respectively.

2.3. Data Analysis

First, a confirmatory factor analysis (CFA) was carried out to assess the psychometric properties of the self-report instruments administered in the study. The CFA adopted the maximum likelihood method with robust standard errors and a scaled test statistic as estimator **[112]**. In a two-factor model, workload and JA at T1 were measured by the respective scale items. To assess model fit, the scaled chi-square test was used along with the following fit indices: the root mean square error of approximation (RMSEA), the comparative fit index (CFI) and the standardized root mean square residual (SRMR). A model shows a good fit to data if χ^2 is nonsignificant. Furthermore, values below 0.08 for RMSEA and SRMR, and values above 0.90 for CFI, indicate an acceptable fit **[113]**. Reliability of each scale was assessed using composite reliability, whose values greater than 0.70 suggest satisfactory reliability **[114]**.

Next, moderated multiple regression analysis was used to test the relationships hypothesized in the study **[115]**. In Model 1 (M1), hair cortisol/DHEA(S) ratio at T2 was regressed on gender, age, workload, JA, and WA at T1. In Model 2 (M2), two interaction terms—between workload and SW, and between JA and SW—were also included. If significant interactions were found, then a simple slope analysis was conducted to determine whether the associations between predictors at T1 (i.e., workload or JA) and cortisol/DHEA(S) ratio at T2 were significant across in-person vs. smart working. Furthermore, significant interactions were plotted following Aiken and West **[115]**. Finally, as ancillary analysis, we estimated an additional Model 3 (M3) in which we also included the interaction between workload and JA **[116]**. The independent variables included in M1/M2/M3 (excluding dichotomous variables) were mean-centered, to enable easier interpretations of results. Additionally, a log-transformation of the cortisol/DHEA(S) ratio was used, which was computed as follows: $\log_{10}$(Cortisol/DHEA(S)) = $\log_{10}$(Cortisol) - $\log_{10}$(DHEA(S)). The ratio was log-transformed to improve its distribution and symmetry, thus ensuring the appropriateness of subsequent parametric tests (e.g., regression analysis) **[117]**. All regression models were estimated controlling for the effect of gender and age **[118]**, as previous research has shown an association between hair cortisol/DHEA(S) concentrations and these demographic variables **[28,119–121]**. Statistical analyses were conducted using R version 4.2.1 **[122]** as well as the lavaan R package version 0.6–13 for CFAs **[112]**.

3. Results

3.1. *Confirmatory Factor Analysis*

First, a CFA was carried out to investigate the psychometric properties of the self-report questionnaires (i.e., psychological data) used in the study. The model showed a moderate fit to data: $\chi^2(34) = 67.08$, $p < 0.001$; RMSEA = 0.089, CFI = 0.923, SRMR = 0.086. An inspection of modification indices suggested that the error covariance between items 2 and 3 of workload should be freely estimated. This is conceivable, given that these items both reflect quantitative workload (i.e., the amount of work to be done in a given time) **[37,56]** and share similar wording, accordingly. A second CFA was performed, and fit indices showed an acceptable fit to data: $\chi^2(33) = 47.98$, $p = 0.05$; RMSEA = 0.060, CFI = 0.965, SRMR = 0.076. The revised model also showed a better fit to data, $\Delta\chi^2(1) = 17.43$, $p < 0.001$. Finally, composite reliability was 0.84 for workload and 0.91 for JA. All in all, the self-report questionnaires administered at T1 showed adequate psychometric properties.

3.2. *Preliminary Analysis*

Descriptive statistics were first examined for study variables. Log cortisol/DHEA(S) ratio ($M = -0.45$, $SD = 0.38$), workload ($M = 3.88$, $SD = 1.11$), and JA ($M = 3.80$, $SD = 1.58$) had univariate skewness and kurtosis, which fell within the acceptable range of ±2.0 and ±7.0, respectively **[123]**. Correlation analysis showed a positive albeit marginally significant association between workload and JA ($r = 0.17$, $p = 0.06$), whereas zero-order correlations between log cortisol/DHEA(S) ratio and workload ($r = 0.07$, $p = 0.46$) or JA ($r = 0.10$, $p = 0.28$) were not significant. Interestingly, there was a significant difference in log cortisol/DHEA(S) ratio by SW, with higher levels among in person workers ($M = -0.39$, $SD = 0.37$) compared to smart workers ($M = -0.58$, $SD = 0.37$), $t(75.83) = 2.58$, $p = 0.01$, Cohen's $d = 0.50$ **[124]**. Contrarily, there was no significant difference in workload between in person workers ($M = 3.79$, $SD = 1.17$) and smart workers ($M = 4.05$, $SD = 0.98$), $t(90.42) = -1.28$, $p = 0.20$, Cohen's $d = 0.24$. Similarly, there was no significant difference in JA between in person workers ($M = 3.71$, $SD = 1.69$) and smart workers ($M = 3.98$, $SD = 1.31$), $t(96.92) = -0.95$, $p = 0.34$, Cohen's $d = 0.17$. Next, with respect to control variables, there was a marginally significant difference in log cortisol/DHEA(S) ratio across gender, with relatively higher levels in females (*M* = −0.41, *SD* = 0.32) compared to males (*M* = −0.57, *SD* = 0.48), *t*(42.98) = 1.83, *p* = 0.07, Cohen's d = 0.39. Finally, there was a positive association between log cortisol/DHEA(S) ratio and age (*r* = 0.33, *p* < 0.001).

3.2. *Hypothesis Testing*

Results of the regression analyses are presented in Table 1. In M1, the predictors at T1 accounted for 18.6% of the variance in the log cortisol/DHEA(S) ratio at T2 (R^2 = 0.19, *F*(5, 118) = 5.39, *p* < 0.001). In this model, gender (*b* = −0.13, *SE* = 0.07, *p* = 0.07) and age (*b* = 0.01, *SE* = 0.00, *p* < 0.01) at T1 were associated with log cortisol/DHEA(S) ratio at T2, although the association was marginally significant in the former case. Workload (*b* = 0.03, *SE* = 0.03, *p* = 0.27) and JA (*b* = 0.01, *SE* = 0.02, *p* = 0.66) at T1 were not associated with log cortisol/DHEA(S) ratio at T2. Hence, H1 and H2 were not supported. Smart working at T1 (0 = in-person working, 1 = smart working) was negatively associated with log cortisol/DHEA(S) ratio at T2 (*b* = −0.18, *SE* = 0.07, *p* < 0.01), and H3 was supported.

Table 1. Multiple regression analyses for log cortisol/DHEA(S) ratio (Time 2): Model 1 and Model 2 (*N* = 124).

Predictors (Time 1)	Model 1		Model 2	
	B	*SE*	*B*	*SE*
Intercept	−0.360 ***	0.043	−0.362 ***	0.042
Gender [1]	−0.133 †	0.072	−0.140 †	0.072
Age	0.008 **	0.002	0.007 **	0.002
Workload	0.032	0.029	−0.011	0.032
Job autonomy	0.009	0.021	0.008	0.023
Smart working [2]	−0.177 **	0.067	−0.202 **	0.066
Workload x smart working			0.173 **	0.065
Job autonomy x smart working			0.031	0.048
Simple slope workload (in-person)			−0.011	0.032
Simple slope workload (smart working)			0.162 **	0.056
Total R^2	0.186 ***		0.238 ***	
Change in R^2			0.052 *	

Note: log cortisol/DHEA(S) ratio Time 2 was the dependent variable in all the models tested. *B* = unstandardized regression coefficient; *SE* = standard error; R^2 = squared multiple correlation. [1] Female = 0, male = 1; [2] in-person working = 0, smart working = 1. † *p* < 0.10. * *p* < 0.05. ** *p* < 0.01. *** *p* < 0.001.

In M2, the interaction terms accounted for an additional 5.2% of the variance in log cortisol/DHEA(S) ratio at T2, $F_{change}(2, 116) = 3.96$, *p* = 0.02, f^2 = 0.07 **[124]**. The interaction between workload and SW was significant (*b* = 0.17, *SE* = 0.07, *p* < 0.01), whereas the interaction between JA and SW was not (*b* = 0.03, *SE* = 0.05, *p* = 0.52). Simple slope analysis revealed that the association between workload at T1 and log cortisol/DHEA(S) ratio at T2 was positive and significant for smart workers (*b* = 0.16, *SE* = 0.06, *p* < 0.01), but not significant for in-person workers (*b* = −0.01, *SE* = 0.03, *p* = 0.75). The interaction between workload and SW is shown in Figure 1. Smart working strengthened the positive association between workload at T1 and log cortisol/DHEA(S) ratio at T2. Overall, Hypothesis 4 was supported, but Hypothesis 5 was not. Finally, in M3 the interaction between workload and JA was not significant, $F_{change}(1, 115) = 0.13$, *p* = 0.72. Summarizing, SW was associated with lower (better) hair cortisol-DHEA(S) ratio, so overall smart working is beneficial for workers' well-being, but if work stressors (i.e., workload) increase, the advantage of SW gets lost.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 10 March 2023 doi:10.20944/preprints202303.0199.v1

