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Perception of the Effects of Working from Home on Isolation and Stress by Spanish Workers during COVID-19 Pandemic

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Abstract: This paper tests the explanatory capability of the individual, organizational, environmental and job factors regarding Spanish workers' perception of isolation and stress owing to working from home (WFH). We used a survey of the Spanish agency Centro de Investigaciones Sociológicas on the Spanish population's perceptions of several aspects of information technologies that was carried out in March 2021. Information overload, work overload and isolation are perceived to be the principal factors involved in WFH. Because WFH could be inhibit professional development, drawbacks in the infrastructure include overload and impediments to career development as the most relevant variables to explain the perception of isolation. Age and balance between family and work also have explanatory power, but less so for isolation and stress. While people with intermediate ages are less sensitive to isolation and stress, having a correct balance between work and personal life is a protective factor against these effects. From the results in this paper, we outline several questions that must be addressed by labour authorities via legal regulations and by firms and workers to adapt organizational and working culture to ensure the efficient implementation of WFH settings compatible with employees' well-being.

Keywords: teleworking; working from home; home teleworking; COVID-19 pandemic; isolation; stress



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1. Introduction

Teleworking or telecommuting is a work mode that consists of implementing labour tasks outside a conventional workplace, such as at home or in a remote place, and usually relies on the use of information communication technologies (ICTs) (Baruch and Nicholson 1997). Teleworking implemented at home is called working from home (WFH); otherwise, it is labelled as nomadic telework (Bailey and Kurland 2002). Although many of the questions developed in this paper can be extrapolated to any telecommuting mode, we will constrain our analysis to WFH.

The advantages of working from home benefit workers (e.g., allows a better balance between job and family), firms (e.g., WFH could be more productive) and society (reduces workers' commuting, traffic congestion, contamination, etc.). They have been extensively argued in the literature and tested empirically (Baruch 2001; Beauregard et al. 2019). Those positive consequences and the energy crisis in the 1970s led to the prediction of its generalized spread in developed countries (Bailey and Kurland 2002). However, it did not happen in many countries either at the beginning of the 21st century (Illegems et al. 2001; Baruch 2001) or at the beginning of March 2020 (Fana et al. 2020). Until Spring 2020, the development of WFH across territories was not uniform, due to factors such as labour cultures and regulations or the development of ICT infrastructures (Gschwind and Vargas 2019). In Europe, Anglo-Saxon and Nordic countries reached a notable development of WFH, but in Mediterranean states such as Spain, France, Italy and Greece, teleworking arrangements displayed a limited expansion (Eldér 2019; Gschwind and Vargas 2019).

In Spring 2020, practically all countries around the world adopted lockdown measures to mitigate the transmission of SARS-CoV-2. In Spain, companies were strongly advised to allow WFH for those employees whose functions could be carried out from home (Corral and Isusi 2020). Similar measures were applied in neighbouring countries with similar degrees of development in working from home, such as Portugal (Tavares et al. 2021) and Italy (Donati et al. 2021). Undoubtedly, WFH allowed many firms to carry on economic activity despite quarantine measures (Belzunegui-Eraso and Erro-Garcés 2020); however, many companies and employees without any experience in WFH were pushed to implement this working mode (Corral and Isusi 2020). Therefore, during 2020–2021, practically all Spanish workers worked from home if their work was adaptable. Otherwise, although the tasks of a given worker were not adaptable, their interaction with the administrative departments of the company was surely implemented by means of ICTs. Likewise, the majority of citizens received telecommuted services such as medical aid, online shopping, procedures with public administrations, gymnastic activities, etc.

The great extension of WFH during the COVID-19 crisis in the labour market provides an invaluable opportunity to measure the actual limits of its adoption (Tokarchuk et al. 2021; Van Zoonen and Sivunen 2022). The SARS-CoV-2 pandemic has pushed working from home and accelerated its implementation in organizational models (Herrera et al. 2022; Kohont and Ignjatović 2022). Although there is a wide body of literature on the perception of WFH among employees, studies on subjective well-being are scarcer (Charalampous et al. 2019; Pataki-Bittó and Kun 2022). A review by Lunde et al. (2022) reveals that there is no clear agreement about whether WFH improves workers' well-being. Whereas Anderson et al. (2015) outline that employees report more positive emotions and fewer negative emotions when working remotely, Song and Gao (2020) found increased levels of negative emotions and discomfort in working at home.