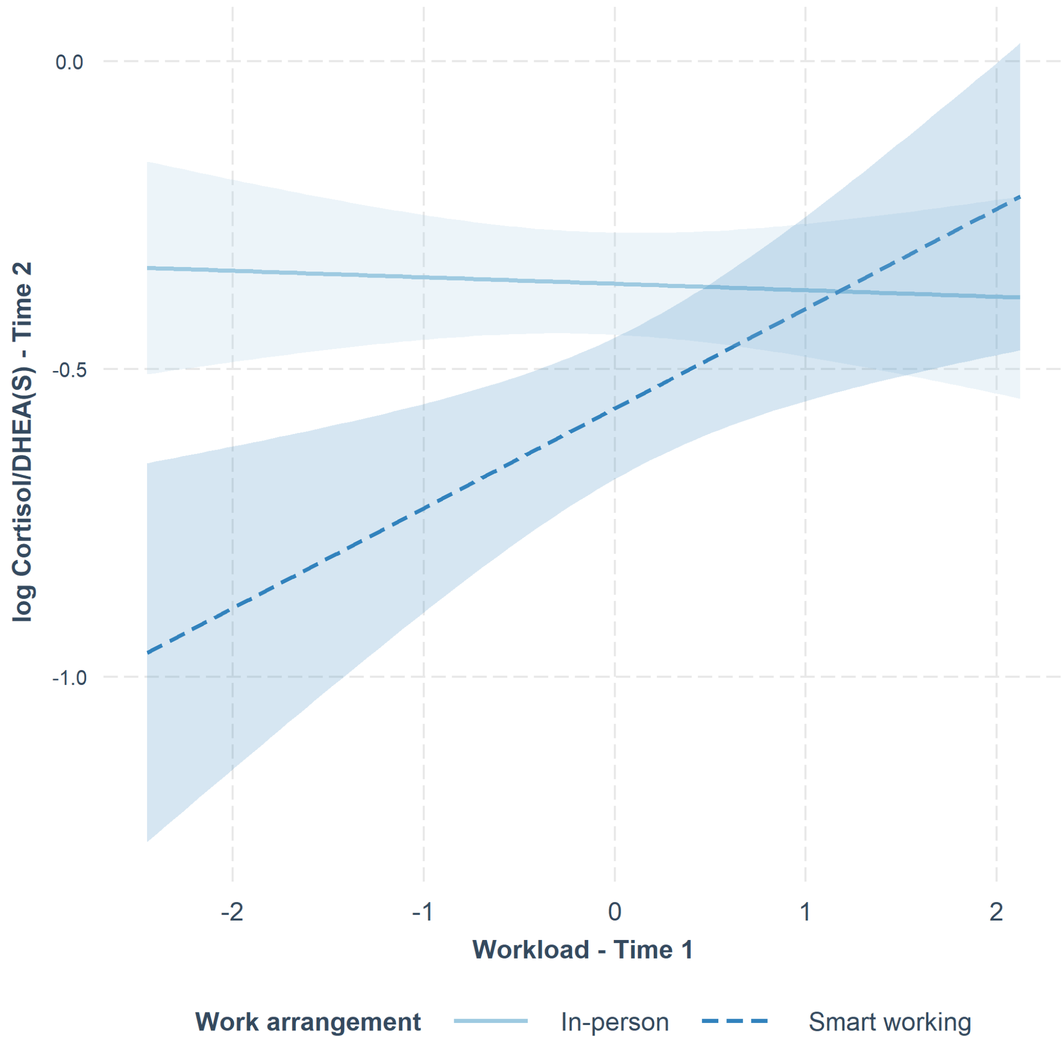

Figure 1. The moderating role of smart working in the relationship between workload and log cortisol/DHEA(S) ratio over time.

4. Discussion

In this study we longitudinally investigated the role of SW in the WRS process. Specifically, building on the JD-R and the AL models, we examined the associations over time between two relevant job demands/resources in the general working population, namely workload/JA, and cortisol/DHEA(S) ratio in the hair, as a possible biomarker of WRS. We also investigated the role of SW in the aforementioned process and relationships. Based on theoretical reasoning and past empirical results, we first hypothesized SW to have an overall beneficial impact on workers' health and well-being, thus being negatively associated to hair cortisol/DHEA(S) ratio over time. Next, we suggested that SW may intensify the positive association between workload and hair cortisol/DHEA(S) ratio, since smart workers may encounter difficulties in completing their work tasks. Finally, we hypothesized that SW may also intensify the negative association between JA and hair cortisol/DHEA(S) ratio, so that JA contributes to prevent negative consequence of WRS especially among smart workers.

Results partially supported our predictions. Contrary to our expectations, neither workload nor JA at T1 were associated with hair cortisol/DHEA(S) at T2 (i.e., three months later). Interestingly, SW was negatively associated with hair cortisol/DHEA(S) ratio over time. Furthermore, the interaction between workload and SW was significant, with the association between workload at T1 and hair cortisol/DHEA(S) ratio at T2 being positive and significant for smart workers. Finally, the interaction between JA and SW was not significant.

4.1. Theoretical Implications

We believe that our research offers a valuable contribution to the existing literature on SW, with both theoretical and practical implications. To begin with, in this study we conceptualized SW as a "context" that affects the meaning of work and the ability of workers to effectively manage their professional obligations, also with respect to family and private life domains [3]. In this perspective, SW does not necessarily influence workers' health, well-being, and productivity though a different perception of work characteristics (e.g., increased workload, reduced quality of relationships with supervisor/colleagues) [5]. Rather, to enhance well-being and job performance, it is important that work characteristics (i.e., job demands/resources) fit the specific, flexible work arrangement as well as remote workers' specific needs and expectations. As noted by Wang and colleagues [3][], this approach is especially useful during the COVID-19 pandemic, in which SW is not necessarily an option, but often a necessity (depending on the current measures adopted to contain the spread of the SARS-CoV-2 virus), and the meaning of specific job demands/resources is deeply affected by the exceptional COVID-19 crisis.

Interestingly, in our study smart workers did not report higher levels of workload or JA (please see the results section). Contrarily, and consistent with the proposed theoretical perspective, SW emerged as a complex phenomenon, with in-depth, wide-ranging effects on employees' health and well-being [33]. On the one hand, by being negatively associated with hair cortisol/DHEA(S) ratio, SW seemed to be related to lessened psychophysical strain over time. This result is consistent with recent empirical evidence, showing that SW may have both favorable and adverse consequences, but with an overall beneficial effect on employees' well-being [29–31,72]. By reducing commuting time, favoring the adoption of healthy behaviors (e.g., improved sleep pattern), and increasing opportunities for leisure activities [33,78–80], SW may help workers to maintain or replenish resources (e.g., time, energy) and to prevent negative health consequences associated with resource exhaustion over time [75,76]. On the other hand, SW exacerbated the positive association between workload at T1 and hair cortisol/DHEA(S) ratio at T2, which was positive and significant for smart workers. A possible explanation is that SW implies both an extensification and an intensification of work [125]. Because smart workers may encounter difficulties in managing their workload effectively [83,85,86,126], they end up dedicating more time and effort—physical and mental—to their work, in order to meet job requirement and achieve their objectives. This may result in sustained psycho-physiological activation and, ultimately, negative health outcomes [22,46]. Interestingly, these findings are in line with a recent longitudinal study showing a positive association between workload and exhaustion—a central feature of job burnout—among smart workers over time [9]. Taken together, our results contribute to the literature by showing that SW can be conceived as a double-edged sword for employee well-being [127]. By increasing the flexibility in defining the spatio-temporal boundaries of the work and the massive adoption of new technologies, SW generates opportunities for employees to harmoniously integrate work and non-work activities but, at the same time, it also contributes to hinder the achievement of one's work goals effectively through the disruption of employees' workflow and information overload [128–130], with opposite effects on individual well-being.

Second, recent reviews on outcomes of SW sometimes showed conflicting results [29–32]. However, it should be noted that past empirical research was largely based on cross-sectional data [29,31] (with some exceptions, for example [131,132]), which precluded conclusions about the direction of the observed relationships between SW, job demands/resources, and mental/physical health [72]. Similarly, most previous study solely included self-report measures and did not consider physiological measures (for notable exceptions, see [133,134]), so that our understanding of the physiological processes involved in the aforementioned associations is still limited [35,135]. Additionally, cross-sectional, single-method research is also susceptible to CMB [21,136]. Therefore, to contribute to fill a gap in the literature, as well as to contain CMB, we use multi-method, longitudinal research design that combined psychological and biological measures. By showing an association between SW, workload, and cortisol/DHEA(S) ratio in hair, our results provide useful insight into physiological mechanisms potentially involved in the association between stressful working conditions and stress-related health impairment over time [137,138]. Specifically, the exposure to high workload, coupled with an impaired ability to manage one's job demand among smart workers (e.g., due to information overload or disrupted workflow), may be associated with a sustained activation of the HPA axis [139,140]. Over time, this sustained activation of so-called primary mediators [22] may result in an imbalance of the HPA axis, as reflected by an elevated cortisol and DHEA(S) ratio in hair [102,103]. At the same time, the opportunities for smart workers to harmoniously integrate the work and non-work domains may help them to inhibit the sustained activation of the HPA axis, which helps to counterbalance—at least partially—the effects associated with a suboptimal workload management [46].

Overall, our results are rather consistent with prior research in the field, although with some differences. For example, studies on hair cortisol concentration (HCC) showed that working from home was associated with greater maternal HCC levels during the COVID-19 pandemic [134], whereas van der Meij and colleagues found that HCCs were higher in a high workload sample compared to a normal workload sample (i.e., workers following an executive management program outside their normal jobs vs. those with regular jobs) [140]. Research on cortisol/DHEA ratio showed mixed results. For example, a study by Kim and colleagues showed the molar cortisol/DHEA ratios on Sunday were significantly lower than those on workdays among full-time working individuals who underwent saliva sample collections for seven consecutive days [141]. Similarly, a recent work by Ledford and colleagues found that serum levels of DHEA/cortisol ratio—as indicative of physiological resilience—was associated with one's ability to successfully complete the first phase of a military special operations training course [142]. Contrarily, Ota and colleagues did not find an association between effort–reward imbalance or overcommitment to work on daytime salivary cortisol, DHEA, or cortisol/DHEA ratio among female nursery schoolteachers [143]. In the light of the complex picture from previous research, two main peculiarities of the biological assessment carried out in this study need to be acknowledged. First, traditional assessment in saliva or serum mostly captures acute, short-term stress response [120,144]. However, in line with the AL model, in this study we focused on hair concentrations of cortisol and DHEA(S) as a retrospective measure of the sustained, long-term HPA activity associated with chronic/prolonged stress [145,146]. Second, given mixed findings concerning the association between WRS and hair cortisol [106,147–149] (see also [146], for a review), in this study we specifically focused on the ratio between hair concentrations of two stress-related hormones, namely cortisol and DHEA(S), a promising biomarker [27,28] that reflects an imbalance in the HPA axis associated with chronic/prolonged stress [102,103].

Contrary to our expectations, by not being negatively associated with cortisol/DHEA(S) ratio, JA did not seem to play a role in preventing negative outcomes of WRS. This unexpected result might be explained in the light of recent research suggesting that job resources are not necessarily and universally beneficial, but that the value of a resource may depend on its levels or the context in which a specific resource occurs [150]. With respect to the levels of JA, it should be noted that study participants were mostly white-collar workers (77.4%), doing intellectual (e.g., freelancers, managers, office workers, or teachers) rather than manual work. Hence, it is possible that for these workers the beneficial effect of JA was somewhat limited because autonomy is already an intrinsic component of their knowledge-based jobs, as reflected by the fairly high JA scores reported (M = 4.01, SD = 1.58 on a response scale ranging from 1 to 6) [151]. Additionally, according to the vitamin model [55], the beneficial effect of a job resource can rise to a certain level, then a further increase in the resource may have no additional effect or, alternatively, a detrimental effect. In this perspective, the lack of association between JA and cortisol/DHEA(S) ratio also among smart workers is not surprising, giving that those working remotely likely had occupations characterized by a good deal of autonomy even before they took advantage of SW [152], so that the related increase in JA would have a limited impact. Finally, with respect to the context in which a specific resource occurs, it should be recalled that our study was carried out during the COVID-19 pandemic. Since social connection with others at work may be particularly relevant after a period in which social gatherings were made difficult by restrictions and social distancing [3], it is possible that workers are more willing to give up a degree of JA in favor of other resources, such as social support, in order to buttress good relations with colleagues/supervisor, and reduce professional and social isolation [152,153]. Of course, this does not imply that JA should no longer be regarded as a valuable resource. In the future, it could be useful to pay closer attention to new forms of JA aimed at integrating the modern organization of work, based on teamwork and interdependence (e.g., tied autonomy) [154], the specific needs of remote workers (e.g., a self-paced, self-determined use of new technologies) [155] as well as supervisors' leadership styles (e.g., that value support and trust instead of excessive monitoring) [156,157].

We believe that our study has relevant practical implications for organizations and practitioners, in terms of primary and secondary prevention (e.g., directed to smart workers as a specific subpopulation of workers). First, by showing an association with SW and workload, this study suggests that hair cortisol/DHEA(S) ratio is a promising biomarker of WRS. The identification of a panel of possible biological indicators of WRS, similarly to the composite AL index [22], is a relevant goal for organizations and practitioners (e.g., occupational physician), in a perspective of prevention and occupational health promotion. Notably, a strength of hair sampling is that it is a painless, non-invasive WRS assessment method that can also be performed by the workers themselves. Hence, the evaluation of hair cortisol/DHEA(S), coupled for example with the collection of other digital biomarkers (i.e., physiological data collected via digital devices, such as blood pressure and sleep quality) [158], could be useful to promote health (e.g., by fostering behavioral change when working from home) as well as in terms of early detection and prevention of more severe consequences of WRS, among in-person but also remote workers [159]. Second, with respect to the potential detrimental effect of workload, organizations should encourage supervisors to develop new skills that effectively support smart workers in managing their job tasks when working remotely (e.g., e-leadership) [160], with a focus on mutual trust and instrumental/emotional support, rather than excessive monitoring and control [156]. Moreover, to reduce the tendency to exceed regular working hours and to forestall an "always-on culture" [161], specific organizational policies might be aimed at dissuading the use of work-related technologies (e.g., email, virtual meetings) during leisure time [162], including the acknowledgment of a right to disconnect [163]. Finally, in addition to these top-down strategies [164], interventions could also be aimed at promoting bottom-up, job crafting interventions, in which workers may be encouraged to proactively optimize their job [165], for example, by increasing structural job resources (e.g., seeking greater clarity of tasks or roles).

In addition to the aforementioned strong points, our study has some limitations. First, different forms of "remote working" are described in the literature, identified by terms such as telecommuting, remote work, telework, distance work, and, clearly, smart working. Although these phenomena overlap to some extent [4,5], some dissimilarities need to be acknowledged, with difficulties with respect to the evaluation of prior research and generalization of results across different work arrangements and contexts [33]. Second, the study was carried out during the COVID-19 pandemic, in which the adoption of remote working was mostly imposed to contain the spread of SARS-CoV-2 and—in Italy—facilitated by an ad hoc regulation. Again, this may pose a challenge to the interpretation of our findings. At the same time, we believe our study to provide a precious insight into smart workers' work experiences and well-being during the COVID-19 crisis, in which millions of workers worldwide were forced to work remotely in a "global experiment" of smart working [3]. Third, in line with a considerable amount of past research, in this study we basically compared in-person vs. remote workers with respect to their work experience and well-being. However, it should be recognized that SW is rarely an "all or nothing" phenomenon, as employees may differ with respect to the extent to which they work remotely [74]. Hence, future research should investigate whether and how the extent of remote working may affect individual and organizational outcomes such as work-life balance, well-being, and productivity. Fourth, this study included only two measurement occasions over a three-months time-period. Although this is consistent with the rationale behind the research, future studies could be based on multiple, shorter time lags (i.e., shortitudinal design) [166]. This approach could be valuable to understand the unfolding of psychological and physiological responses over time, as well as to determine the optimal time-lag for the process under investigation. Finally, the role of personal demands (e.g., negative affectivity, perfectionism) in the health impairment process of the JD-R should be further examined [35,167–169].

5. Conclusions

Building on the JD-R and the AL models, this study showed that SW was negatively associated with hair cortisol/DHEA(S) ratio—a promising biomarker of WRS—over a three-months time-period during the COVID-19 pandemic. At the same time, workload was positively associated with hair cortisol/DHEA(S) ratio over time among smart workers. Taken together, our findings suggest that SW can be conceived as a double-edged sword for workers' well-being. On the one hand, some characteristics of SW associated with greater flexibility in defining work/life boundaries, likely related to a "bright side" of new technologies that facilitates techno-eustress [91], can help individuals to protect or replenish valuable resources, and to prevent negative health consequences over time [75,76]. On the other hand, other aspects of SW associated with information overload or disrupted workflow, possibly attributable to a "dark side" of new technologies linked to techno-distress [91], can lead to resource exhaustion and negative health consequences over time [75,76]. Furthermore, by integrating psychological and biological measures, our study contributed to shed light on the physiological processes potentially involved in the association between perceived aspect of the job (i.e., job demands/resources) and long-term health impairment, a theme on which the literature has urged additional research [35]. In terms of practical implications, this study suggests that the evaluation of hair cortisol/DHEA(S)ratio, together with other—including digital—biomarkers, could prove to be a useful tool for occupational health protection and promotion. Additionally, concerning workplace interventions, our findings indicate that organizations and managers should shape a new way of working, tailored to remote employees' specific needs and expectation (e.g., through revised organizational policies, support, and leadership styles). Finally, as SW will probably continue to play a central role after the COVID-19 pandemic, our study suggests an in-depth reflection on its broader meaning and effects on quality of life of people at work. While SW may contribute to "reinforces the self-image of responsible, committed, independent, and autonomous professionals/individuals" (p. 782) [30], it should be acknowledged that these beneficial resources would be available only to high-qualified employees who are able to work from home, thus fostering inequalities with low-qualified workers, especially during crisis situations [170].

Author Contributions: Conceptualization, A.F., D.G. and L.D.C.; methodology, A.F., D.G. and L.D.C.; software, D.G.; formal analysis, D.G.; investigation, A.F. and D.G.; resources, A.F., T.P., I.P. and L.D.C.; writing—original draft preparation, A.F., D.G., A.E., T.P. and I.P.; writing—review and editing, A.F., D.G., A.E. and L.D.C.; supervision, A.F.; funding acquisition, L.D.C.

Funding: This research was funded by the Department of Philosophy, Sociology, Education and Applied Psychology (FISPPA), University of Padua, grant number #BIRD205979 (L.D.C.). The APC received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee for the Psychological Research of the University of Padua, Italy (protocol n. 4635).

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

Data Availability Statement: The data presented in this study are available on reasonable request from the corresponding author. The data are not publicly available due to privacy reasons.