Tavares (2017) report three principal issues on well-being in a WFH setting: musculoskeletal pain, isolation and stress. Isolation is usually linked with a lack of worker comfort, engagement, satisfaction and commitment (Gainey et al. 1999); occupational stress (Dussault et al. 1999); morbidity and mortality (Johnson et al. 1989); psychological strain (Bentley et al. 2016); and overall well-being (Yang 2017). Undesirable manifestations of stress include fear, worry, an inability to relax, an increased heart rate, difficulty breathing, disturbances in sleeping patterns, changes in eating patterns, difficulty concentrating, worsening of pre-existing health conditions (physical and mental) and increased use of alcohol, tobacco and other drugs (WHO 2022).

The above considerations motivated us to write our paper. It analyses Spanish workers' perceptions of the influence of individual, environmental, organizational and job factors of WFH and whether they cause isolation and stress. To develop this empirical analysis, we have used the survey by the Spanish government agency Research Centre of Sociology (CIS) (Centro de Investigaciones Sociológicas, in Spanish): "Tendencies in the digital society during COVID-19 pandemic in Spain", from March 2021. We answer the following research questions (RQ):

RQ1: What are the explanatory factors of workers' perceptions that working from home causes stress?

RQ2: Does isolation have a significant impact on stress, according to the opinions in our sample?

RQ3: What are the explanatory factors of workers' perceptions that working from home causes isolation?

2. Theoretical Framework

In this section, we review the literature on the factors that influence isolation and stress in a home teleworking setting. Following the model of the adequacy of WFH by Baruch and Nicholson (1997) and the study on employees' adaptation to WFH during the COVID-19 pandemic by Carillo et al. (2021), we differentiate personal and family variables, which, similar to Carillo et al. (2021), we label individual variables, organizational and

environmental factors and variables linked to jobs. On the other hand, within individual variables, we differentiate socioeconomic factors and variables tied to the perception of the personal benefits of working from home. The theoretical ground described in this section is summarized in Figures 1 and 2.

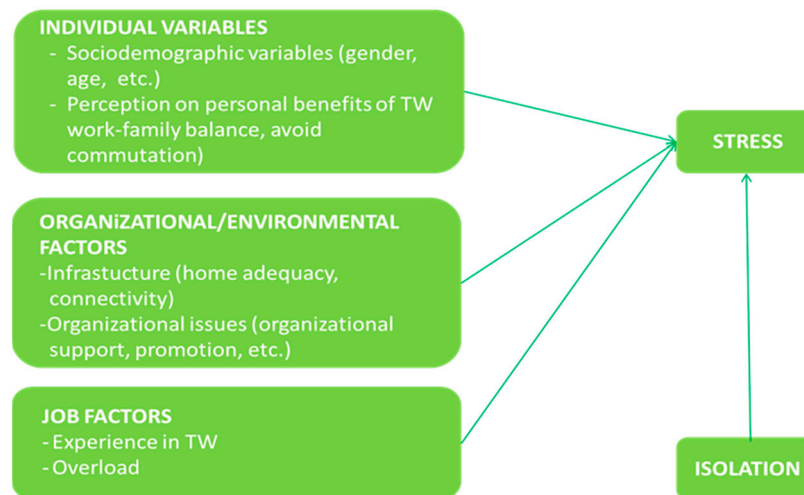


Figure 1. Framework used to explain perceived stress because of working from home.