References

1. Leger, K.A.; Lee, S.; Chandler, K.D.; Almeida, D.M. Effects of a Workplace Intervention on Daily Stressor Reactivity. *J Occup Health Psychol* **2022**, *27*, 152–163, doi:10.1037/ocp0000297.
2. Messenger, J.; Llave, O.V.; Gschwind, L.; Boehmer, S.; Vermeylen, G.; Wilkens, M. *Working Anytime, Anywhere: The Effects on the World of Work*; International Labour Organization and the European Foundation for the Improvement of Living and Working Conditions (Eurofound) & International Labour Organization (ILO): Luxembourg, 2017;
3. Wang, B.; Liu, Y.; Qian, J.; Parker, S.K. Achieving Effective Remote Working during the COVID-19 Pandemic: A Work Design Perspective. *Appl Psychol* **2021**, *70*, 16–59, doi:10.1111/apps.12290.
4. Allen, T.D.; Golden, T.D.; Shockley, K.M. How Effective Is Telecommuting? Assessing the Status of Our Scientific Findings. *Psychol Sci Public Interest* **2015**, *16*, 40–68, doi:10.1177/1529100615593273.
5. Gajendran, R.S.; Harrison, D.A. The Good, the Bad, and the Unknown about Telecommuting: Meta-Analysis of Psychological Mediators and Individual Consequences. *J Appl Psychol* **2007**, *92*, 1524–1541, doi:10.1037/0021-9010.92.6.1524.
6. International Labour Organization *Working from Home: From Invisibility to Decent Work*; International Labour Organization (ILO): Geneva, Switzerland, 2021;
7. Marino, L.; Capone, V. Smart Working and Well-Being before and during the COVID-19 Pandemic: A Scoping Review. *Eur J Investig Health Psychol Educ* **2021**, *11*, 1516–1536, doi:10.3390/ejihpe11040108.
8. Albano, R.; Parisi, T.; Tirabeni, L. Gli Smart Workers Tra Solitudine e Collaborazione. *Cambio* **2019**, *9*, 61–73, doi:10.13128/cambio-24960.
9. De Carlo, A.; Girardi, D.; Dal Corso, L.; Arcucci, E.; Falco, A. Out of Sight, out of Mind? A Longitudinal Investigation of Smart Working and Burnout in the Context of the Job Demands–Resources Model during the COVID-19 Pandemic. *Sustainability* **2022**, *14*, 7121, doi:10.3390/su14127121.
10. Zappalà, S.; Toscano, F.; Topa, G. The Implementation of a Remote Work Program in an Italian Municipality before COVID-19: Suggestions to HR Officers for the Post-COVID-19 Era. *Eur J Investig Health Psychol Educ* **2021**, *11*, 866–877, doi:10.3390/ejihpe11030064.
11. Todisco, L.; Tomo, A.; Canonico, P.; Mangia, G. The Bright and Dark Side of Smart Working in the Public Sector: Employees' Experiences before and during COVID-19. *Manag Decis* **2023**, *61*, 85–102, doi:10.1108/MD-02-2022-0164.
12. Galanti, T.; Guidetti, G.; Mazzei, E.; Zappalà, S.; Toscano, F. Work from Home during the COVID-19 Outbreak. *J Occup Environ Med* **2021**, *63*, e426–e432, doi:10.1097/JOM.0000000000002236.
13. *Telework in the EU before and after the COVID-19: Where We Were, Where We Head To*; Joint Research Centre of the European Commission: Brussels, Belgium, 2020;
14. Corso, M. Il Ruolo e Le Prospettive Dello Smart Working Nella PA Oltre La Pandemia.; January 25 2021.
15. Osservatorio Smart Working *Gli Smart Worker Italiani Scendono a 3,6 Milioni, Previsioni Di Crescita Nel 2023*; 2022;
16. OECD *Implications of Remote Working Adoption on Place Based Policies: A Focus on G7 Countries*; Organisation for Economic Co-operation and Development: Paris, 2021;

17. Baumann, O.; Sander, E. (Libby) J. Psychological Impacts of Remote Working under Social Distancing Restrictions. In *Handbook of Research on Remote Work and Worker Well-Being in the Post-COVID-19 Era*; Wheatley, D., Hardill, I., Buglass, S., Eds.; IGI Global: Hershey, PA, USA, 2021; pp. 1–17 ISBN 978-1-79986-754-8.
18. Demerouti, E.; Bakker, A.B.; Nachreiner, F.; Schaufeli, W.B. The Job Demands-Resources Model of Burnout. *J Appl Psychol.* **2001**, *86*, 499–512, doi:10.1037/0021-9010.86.3.499.
19. Bakker, A.B.; Demerouti, E.; Sanz-Vergel, A. Job Demands–Resources Theory: Ten Years Later. *Annu Rev Organ Psychol Organ Behav* **2023**, *10*, 25–53, doi:10.1146/annurev-orgpsych-120920-053933.
20. Ganster, D.C.; Rosen, C.C. Work Stress and Employee Health: A Multidisciplinary Review. *J Manage* **2013**, *39*, 1085–1122, doi:10.1177/0149206313475815.
21. Podsakoff, P.M.; MacKenzie, S.B.; Podsakoff, N.P. Sources of Method Bias in Social Science Research and Recommendations on How to Control It. *Annu Rev Psychol* **2012**, *63*, 539–569, doi:10.1146/annurev-psych-120710-100452.
22. Juster, R.-P.; McEwen, B.S.; Lupien, S.J. Allostatic Load Biomarkers of Chronic Stress and Impact on Health and Cognition. *Neurosci Biobehav Rev* **2010**, *35*, 2–16, doi:10.1016/j.neubiorev.2009.10.002.
23. Seeman, T.; Epel, E.; Gruenewald, T.; Karlamangla, A.; McEwen, B.S. Socio-Economic Differentials in Peripheral Biology: Cumulative Allostatic Load. *Ann N Y Acad Sci* **2010**, *1186*, 223–239, doi:10.1111/j.1749-6632.2009.05341.x.
24. Guidi, J.; Lucente, M.; Sonino, N.; Fava, G.A. Allostatic Load and Its Impact on Health: A Systematic Review. *Psychother Psychosom* **2021**, *90*, 11–27, doi:10.1159/000510696.
25. Rodriquez, E.J.; Kim, E.N.; Sumner, A.E.; Nápoles, A.M.; Pérez-Stable, E.J. Allostatic Load: Importance, Markers, and Score Determination in Minority and Disparity Populations. *J Urban Health* **2019**, *96*, 3–11, doi:10.1007/s11524-019-00345-5.
26. Maninger, N.; Wolkowitz, O.M.; Reus, V.I.; Epel, E.S.; Mellon, S.H. Neurobiological and Neuropsychiatric Effects of Dehydroepiandrosterone (DHEA) and DHEA Sulfate (DHEAS). *Front Neuroendocrinol* **2009**, *30*, 65–91, doi:10.1016/j.yfrne.2008.11.002.
27. Theorell, T.; Engström, G.; Hallinder, H.; Lennartsson, A.-K.; Kowalski, J.; Emami, A. The Use of Saliva Steroids (Cortisol and DHEA-s) as Biomarkers of Changing Stress Levels in People with Dementia and Their Caregivers: A Pilot Study. *Science Progress* **2021**, *104*, 003685042110198 56, doi:10.1177/00368504211019856.
28. Qiao, S.; Li, X.; Zilioli, S.; Chen, Z.; Deng, H.; Pan, J.; Guo, W. Hair Measurements of Cortisol, DHEA, and DHEA to Cortisol Ratio as Biomarkers of Chronic Stress among People Living with HIV in China: Known-Group Validation. *PLOS ONE* **2017**, *12*, e0169827, doi:10.1371/journal.pone.0169827.
29. Lunde, L.-K.; Fløvik, L.; Christensen, J.O.; Johannessen, H.A.; Finne, L.B.; Jørgensen, I.L.; Mohr, B.; Vleeshouwers, J. The Relationship between Telework from Home and Employee Health: A Systematic Review. *BMC Public Health* **2022**, *22*, 47, doi:10.1186/s12889-021-12481-2.
30. de Macêdo, T.A.M.; Cabral, E.L. dos S.; Silva Castro, W.R.; de Souza Junior, C.C.; da Costa Junior, J.F.; Pedrosa, F.M.; da Silva, A.B.; de Medeiros, V.R.F.; de Souza, R.P.; Cabral, M.A.L.; et al. Ergonomics and Telework: A Systematic Review. *Work* **2020**, *66*, 777–788, doi:10.3233/WOR-203224.
31. Oakman, J.; Kinsman, N.; Stuckey, R.; Graham, M.; Weale, V. A Rapid Review of Mental and Physical Health Effects of Working at Home: How Do We Optimise Health? *BMC Public Health* **2020**, *20*, 1825, doi:10.1186/s12889-020-09875-z.
32. Buomprisco, G.; Ricci, S.; Perri, R.; Sio, S.D. Health and Telework: New Challenges after COVID-19 Pandemic. *EUR J ENV PUBLIC HLT* **2021**, *5*, em0073, doi:10.21601/ejeph/9705.
33. Beckel, J.L.O.; Fisher, G.G. Telework and Worker Health and Well-Being: A Review and Recommendations for Research and Practice. *Int J Environ Res Public Health* **2022**, *19*, 3879, doi:10.3390/ijerph19073879.

34. Lundberg, U.; Lindfors, P. Psychophysiological Reactions to Telework in Female and Male White-Collar Workers. *J Occup Health Psychol* **2002**, *7*, 354–364, doi:10.1037/1076-8998.7.4.354.
35. Bakker, A.B.; Demerouti, E. Job Demands–Resources Theory: Taking Stock and Looking Forward. *J Occup Health Psychol.* **2017**, *22*, 273–285, doi:10.1037/ocp0000056.
36. Falco, A.; Girardi, D.; Marcuzzo, G.; De Carlo, A.; Bartolucci, G.B. Work Stress and Negative Affectivity: A Multi-Method Study. *Occup Med (Lond)* **2013**, *63*, 341–347, doi:10.1093/occmed/kqt054.
37. Nixon, A.E.; Mazzola, J.J.; Bauer, J.; Krueger, J.R.; Spector, P.E. Can Work Make You Sick? A Meta-Analysis of the Relationships between Job Stressors and Physical Symptoms. *Work Stress* **2011**, *25*, 1–22, doi:10.1080/02678373.2011.569175.
38. Schaufeli, W.B.; Taris, T.W. A Critical Review of the Job Demands-Resources Model: Implications for Improving Work and Health. In *Bridging Occupational, Organizational and Public Health: A Transdisciplinary Approach*; Bauer, G.F., Hämmig, O., Eds.; Springer: Dordrecht, The Netherlands, 2014; pp. 43–68 ISBN 978-94-007-5640-3.
39. Schmiedl, A. The Demands-Buffering Role of Perceived and Received Social Support for Perceived Stress and Cortisol Levels. *Eur J Health Psychol* **2022**, *29*, 175, doi:10.1027/2512-8442/a000110.
40. McEwen, B.S. Protective and Damaging Effects of Stress Mediators. *N Engl J Med* **1998**, *338*, 171–179, doi:10.1056/NEJM199801153380307.
41. Bakker, A.B. Towards a Multilevel Approach of Employee Well-Being. *Eur J Work Organ Psychol* **2015**, *24*, 839–843, doi:10.1080/1359432X.2015.1071423.
42. Ilies, R.; Aw, S.S.Y.; Pluut, H. Intraindividual Models of Employee Well-Being: What Have We Learned and Where Do We Go from Here? *Eur J Work Organ Psychol* **2015**, *24*, 827–838, doi:10.1080/1359432X.2015.1071422.
43. Falco, A.; Dal Corso, L.; Girardi, D.; De Carlo, A.; Comar, M. The Moderating Role of Job Resources in the Relationship between Job Demands and Interleukin-6 in an Italian Healthcare Organization. *Res Nurs Health* **2018**, *41*, 39–48, doi:10.1002/nur.21844.
44. Kerr, R.; McHugh, M.; McCrory, M. HSE Management Standards and Stress-Related Work Outcomes. *Occup Med (Lond)* **2009**, *59*, 574–579, doi:10.1093/occmed/kqp146.
45. Elfering, A.; Grebner, S.; Ganster, D.C.; Berset, M.; Kottwitz, M.U.; Semmer, N.K. Cortisol on Sunday as Indicator of Recovery from Work: Prediction by Observer Ratings of Job Demands and Control. *Work Stress* **2018**, *32*, 168–188, doi:10.1080/02678373.2017.1417337.
46. Geurts, S.A.E.; Sonnentag, S. Recovery as an Explanatory Mechanism in the Relation between Acute Stress Reactions and Chronic Health Impairment. *Scand J Work Environ Health* **2006**, *32*, 482–492, doi:10.5271/sjweh.1053.
47. Bowling, N.A.; Alarcon, G.M.; Bragg, C.B.; Hartman, M.J. A Meta-Analytic Examination of the Potential Correlates and Consequences of Workload. *Work & Stress* **2015**, *29*, 95–113, doi:10.1080/02678373.2015.1033037.
48. Crawford, E.R.; LePine, J.A.; Rich, B.L. Linking Job Demands and Resources to Employee Engagement and Burnout: A Theoretical Extension and Meta-Analytic Test. *J Appl Psychol* **2010**, *95*, 834–848, doi:10.1037/a0019364.
49. Alarcon, G.M. A Meta-Analysis of Burnout with Job Demands, Resources, and Attitudes. *J Vocat Behav* **2011**, *79*, 549–562, doi:10.1016/j.jvb.2011.03.007.
50. Karasek, R.A. Job Demands, Job Decision Latitude, and Mental Strain: Implications for Job Redesign. *Adm Sci Q* **1979**, *24*, 285–308, doi:10.2307/2392498.
51. Johnson, J.V.; Hall, E.M. Job Strain, Work Place Social Support, and Cardiovascular Disease: A Cross-Sectional Study of a Random Sample of the Swedish Working Population. *Am J Public Health* **1988**, *78*, 1336–1342, doi:10.2105/AJPH.78.10.1336.
52. Siegrist, J. Adverse Health Effects of High-Effort/Low-Reward Conditions. *J Occup Health Psychol* **1996**, *1*, 27–41, doi:10.1037/1076-8998.1.1.27.

53. Edwards, J.A.; Webster, S.; Laar, D.V.; Easton, S. Psychometric Analysis of the UK Health and Safety Executive's Management Standards Work-Related Stress Indicator Tool. *Work Stress* **2008**, *22*, 96–107, doi:10.1080/02678370802166599.
54. Hackman, J.R.; Oldham, G.R. Motivation through the Design of Work: Test of a Theory. *Organ Behav Hum Perform* **1976**, *16*, 250–279, doi:10.1016/0030-5073(76)90016-7.
55. Warr, P. A Conceptual Framework for the Study of Work and Mental Health. *Work Stress* **1994**, *8*, 84–97, doi:10.1080/02678379408259982.
56. Xie, J.L.; Schaubroeck, J.; Lam, S.S.K. Theories of Job Stress and the Role of Traditional Values: A Longitudinal Study in China. *J Appl Psychol* **2008**, *93*, 831–848, doi:10.1037/0021-9010.93.4.831.
57. Bowling, N.A.; Kirkendall, C. Workload: A Review of Causes, Consequences, and Potential Interventions. In *Contemporary occupational health psychology: Global perspectives on research and practice*; Houdmont, J., Leka, S., Sinclair, R., Eds.; John Wiley & Sons: Chichester, UK, 2012; Vol. 2.
58. De Carlo, A.; Girardi, D.; Falco, A.; Dal Corso, L.; Di Sipio, A. When Does Work Interfere with Teachers' Private Life? An Application of the Job Demands-Resources Model. *Front Psychol* **2019**, *10*, 1121, doi:10.3389/fpsyg.2019.01121.
59. Ilies, R.; Aw, S.S.Y.; Lim, V.K.G. A Naturalistic Multilevel Framework for Studying Transient and Chronic Effects of Psychosocial Work Stressors on Employee Health and Well-Being. *Appl Psychol* **2016**, *65*, 223–258, doi:10.1111/apps.12069.
60. Morgeson, F.P.; Humphrey, S.E. The Work Design Questionnaire (WDQ): Developing and Validating a Comprehensive Measure for Assessing Job Design and the Nature of Work. *J Appl Psychol.* **2006**, *91*, 1321–1339, doi:10.1037/0021-9010.91.6.1321.
61. Bakker, A.B.; Demerouti, E. The Job Demands-Resources Model: State of the Art. *J Manage Psychol.* **2007**, *22*, 309–328, doi:10.1108/02683940710733115.
62. Väänänen, A.; Toppinen-Tanner, S.; Kalimo, R.; Mutanen, P.; Vahtera, J.; Peiró, J.M. Job Characteristics, Physical and Psychological Symptoms, and Social Support as Antecedents of Sickness Absence among Men and Women in the Private Industrial Sector. *Soc Sci Med* **2003**, *57*, 807–824, doi:10.1016/S0277-9536(02)00450-1.
63. Frese, M.; Garst, H.; Fay, D. Making Things Happen: Reciprocal Relationships between Work Characteristics and Personal Initiative in a Four-Wave Longitudinal Structural Equation Model. *J Appl Psychol* **2007**, *92*, 1084–1102, doi:10.1037/0021-9010.92.4.1084.
64. Tabiu, A.; Pangil, F.; Othman, S.Z. Does Training, Job Autonomy and Career Planning Predict Employees' Adaptive Performance? *Glob Bus Rev* **2020**, *21*, 713–724, doi:10.1177/0972150918779159.
65. Saragih, S. The Effects of Job Autonomy on Work Outcomes: Self Efficacy as an Intervening Variable. *Int Res J Bus Stud* **2015**, *4*, doi:10.21632/irjbs.4.3.89.
66. Shoji, K.; Cieslak, R.; Smoktunowicz, E.; Rogala, A.; Benight, C.C.; Luszczynska, A. Associations between Job Burnout and Self-Efficacy: A Meta-Analysis. *Anxiety Stress Coping* **2016**, *29*, 367–386, doi:10.1080/10615806.2015.1058369.
67. Kilo, R.A.; Hassmén, P. Burnout and Turnover Intentions in Australian Coaches as Related to Organisational Support and Perceived Control. *Int J Sports Sci Coach* **2016**, *11*, 151–161, doi:10.1177/1747954116636710.
68. Alarcon, G.; Eschleman, K.J.; Bowling, N.A. Relationships between Personality Variables and Burnout: A Meta-Analysis. *Work Stress* **2009**, *23*, 244–263, doi:10.1080/02678370903282600.
69. Boyd, C.M.; Bakker, A.B.; Pignata, S.; Winefield, A.H.; Gillespie, N.; Stough, C. A Longitudinal Test of the Job Demands-Resources Model among Australian University Academics. *Appl Psychol* **2011**, *60*, 112–140, doi:10.1111/j.1464-0597.2010.00429.x.