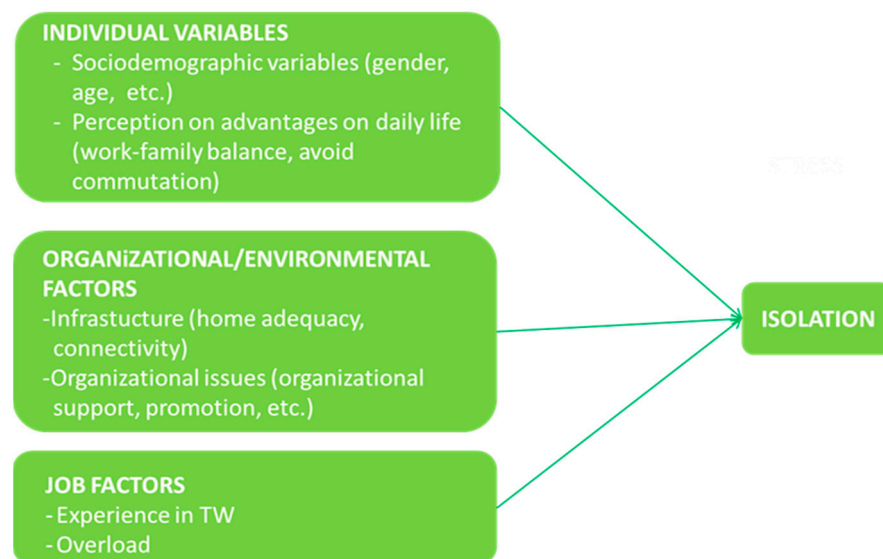


Figure 2. Framework used to explain perceived isolation because of working from home.

2.1. Individual Variables

2.1.1. Sociodemographic Variables

Socioeconomic factors have often been found to be relevant in explaining stress and isolation in WFH practices (Pataki-Bittó and Kun 2022; Sutarto et al. 2021; Beckel and Fisher 2022; Song and Gao 2020; Mendonça et al. 2022; de Sousa et al. 2022; Macciotta et al. 2022; Fang et al. 2022). Many studies have reported that gender is a relevant variable to explain positive and negative feelings and psychological effects such as stress and isolation produced by home teleworking (Song and Gao 2020; Mendonça et al. 2022). Usually, women perceive worse effects from WFH because they still play a more prominent role than men do in household duties (Beckel and Fisher 2022; Kohont and Ignjatović 2022) and in the care of children (Calleja and Mota 2022; Pataki-Bittó and Kun 2022; Sutarto et al. 2021) and, in general, of dependent persons (Beckel and Fisher 2022; de Sousa et al. 2022). These reasons explain why they are usually more sensitive to work-from-home conflicts

(Magnier-Watanabe et al. 2022; Macciotta et al. 2022). Fang et al. (2022) warned that home telecommuting during the pandemic may have pushed gender inequality. Therefore, the following hypotheses are proposed:

Hypothesis 1.1 (H1.1). *Being female is positively linked with perceiving that working from home produces stress.*

Hypothesis 2.1 (H2.1). *Being female is positively linked with perceiving that working from home produces isolation.*

The existence of children in households increases the difficulty of balancing work and family. Parental duties arise, and spaces and ICT resources must include more persons (Fana et al. 2020). Authors such as Macciotta et al. (2022), Heiden et al. (2021), Mendonça et al. (2022) and Niu et al. (2021) found that the existence of children at home exacerbates stress perceptions and makes it more difficult to balance work and a personal life. In this regard, Pataki-Bittó and Kun (2022) report that during the COVID-19 confinement measures, the stress level of home teleworkers without children was significantly lower than that of those with children. This has also been observed in Maillot et al. (2022) in the university-level educational setting. The final consequences of these issues may be professional isolation or a hindered professional career. Therefore, the following hypotheses are proposed:

Hypothesis 1.2 (H1.2). *Having children in care is positively linked with perceiving that working from home produces stress.*

Hypothesis 2.2 (H2.2). *Having children in care is positively linked with perceiving that working from home produces isolation.*