70. Kim, B.J.; Ishikawa, H.; Liu, L.; Ohwa, M.; Sawada, Y.; Lim, H.Y.; Kim, H.Y.; Choi, Y.; Cheung, C. The Effects of Job Autonomy and Job Satisfaction on Burnout among Careworkers in Long-Term Care Settings: Policy and Practice Implications for Japan and South Korea. *Educ Gerontol* **2018**, *44*, 289–300, doi:10.1080/03601277.2018.1471255.
71. Khan, A.; Teoh, K.R.; Islam, S.; Hassard, J. Psychosocial Work Characteristics, Burnout, Psychological Morbidity Symptoms and Early Retirement Intentions: A Cross-Sectional Study of NHS Consultants in the UK. *BMJ Open* **2018**, *8*, e018720, doi:10.1136/bmjopen-2017-018720.
72. Charalampous, M.; Grant, C.A.; Tramontano, C.; Michailidis, E. Systematically Reviewing Remote E-Workers' Well-Being at Work: A Multidimensional Approach. *Eur J Work Organ Psychol* **2019**, *28*, 51–73, doi:10.1080/1359432X.2018.1541886.
73. Shepherd-Banigan, M.; Bell, J.F.; Basu, A.; Booth-LaForce, C.; Harris, J.R. Workplace Stress and Working from Home Influence Depressive Symptoms among Employed Women with Young Children. *Int J Behav Med* **2016**, *23*, 102–111, doi:10.1007/s12529-015-9482-2.
74. Golden, T.D.; Gajendran, R.S. Unpacking the Role of a Telecommuter's Job in Their Performance: Examining Job Complexity, Problem Solving, Interdependence, and Social Support. *J Bus Psychol* **2019**, *34*, 55–69, doi:10.1007/s10869-018-9530-4.
75. Hobfoll, S.E. The Influence of Culture, Community, and the Nested-Self in the Stress Process: Advancing Conservation of Resources Theory. *Appl Psychol* **2001**, *50*, 337–421, doi:10.1111/1464-0597.00062.
76. Westman, M.; Hobfoll, S.E.; Chen, S.; Davidson, O.B.; Laski, S. Organizational Stress through the Lens of Conservation of Resources (COR) Theory. In *Exploring interpersonal dynamics*; Perrewé, P.L., Ganster, D.C., Eds.; Research in occupational stress and well-being; Elsevier Science/JAI Press: US, 2005; pp. 167–220 ISBN 978-0-7623-1153-8.
77. Boell, S.K.; Cecez-Kecmanovic, D.; Campbell, J. Telework Paradoxes and Practices: The Importance of the Nature of Work. *New Technol Work Employ* **2016**, *31*, 114–131, doi:10.1111/ntwe.12063.
78. Bentley, T.A.; Teo, S.T.T.; McLeod, L.; Tan, F.; Bosua, R.; Gloet, M. The Role of Organisational Support in Teleworker Wellbeing: A Socio-Technical Systems Approach. *Appl Ergon* **2016**, *52*, 207–215, doi:10.1016/j.apergo.2015.07.019.
79. Hilbrecht, M.; Shaw, S.M.; Johnson, L.C.; Andrey, J. Remixing Work, Family and Leisure: Teleworkers' Experiences of Everyday Life. *New Technol Work Employ* **2013**, *28*, 130–144, doi:10.1111/ntwe.12010.
80. Erdoğdu, A.İ.; Watson, F. Millennials' Changing Mobility Preferences: A Telecommuting Case in Istanbul. *J Consum Behav n/a*, doi:10.1002/cb.2101.
81. Chakrabarti, S. Does Telecommuting Promote Sustainable Travel and Physical Activity? *J Transp Health* **2018**, *9*, 19–33, doi:10.1016/j.jth.2018.03.008.
82. Tustin, D.H. Telecommuting Academics within an Open Distance Education Environment of South Africa: More Content, Productive, and Healthy? *irrodl* **2014**, *15*, 185–214, doi:10.19173/irrodl.v15i3.1770.
83. Hosoda, M. Telework amidst the COVID-19 Pandemic: Effects on Work Style Reform in Japan. *Corp Gov* **2021**, *21*, 1059–1071, doi:10.1108/CG-09-2020-0390.
84. López Peláez, A.; Erro-Garcés, A.; Pinilla García, F.J.; Kiriakou, D. Working in the 21st Century. The Coronavirus Crisis: A Driver of Digitalisation, Teleworking, and Innovation, with Unintended Social Consequences. *Information* **2021**, *12*, 377, doi:10.3390/info12090377.
85. Brown, R.; Duck, J.; Jimmieson, N. E-Mail in the Workplace: The Role of Stress Appraisals and Normative Response Pressure in the Relationship between e-Mail Stressors and Employee Strain. *Int J Stress Manag* **2014**, *21*, 325–347, doi:10.1037/a0037464.
86. Waizenegger, L.; McKenna, B.; Cai, W.; Bendz, T. An Affordance Perspective of Team Collaboration and Enforced Working from Home during COVID-19. *Eur J Inf Syst* **2020**, *29*, 429–442, doi:10.1080/0960085X.2020.1800417.

87. McArthur, J.A. From Classroom to Zoom Room: Exploring Instructor Modifications of Visual Nonverbal Behaviors in Synchronous Online Classrooms. *Commun Teach* **2022**, *36*, 204–215, doi:10.1080/17404622.2021.1981959.
88. Nesher Shoshan, H.; Wehrt, W. Understanding "Zoom Fatigue": A Mixed-Method Approach. *Appl Psychol* **2022**, *71*, 827–852, doi:10.1111/apps.12360.
89. Molino, M.; Ingusci, E.; Signore, F.; Manuti, A.; Giancaspro, M.L.; Russo, V.; Zito, M.; Cortese, C.G. Wellbeing Costs of Technology Use during Covid-19 Remote Working: An Investigation Using the Italian Translation of the Technostress Creators Scale. *Sustainability* **2020**, *12*, 5911, doi:10.3390/su12155911.
90. Ortbach, K.; Köffer, S.; Müller, C.P.F.; Niehaves, B. How IT Consumerization Affects the Stress Level at Work: A Public Sector Case Study. In Proceedings of the PACIS 2013 Proceedings; June 18 2013; p. 231.
91. Tarafdar, M.; Cooper, C.L.; Stich, J.-F. The Technostress Trifecta - Techno Eustress, Techno Distress and Design: Theoretical Directions and an Agenda for Research. *Inf Syst J* **2019**, *29*, 6–42, doi:10.1111/isj.12169.
92. La Torre, G.; Esposito, A.; Sciarra, I.; Chiappetta, M. Definition, Symptoms and Risk of Techno-Stress: A Systematic Review. *Int Arch Occup Environ Health* **2019**, *92*, 13–35, doi:10.1007/s00420-018-1352-1.
93. Braukmann, J.; Schmitt, A.; Ďuranová, L.; Ohly, S. Identifying ICT-Related Affective Events across Life Domains and Examining Their Unique Relationships with Employee Recovery. *J Bus Psychol* **2018**, *33*, 529–544, doi:10.1007/s10869-017-9508-7.
94. Xu, S.; Kee, K.; Mao, C. Multitasking and Work-Life Balance: Explicating Multitasking When Working from Home. *J Broadcast Electron Media* **2021**, *65*, 397–425, doi:10.1080/08838151.2021.1976779.
95. Jamal, M.T.; Anwar, I.; Khan, N.A. Voluntary Part-Time and Mandatory Full-Time Telecommuting: A Comparative Longitudinal Analysis of the Impact of Managerial, Work and Individual Characteristics on Job Performance. *Int J Manpow* **2021**, *43*, 1316–1337, doi:10.1108/IJM-05-2021-0281.
96. Barrett, A.K. Technological Appropriations as Workarounds: Integrating Electronic Health Records and Adaptive Structuration Theory Research. *Inf Technol People* **2018**, *31*, 368–387, doi:10.1108/ITP-01-2016-0023.
97. Sardeshmukh, S.R.; Sharma, D.; Golden, T.D. Impact of Telework on Exhaustion and Job Engagement: A Job Demands and Job Resources Model. *New Technol Work Employ* **2012**, *27*, 193–207, doi:10.1111/j.1468-005X.2012.00284.x.
98. Jamal, M.T.; Anwar, I.; Khan, N.A.; Saleem, I. Work during COVID-19: Assessing the Influence of Job Demands and Resources on Practical and Psychological Outcomes for Employees. *Asia-Pac J Bus Adm* **2021**, *13*, 293–319, doi:10.1108/APJBA-05-2020-0149.
99. De Carlo, N.A.; Falco, A.; Capozza, D. *Test di valutazione del rischio stress lavoro-correlato nella prospettiva del benessere organizzativo, Qu-Bo [Test for the assessment of work-related stress risk in the organizational well-being perspective, Qu-Bo]*; FrancoAngeli: Milano, 2008;
100. Staufenbiel, S.M.; Penninx, B.W.J.H.; Spijker, A.T.; Elzinga, B.M.; Rossum, E.F.C. van Hair Cortisol, Stress Exposure, and Mental Health in Humans: A Systematic Review. *Psychoneuroendocrinology* **2013**, *38*, 1220–1235, doi:10.1016/j.psyneuen.2012.11.015.
101. Whitham, J.C.; Bryant, J.L.; Miller, L.J. Beyond Glucocorticoids: Integrating Dehydroepiandrosterone (DHEA) into Animal Welfare Research. *Animals (Basel)* **2020**, *10*, 1381, doi:10.3390/ani10081381.
102. Kimonis, E.R.; Fleming, G.E.; Wilbur, R.R.; Groer, M.W.; Granger, D.A. Dehydroepiandrosterone (DHEA) and Its Ratio to Cortisol Moderate Associations between Maltreatment and Psychopathology in Male Juvenile Offenders. *Psychoneuroendocrinology* **2019**, *101*, 263–271, doi:10.1016/j.psyneuen.2018.12.228.
103. Goulter, N.; Kimonis, E.R.; Denson, T.F.; Begg, D.P. Female Primary and Secondary Psychopathic Variants Show Distinct Endocrine and Psychophysiological Profiles. *Psychoneuroendocrinology* **2019**, *104*, 7–17, doi:10.1016/j.psyneuen.2019.02.011.