Although ICT skills generally decrease with age (Asgari et al. 2014; Malik et al. 2016; Nguyen 2021; Raišienė et al. 2020), telecommuting and WFH are often performed by senior workers (Gschwind and Vargas 2019). The mainstream literature reports that mental health issues are less likely at older ages surely because of experience in working from home, which, although the link is not the same as expertise in using ICTs, increases with seniority (Sutarto et al. 2021; Lange and Kayser 2022; Van Zoonen and Sivunen 2022). While Carillo et al. (2021) checked that adaptation to mandatory WFH during COVID-19 increases with a worker's age; Van Zoonen and Sivunen (2022) report that feelings of isolation had a negative correlation with age. However, we cannot rule out whether these outcomes depend on a worker's generation. Baby boomers tend to appreciate satisfactory social interactions and judge telecommuting activities as unproductive; Generation X members prefer autonomy and flexibility; and millennials are the first generation to use ICTs at their peak (Raišienė et al. 2020). López-Igual and Rodríguez-Modroño (2020) reported that adherence to working from home is not a monotonous function of age, but it is greater in members of Generation X. Although it can be deduced from the literature that age could influence the perception of stress and isolation, we cannot hypothesize a concrete sign. Therefore, we propose the following:

Hypothesis 1.3 (H1.3). *Age influences the perception that working from home produces stress.*

Hypothesis 2.3 (H2.3). *Age influences the perception that working from home produces isolation.*

Developing a job at home is better adapted for clerical jobs and for those who are more intellectual and skilled (Park and Cho 2022). This explains why higher acceptance degrees usually come from persons with greater academic levels, who tend to develop qualified tasks (Illegems et al. 2001; Nguyen 2021). Sutarto et al. (2021) report that having a high educational level inhibits stress by WFH. Likewise, Sahai et al. (2020) outline that isolation

due to implementing work at home affects more blue-collar workers than white-collar workers, whose educational level is often superior. Therefore, the following hypotheses are proposed:

Hypothesis 1.4 (H1.4). *A higher academic level is negatively linked with the perception that working from home produces stress.*

Hypothesis 2.4 (H2.4). *A higher academic level is negatively linked with the perception that working from home produces isolation.*

2.1.2. Perceptions of the Personal Benefits of Working from Home

It has been repeatedly argued that an advantage of WFH is allowing a better balance between a person's job and their personal and family life (Baruch 2001). This variable has been widely proven to be significant in explaining work satisfaction (Ferrara et al. 2022). However, weak (or nonexistent) boundaries between household and work regarding time spent and space used in the home may blur limits between work and personal environments, and then, a conflict between job and home may arise (Baruch 2001; Harris 2003; Beckel and Fisher 2022; Kohont and Ignjatović 2022). Work–life conflict is a powerful stressor that may lead workers to experience stress symptoms such as exhaustion (Golden 2012).

Hypothesis 1.5 (H1.5). *Perceiving a positive work–life balance is negatively linked with the perception that working from home produces stress.*

Teleworkers may become invisible to supervisors and managers when the firm is not committed to WFH (Orhan et al. 2016; Sahai et al. 2020). This fact may force employees to work longer and harder in such a way that the boundary between work and their personal agenda could be lost. Time used for job tasks is taken from the time needed to accomplish family duties and engage in social activities (Weinert et al. 2015) in such a way that WFH can isolate employees from their personal circle. Therefore, the following hypothesis is proposed:

Hypothesis 2.5 (H2.5). *Perceiving a positive work–home balance is negatively linked with the perception that WFH produces isolation.*

The distance from home to the workplace is a relevant issue in WFH acceptance (Eom et al. 2016; Malik et al. 2016; Silva-C et al. 2019; Ton et al. 2022). Moens et al. (2022) observed a better acceptance of WFH by the inhabitants of the suburbia of cities than by those of its centre, which usually includes administrative working places. It is widely accepted by academics that commuting to the workplace is an important stressor (Novaco and Gonzalez 2009; Beckel and Fisher 2022) for reasons such as commuting situation, impedance and control, predictability (Gottholmseder et al. 2009), risk of viral infection (De Borger and Proost 2022), accidents from commutes to the workplace (Huber et al. 2022) and congestion and pollution (Ollo-López et al. 2021). Avoiding commuting allows for spending more time in healthy activities that diminish the probability of incurring physical and mental problems, such as exercising and improving nutritional adequacy (Drašler et al. 2021; Beckel and Fisher 2022). Therefore, the following hypothesis is formulated:

Hypothesis 1.6 (H1.6). *Perceiving that an advantage of working from home is avoiding commuting is negatively linked with the perception that this work arrangement produces stress.*

2.2. Environmental and Organizational Factors

2.2.1. Infrastructure

The adequacy of the home space used to implement WFH is fairly relevant in the literature to explain well-being at work (Nakrošienė et al. 2019; Fischer et al. 2021). Space boundaries may generate work interruptions (Gajendran and Harrison 2007) and domestic

conflicts (Weinert et al. 2015). Telecommuting from home occupies private space and resources such as connectivity and laptops, which can lead to tension between work and family (Weinert et al. 2015; Niu et al. 2021; Sutarto et al. 2021; Tomasina and Pisani 2022). Therefore, households with insufficient space and ICT resources to combine work and family life are less likely to attain an adequate job–family balance (Soubelet-Fagoaga et al. 2022). Likewise, inadequate space and equipment are stressors of musculoskeletal pain (Cuerdo-Vilches et al. 2021; McAllister et al. 2022) and even poorer air quality (Ferreira and Barros 2022). In a paper centred on Japan, Niu et al. (2021) outline that because of the lack of professional home office space, countless people have been forced to set up makeshift workspaces in living rooms, kitchens, and bedrooms.

Of course, the preference for WFH may also include good connectivity and ICT equipment (Macciotta et al. 2022; Maillot et al. 2022; Pelissier et al. 2021) given that a great concern of telecommuters is the difficulty of accessing the information needed to carry out tasks from home (Mello 2007; Tahavori 2015; Nakrošienė et al. 2019; Nguyen 2021); thus, control of work is lost (Schade et al. 2021). A home with poor ICT infrastructure that is not comfortable for telecommuting hurts well-being (Eldér 2019; Kitagawa et al. 2021; Schade et al. 2021). Therefore, the following hypotheses are formulated:

Hypothesis 1.7 (H1.7). *Perceiving that ICTs allowed for adequately conducting professional activities during the COVID-19 pandemic is negatively linked with the perception that working from home produces stress.*

Hypothesis 1.8 (H1.8). *Perceiving that homes were not prepared to develop working from home during the COVID-19 pandemic is positively linked with the perception that working from home produces stress.*

Fluid, mediated communication reduces isolation (Van Zoonen and Sivunen 2022). Therefore, it is essential to have a good ICT infrastructure to have satisfactory interactions via audio and video conferencing (Beauregard et al. 2019), good access to data (Mello 2007; Even 2020; Kohont and Ignjatović 2022) and adequate space to develop these communication activities (Nakrošienė et al. 2019; Giudice et al. 2022). Therefore, the following hypotheses are proposed:

Hypothesis 2.6 (H2.6). *Perceiving that ICTs allowed for adequately developing professional activities during the COVID-19 pandemic is negatively linked with the perception that working from home produces isolation.*

Hypothesis 2.7 (H2.7). *Perceiving that homes were not prepared for working from home during the COVID-19 pandemic is positively linked with the perception that working from home produces isolation.*

2.2.2. Organizational Issues

Firms that compromise on telecommuting and that stimulate workers to be self-responsible in WFH practices improve the performance of both (Martínez-Sánchez et al. 2007). Giving sources to employees to efficiently develop their work, such as training (Beauregard et al. 2019; Soubelet-Fagoaga et al. 2022); stimulating the practices of mediated communication (Van Zoonen and Sivunen 2022); or diminishing the effects of isolation (Deschênes 2023) increases job well-being and adherence to WFH practices (Ollo-López et al. 2021). This compromise on telecommuting also includes providing material and technical support to the home office (Danker et al. 2022) and clear supervisor support (Nakrošienė et al. 2019). It must be noted that in many countries, there is a lack of legal frameworks on how workplaces in home offices should be equipped. The consequence is that technical equipment provided by organizations is often not sufficient for some employees (Niebuhr et al. 2022), who have to personally finance resources such as greater connectivity or electronic devices. CIS (2021) reports that 95% of employees financed connectivity and

65% used their own electronic devices to carry out work from home during the COVID-19 pandemic. Likewise, organizational support implies not using traditional instruments to evaluate workers' contributions; instead of using presentism criteria, they should use objectives (Baruch 2001) that are based on trust and measurable items (Beauregard et al. 2019) and should align organizational values with employee values (Ferrara et al. 2022). Otherwise, WFH can be perceived as inhibiting being professionally promoted.