104. Phillips, A.C.; Carroll, D.; Gale, C.R.; Lord, J.M.; Arlt, W.; Batty, G.D. Cortisol, DHEA Sulphate, Their Ratio, and All-Cause and Cause-Specific Mortality in the Vietnam Experience Study. *Eur J Endocrinol* **2010**, *163*, 285–292, doi:10.1530/EJE-10-0299.
105. O'Connor, D.B.; Thayer, J.F.; Vedhara, K. Stress and Health: A Review of Psychobiological Processes. *Annu Rev Psychol* **2021**, *72*, 663–688, doi:10.1146/annurev-psych-062520-122331.
106. Herr, R.M.; Almer, C.; Loerbroks, A.; Barrech, A.; Elfantel, I.; Siegrist, J.; Gündel, H.; Angerer, P.; Li, J. Associations of Work Stress with Hair Cortisol Concentrations – Initial Findings from a Prospective Study. *Psychoneuroendocrinology* **2018**, *89*, 134–137, doi:10.1016/j.psyneuen.2018.01.011.
107. Ibar, C.; Fortuna, F.; Gonzalez, D.; Jamardo, J.; Jacobsen, D.; Pugliese, L.; Giraudo, L.; Ceres, V.; Mendoza, C.; Repetto, E.M.; et al. Evaluation of Stress, Burnout and Hair Cortisol Levels in Health Workers at a University Hospital during COVID-19 Pandemic. *Psychoneuroendocrinology* **2021**, *128*, 105213, doi:10.1016/j.psyneuen.2021.105213.
108. Stalder, T.; Kirschbaum, C. Analysis of Cortisol in Hair – State of the Art and Future Directions. *Brain Behav Immun* **2012**, *26*, 1019–1029, doi:10.1016/j.bbi.2012.02.002.
109. Abell, J.G.; Stalder, T.; Ferrie, J.E.; Shipley, M.J.; Kirschbaum, C.; Kivimäki, M.; Kumari, M. Assessing Cortisol from Hair Samples in a Large Observational Cohort: The Whitehall II Study. *Psychoneuroendocrinology* **2016**, *73*, 148–156, doi:10.1016/j.psyneuen.2016.07.214.
110. Davenport, M.D.; Tiefenbacher, S.; Lutz, C.K.; Novak, M.A.; Meyer, J.S. Analysis of Endogenous Cortisol Concentrations in the Hair of Rhesus Macaques. *Gen Comp Endocrinol* **2006**, *147*, 255–261, doi:10.1016/j.ygcen.2006.01.005.
111. Comin, A.; Renaville, B.; Marchini, E.; Maiero, S.; Cairoli, F.; Prandi, A. Technical Note: Direct Enzyme Immunoassay of Progesterone in Bovine Milk Whey. *J Dairy Sci* **2005**, *88*, 4239–4242, doi:10.3168/jds.S0022-0302(05)73110-6.
112. Rosseel, Y. Lavaan: An R Package for Structural Equation Modeling. *J Stat Softw.* **2012**, *48*, 1–36, doi:10.18637/jss.v048.i02.
113. Brown, T.A. *Confirmatory Factor Analysis for Applied Research*; 2nd ed.; Guilford Press: New York, NY, 2015;
114. Bagozzi, R.P.; Yi, Y. Specification, Evaluation, and Interpretation of Structural Equation Models. *J Acad Mark Sc* **2012**, *40*, 8–34, doi:10.1007/s11747-011-0278-x.
115. Aiken, L.S.; West, S.G. *Multiple Regression: Testing and Interpreting Interactions*; Sage Publications, Inc: Thousand Oaks, CA, US, 1991;
116. de Lange, A.H.; Taris, T.W.; Kompier, M.A.J.; Houtman, I.L.D.; Bongers, P.M. "The Very Best of the Millennium": Longitudinal Research and the Demand-Control-(Support) Model. *J Occup Health Psychol* **2003**, *8*, 282–305, doi:10.1037/1076-8998.8.4.282.
117. Sollberger, S.; Ehlert, U. How to Use and Interpret Hormone Ratios. *Psychoneuroendocrinology* **2016**, *63*, 385–397, doi:10.1016/j.psyneuen.2015.09.031.
118. Dettenborn, L.; Tietze, A.; Kirschbaum, C.; Stalder, T. The Assessment of Cortisol in Human Hair: Associations with Sociodemographic Variables and Potential Confounders. *Stress* **2012**, *15*, 578–588, doi:10.3109/10253890.2012.654479.
119. Binz, T.M.; Rietschel, L.; Streit, F.; Hofmann, M.; Gehrke, J.; Herdener, M.; Quednow, B.B.; Martin, N.G.; Rietschel, M.; Kraemer, T.; et al. Endogenous Cortisol in Keratinized Matrices: Systematic Determination of Baseline Cortisol Levels in Hair and the Influence of Sex, Age and Hair Color. *Forensic Sci Int* **2018**, *284*, 33–38, doi:10.1016/j.forsciint.2017.12.032.
120. Stalder, T.; Steudte-Schmiedgen, S.; Alexander, N.; Klucken, T.; Vater, A.; Wichmann, S.; Kirschbaum, C.; Miller, R. Stress-Related and Basic Determinants of Hair Cortisol in Humans: A Meta-Analysis. *Psychoneuroendocrinology* **2017**, *77*, 261–274, doi:10.1016/j.psyneuen.2016.12.017.

121. Feller, S.; Vigl, M.; Bergmann, M.M.; Boeing, H.; Kirschbaum, C.; Stalder, T. Predictors of Hair Cortisol Concentrations in Older Adults. *Psychoneuroendocrinology* **2014**, *39*, 132–140, doi:10.1016/j.psyneuen.2013.10.007.
122. R Core Team R: A Language and Environment for Statistical Computing 2022.
123. Finney, S.J.; DiStefano, C. Nonnormal and Categorical Data in Structural Equation Modeling. In *Structural equation modeling: A second course, 2nd ed*; Quantitative methods in education and the behavioral sciences: Issues, research, and teaching; IAP Information Age Publishing: Charlotte, NC, US, 2013; pp. 439–492.
124. Cohen, J. A Power Primer. *Psychol Bull* **1992**, *112*, 155–159, doi:10.1037/0033-2909.112.1.155.
125. Palumbo, R. Let Me Go to the Office! An Investigation into the Side Effects of Working from Home on Work-Life Balance. *Int J Public Sector Manage* **2020**, *33*, 771–790, doi:10.1108/IJPSM-06-2020-0150.
126. Ninaus, K.; Diehl, S.; Terlutter, R.; Chan, K.; Huang, A. Benefits and Stressors – Perceived Effects of ICT Use on Employee Health and Work Stress: An Exploratory Study from Austria and Hong Kong. *Int J Qual Stud Health Well-being* **2015**, *10*, 28838, doi:10.3402/qhw.v10.28838.
127. Palumbo, R.; Flamini, G.; Gnan, L.; Pellegrini, M.M. Looking for Meanings at Work: Unraveling the Implications of Smart Working on Organizational Meaningfulness. *Int J Org Anal* **2021**, *ahead-of-print*, doi:10.1108/IJOA-04-2021-2708.
128. Wei, T.; Wang, W.; Yu, S. Analysis of the Cognitive Load of Employees Working from Home and the Construction of the Telecommuting Experience Balance Model. *Sustainability* **2022**, *14*, 11722, doi:10.3390/su141811722.
129. Fialho, J. Benefits and Challenges of Remote Work. In *Digital Technologies and Transformation in Business, Industry and Organizations*; Pereira, R., Bianchi, I., Rocha, Á., Eds.; Studies in Systems, Decision and Control; Springer International Publishing: Cham, 2022; pp. 1–17 ISBN 978-3-031-07626-8.
130. Hill, N.S.; Axtell, C.; Raghuram, S.; Nurmi, N. Unpacking Virtual Work's Dual Effects on Employee Well-Being: An Integrative Review and Future Research Agenda. *J Manage* **2022**, 01492063221131535, doi:10.1177/01492063221131535.
131. Kazekami, S. Mechanisms to Improve Labor Productivity by Performing Telework. *Telecomm Policy* **2020**, *44*, 101868, doi:10.1016/j.telpol.2019.101868.
132. Vega, R.P.; Anderson, A.J.; Kaplan, S.A. A Within-Person Examination of the Effects of Telework. *J Bus Psychol* **2015**, *30*, 313–323, doi:10.1007/s10869-014-9359-4.
133. Chandola, T.; Booker, C.L.; Kumari, M.; Benzeval, M. Are Flexible Work Arrangements Associated with Lower Levels of Chronic Stress-Related Biomarkers? A Study of 6025 Employees in the UK Household Longitudinal Study. *Sociology* **2019**, *53*, 779–799, doi:10.1177/0038038519826014.
134. Perry, N.B.; Donzella, B.; Troy, M.F.; Barnes, A.J. Mother and Child Hair Cortisol during the COVID-19 Pandemic: Associations among Physiological Stress, Pandemic-Related Behaviors, and Child Emotional-Behavioral Health. *Psychoneuroendocrinology* **2022**, *137*, 105656, doi:10.1016/j.psyneuen.2021.105656.
135. Lomas, T. Positive Work: A Multidimensional Overview and Analysis of Work-Related Drivers of Wellbeing. *Int J Appl Posit Psychol* **2019**, *3*, 69–96, doi:10.1007/s41042-019-00016-5.
136. Falco, A.; Girardi, D.; Sarto, F.; Marcuzzo, G.; Vianello, L.; Magosso, D.; Dal Corso, L.; Bartolucci, G.B.; De Carlo, N.A. Una Nuova Scala Di Misura Degli Effetti Psico-Fisici Dello Stress Lavoro-Correlato in Una Prospettiva d'integrazione Di Metodi [A New Scale for Measuring the Psycho-Physical Effects of Work-Related Stress in a Perspective of Methods Integration]. *Med Lav* **2012**, *103*, 288–308.
137. Pariante, C.M.; Lightman, S.L. The HPA Axis in Major Depression: Classical Theories and New Developments. *Trends Neurosci* **2008**, *31*, 464–468, doi:10.1016/j.tins.2008.06.006.

138. Faraut, B.; Touchette, É.; Gamble, H.; Royant-Parola, S.; Safar, M.E.; Varsat, B.; Léger, D. Short Sleep Duration and Increased Risk of Hypertension: A Primary Care Medicine Investigation. *J Hypertens* **2012**, *30*, 1354, doi:10.1097/HJH.0b013e32835465e5.
139. Steptoe, A.; Cropley, M.; Griffith, J.; Kirschbaum, C. Job Strain and Anger Expression Predict Early Morning Elevations in Salivary Cortisol. *Psychosom Med* **2000**, *62*, 286, doi:10.1097/00006842-200003000-00022.
140. van der Meij, L.; Gubbels, N.; Schaveling, J.; Almela, M.; van Vugt, M. Hair Cortisol and Work Stress: Importance of Workload and Stress Model (JDCS or ERI). *Psychoneuroendocrinology* **2018**, *89*, 78–85, doi:10.1016/j.psyneuen.2017.12.020.
141. Kim, M.-S.; Lee, Y.-J.; Ahn, R.-S. Day-to-Day Differences in Cortisol Levels and Molar Cortisol-to-DHEA Ratios among Working Individuals. *Yonsei Med J* **2010**, *51*, 212–218, doi:10.3349/ymj.2010.51.2.212.
142. Ledford, A.K.; Dixon, D.; Luning, C.R.; Martin, B.J.; Miles, P.C.; Beckner, M.; Bennett, D.; Conley, J.; Nindl, B.C. Psychological and Physiological Predictors of Resilience in Navy SEAL Training. *Behavioral Medicine* **2020**, *46*, 290–301, doi:10.1080/08964289.2020.1712648.
143. Ota, A.; Mase, J.; Howteerakul, N.; Rajatanun, T.; Suwannapong, N.; Yatsuya, H.; Ono, Y. The Effort-Reward Imbalance Work-Stress Model and Daytime Salivary Cortisol and Dehydroepiandrosterone (DHEA) among Japanese Women. *Sci Rep* **2014**, *4*, 6402, doi:10.1038/srep06402.
144. Dutheil, F.; de Saint Vincent, S.; Pereira, B.; Schmidt, J.; Moustafa, F.; Charkhabi, M.; Bouillon-Minois, J.-B.; Clinchamps, M. DHEA as a Biomarker of Stress: A Systematic Review and Meta-Analysis. *Front Psychiatry* **2021**, *12*, doi:10.3389/fpsyt.2021.688367.
145. Wright, K.D.; Hickman, R.; Laudenslager, M.L. Hair Cortisol Analysis: A Promising Biomarker of HPA Activation in Older Adults. *Gerontologist* **2015**, *55*, S140–S145, doi:10.1093/geront/gnu174.
146. Schaafsma, F.G.; Hulsegge, G.; de Jong, M.A.; Overvliet, J.; van Rossum, E.F.C.; Nieuwenhuijsen, K. The Potential of Using Hair Cortisol to Measure Chronic Stress in Occupational Healthcare; a Scoping Review. *J Occup Health* **2021**, *63*, e12189, doi:10.1002/1348-9585.12189.
147. Penz, M.; Stalder, T.; Miller, R.; Ludwig, V.M.; Kanthak, M.K.; Kirschbaum, C. Hair Cortisol as a Biological Marker for Burnout Symptomatology. *Psychoneuroendocrinology* **2018**, *87*, 218–221, doi:10.1016/j.psyneuen.2017.07.485.
148. Penz, M.; Siegrist, J.; Wekenborg, M.K.; Rothe, N.; Walther, A.; Kirschbaum, C. Effort-Reward Imbalance at Work Is Associated with Hair Cortisol Concentrations: Prospective Evidence from the Dresden Burnout Study. *Psychoneuroendocrinology* **2019**, *109*, 104399, doi:10.1016/j.psyneuen.2019.104399.
149. Wendsche, J.; Ihle, A.; Wegge, J.; Penz, M.S.; Kirschbaum, C.; Kliegel, M. Prospective Associations between Burnout Symptomatology and Hair Cortisol. *Int Arch Occup Environ Health* **2020**, *93*, 779–788, doi:10.1007/s00420-020-01528-3.
150. van Veldhoven, M.; Van den Broeck, A.; Daniels, K.; Bakker, A.B.; Tavares, S.M.; Ogbonnaya, C. Challenging the Universality of Job Resources: Why, When, and for Whom Are They Beneficial? *Appl Psychol* **2020**, *69*, 5–29, doi:10.1111/apps.12211.
151. Hakanen, J.J.; Bakker, A.B.; Turunen, J. The Relative Importance of Various Job Resources for Work Engagement: A Concurrent and Follow-up Dominance Analysis. *BRQ Business Research Quarterly* **2021**, 23409444211012420, doi:10.1177/23409444211012419.
152. Sewell, G.; Taskin, L. Out of Sight, out of Mind in a New World of Work? Autonomy, Control, and Spatiotemporal Scaling in Telework. *Organization Studies* **2015**, *36*, 1507–1529, doi:10.1177/0170840615593587.
153. Golden, T.D.; Veiga, J.F.; Dino, R.N. The Impact of Professional Isolation on Teleworker Job Performance and Turnover Intentions: Does Time Spent Teleworking, Interacting Face-to-Face, or Having Access to Communication-Enhancing Technology Matter? *J Appl Psychol* **2008**, *93*, 1412–1421, doi:10.1037/a0012722.

154. Väänänen, A.; Toivanen, M. The Challenge of Tied Autonomy for Traditional Work Stress Models. *Work Stress* **2018**, *32*, 1–5, doi:10.1080/02678373.2017.1415999.
155. Fleischer, J.; Wanckel, C. Job Satisfaction and the Digital Transformation of the Public Sector: The Mediating Role of Job Autonomy. *Rev Public Pers Adm* **2023**, 0734371X221148403, doi:10.1177/0734371X221148403.
156. Slavković, M.; Sretenović, S.; Bugarčić, M. Remote Working for Sustainability of Organization during the COVID-19 Pandemic: The Mediator-Moderator Role of Social Support. *Sustainability* **2022**, *14*, 70, doi:10.3390/su14010070.
157. Bélanger, J.J.; Pierro, A.; Barbieri, B.; De Carlo, N.A.; Falco, A.; Kruglanski, A.W. One Size Doesn't Fit All: The Influence of Supervisors' Power Tactics and Subordinates' Need for Cognitive Closure on Burnout and Stress. *Eur J Work Organ Psychol* **2016**, *25*, 287–300, doi:10.1080/1359432X.2015.1061999.
158. Morrison, C.; Rimpiläinen, S.; Bosnic, I.; Thomas, J.; Savage, J. *Emerging Trends in Digital Health and Care : A Refresh Post-COVID*; Digital Health & Care Institute: Glasgow, 2022;
159. Sano, Y.; Obata, A.; Atsumori, H.; Tanaka, T.; Ito, N.; Minusa, S.; Toyomura, T. QoL Improvement and Preventive Measures Utilizing Digital Biomarkers. *Hitachi Review* **2022**, *71*, 56–64.
160. Contreras, F.; Baykal, E.; Abid, G. E-Leadership and Teleworking in Times of COVID-19 and beyond: What We Know and Where Do We Go. *Front Psychol* **2020**, *11*, doi:10.3389/fpsyg.2020.590271.
161. Derks, D.; van Duin, D.; Tims, M.; Bakker, A.B. Smartphone Use and Work–Home Interference: The Moderating Role of Social Norms and Employee Work Engagement. *J Occup Organ Psychol* **2015**, *88*, 155–177, doi:10.1111/joop.12083.
162. Arlinghaus, A.; Bohle, P.; Iskra-Golec, I.; Jansen, N.; Jay, S.; Rotenberg, L. Working Time Society Consensus Statements: Evidence-Based Effects of Shift Work and Non-Standard Working Hours on Workers, Family and Community. *Ind Health* **2019**, *57*, 184–200, doi:10.2486/indhealth.SW-4.
163. Fortuna, F.; Rossi, L.; Elmo, G.C.; Arcese, G. Italians and Smart Working: A Technical Study on the Effects of Smart Working on the Society. *Technol Forecast Soc Change* **2023**, *187*, 122220, doi:10.1016/j.techfore.2022.122220.
164. van Wingerden, J.; Bakker, A.B.; Derks, D. Fostering Employee Well-Being via a Job Crafting Intervention. *J Vocat Behav* **2017**, *100*, 164–174, doi:10.1016/j.jvb.2017.03.008.
165. Tims, M.; Bakker, A.B.; Derks, D. Development and Validation of the Job Crafting Scale. *J Vocat Behav* **2012**, *80*, 173–186, doi:10.1016/j.jvb.2011.05.009.
166. Dormann, C.; Griffin, M.A. Optimal Time Lags in Panel Studies. *Psychol Methods* **2015**, *20*, 489–505, doi:10.1037/met0000041.
167. Zeijen, M.E.L.; Brenninkmeijer, V.; Peeters, M.C.W.; Mastenbroek, N.J.J.M. Exploring the Role of Personal Demands in the Health-Impairment Process of the Job Demands-Resources Model: A Study among Master Students. *Int J Environ Res Public Health* **2021**, *18*, 632, doi:10.3390/ijerph18020632.
168. Girardi, D.; Falco, A.; Piccirelli, A.; Dal Corso, L.; Bortolato, S.; De Carlo, A. Perfectionism and Presenteeism among Managers of a Service Organization: The Mediating Role of Workaholism. *TPM Test Psychom Methodol Appl Psychol.* **2015**, *22*, 507–521, doi:10.4473/TPM22.4.5.
169. Girardi, D.; Falco, A.; De Carlo, A.; Dal Corso, L.; Benevene, P. Perfectionism and Workaholism in Managers: The Moderating Role of Workload. *TPM Test Psychom Methodol Appl Psychol.* **2018**, *25*, 571–588, doi:10.4473/TPM25.4.7.
170. Moehring, K.; Weiland, A.; Reifenscheid, M.; Naumann, E.; Wenz, A.; Rettig, T.; Krieger, U.; Fikel, M.; Cornesse, C.; Blom, A.G. Inequality in Employment Trajectories and Their Socio-Economic Consequences during the Early Phase of the COVID-19 Pandemic in Germany 2021.