Employers and self-employers are expected to have their own support and, therefore, are not committed to how well WFH is evaluated for workers, because they are the evaluators. Therefore, the following hypotheses are proposed:

Hypothesis 1.9 (H1.9). *Technical and material organizational support decreases the perception that working from home produces stress.*

Hypothesis 1.10 (H1.10). *Feeling that working from home inhibits promotions increases the perception that working from home produces stress.*

Hypothesis 1.11 (H1.11). *Being an employer/self-employer is negatively linked with the perception that working from home produces stress.*

Mainstream reports outline that a key variable to avoid teleworkers' isolation is organizational support (Van Zoonen and Sivunen 2022; Even 2020; Sahai et al. 2020). It supposes implementing measures such as stimulating mediated communication (Even 2020; Van Zoonen and Sivunen 2022), keeping teleworkers in the loop by promoting informal relationships, allowing employees to share knowledge in an informal way and training and educating e-leaders (Even 2020). Isolation is positively influenced by so-called distance to power (Adamovic 2022), which makes the worker invisible to managers (Orhan et al. 2016; Sahai et al. 2020); here, the worker has less influence over people and events in the workplace (Baruch 2001), which is a barrier to being promoted and rewarded (Kurland and Cooper 2002). Kurland and Cooper (2002) found that there is an increased perception of professional isolation for telecommuters when they are expecting a promotion. Of course, these arguments do not apply to employers and self-employers. Traditionally, employers have been reluctant to adopt working-from-home arrangements (Baruch 2000; Martínez-Sánchez et al. 2007; Aguilera et al. 2016) because physical isolation may produce problems: drawbacks in coordinating operations, difficulties in controlling workers' performance if it is measured basically by "presence" instead of by objectives, taking care of workers' health and safety, having less-committed employees or the loss of teamwork benefits (Baruch 2001; Bailey and Kurland 2002; Aguilera et al. 2016; Beauregard et al. 2019). Therefore, the following hypotheses are proposed:

Hypothesis 2.8 (H2.8). *Technical and material organizational support decreases the perception that working from home produces isolation.*

Hypothesis 2.9 (H2.9). *Feeling that working from home inhibits promotions increases the perception that working from home produces isolation.*

Hypothesis 2.10 (H2.10). *Being an employer/self-employer is positively linked with the perception that working from home produces isolation.*

2.3. Job Factors

Having experience with WFH before the COVID-19 crisis may positively impact workers' judgement because these employees had already adapted to this work mode before it was mandatory during the lockdowns. Employees who had already used WFH prior to the pandemic had access to sufficiently large technical and hardware resources to work from home (Maillot et al. 2022). Greater experience leads to higher self-efficacy and thus better well-being (Schade et al. 2021), less stress (Lange and Kayser 2022) and

fewer feelings of isolation (Van Zoonen and Sivunen 2022). Not all persons are eligible for working from home (Eldér 2019) and have the individual skills, such as self-discipline (Gálvez et al. 2020), competence and autonomy (Schade et al. 2021), to efficiently perform tasks at home. Thanks to the limited extension of WFH until March 2020 in Spain, it is expected that workers with experience in this work arrangement were well suited to WFH. Therefore, the following hypotheses are proposed:

Hypothesis 1.12 (H1.12). *Having a habitual WTH arrangement before the COVID-19 crisis is negatively linked with the perception that working from home produces stress.*

Hypothesis 2.11 (H2.11). *Having a habitual WTH arrangement before the COVID-19 crisis is negatively linked with the perception that working from home produces isolation.*

The massive use of ICTs may generate a connectivity overload, which was outlined before the COVID-19 pandemic (Suh and Lee 2017) and during the COVID-19 crisis (Ferrara et al. 2022). Some consequences have been that workers may feel that they must be continuously “online” (Cai et al. 2021; Mendonça et al. 2022); work interruptions (Fonner and Roloff 2012); higher workloads (Ferrara et al. 2022; Chen 2022); less time to recover from work (Grant et al. 2013); and greater work intensity (Heiden et al. 2021). It has been shown that the feelings of overdependence and entrapment associated with the intensive use of ICTs cause digital stress (Steele et al. 2020).

Overwork cuts down relationships with coworkers, family and friends and, in turn, prevents emotional support from fellow workers to cope with difficult situations (Mann and Holdsworth 2003). Furthermore, WFH negatively influences social support received from coworkers, help desks or friends at the workplace because of poor relationship quality and the poor dependability of electronic communication (Weinert et al. 2015). Bentley et al. (2016) outline that telecommuting intensity moderates the impact of isolation on psychological strain (positively) and job satisfaction (negatively). Therefore, it can be argued that these manifestations of work overload may cause less job satisfaction; cause anxiety and physical and mental exhaustion; and deteriorate personal relations. It is well known that work overload is one of the most important stressors (Spurgeon et al. 1997; Millán et al. 2017), and in the context of COVID-19, WFH has been identified as an enabler of acute stress pathologies (Chen 2022). Therefore, the following hypotheses are proposed:

Hypothesis 1.13 (H1.13). *Perceiving that working from home creates an overload of work and information is positively linked with the perception that working from home produces stress.*

Hypothesis 2.12 (H2.12). *Perceiving that working from home creates an overload of work and information is positively linked with the perception that working from home produces isolation.*

The reduction in face-to-face social relations when work takes place from home deprives some employees, specifically those who used to perform their jobs at a conventional workplace, of their usual ways of working and the meaning that they found in that workplace (Maillot et al. 2022). Meta-analyses by Sahai et al. (2020) show that isolation has several consequences at the affective, attitudinal, behavioural and well-being levels. Some possible consequences of isolation on workers include workers’ becoming less confident in their abilities and knowledge to perform, their having less opportunity to interact with coworkers and their experiencing more difficulties in acquiring and using relevant information to perform their job tasks (Beauregard et al. 2019; Nguyen 2021). Therefore, fluid, mediated communication between coworkers and with leaders is a key factor for the successful implementation of WFH (Kohont and Ignjatović 2022). Several authors have outlined that isolation leads to a greater probability of stress, fatigue and burnout (Leigh-Hunt et al. 2017; Bentein et al. 2017; Ferrara et al. 2022; Van Zoonen and Sivunen 2022). Therefore, the following hypothesis is proposed:

Hypothesis 1.14 (H1.14). *Perceiving that working from home induces isolation is positively linked with the perception that working from home produces stress.*

3. Materials and Methods

3.1. Materials

The survey “Tendencies in the digital society during COVID-19 pandemic in Spain” was analysed in this paper and was carried out by the Spanish government agency Centro de Investigaciones Sociológicas (CIS) (Research Centre on Sociology). The responses were collected in March 2021, and the whole questionnaire and its raw results can be consulted in [CIS \(2021\)](#). Table 1 shows a summary of the population composition by gender and labour situation. Table 2 displays the items used to build up the variables used in our analysis. We were interested in the perceptions by citizens who actually worked in March 2021; we selected answers by following the schema in Figure 3. Therefore, although the overall sample had 3014 responses (51.66% by women and 48.34% by men), we constrained the assessment to the active population who worked while the survey was complained. more specifically, our analysis is grounded in the responses of 1405 persons (46.62% of the overall sample). The composition of this subsample by gender was 44.41% women and 55.59% men, as shown in Table 1.

Table 1. Gender and working situation in the sample and subsample used in this paper.

	Whole Sample (N = 3014)		Only Active Population (N = 1739)		Only Working Population (N = 1405)	
	Size	Proportion	Size	Proportion	Size	Proportion
Female	1557	51.66%	845	48.59%	624	44.41%
Male	1457	48.34%	894	51.41%	781	55.59%
<i>Labour situation</i>	<i>Size</i>	<i>Proportion</i>	<i>Size</i>	<i>Proportion</i>	<i>Size</i>	<i>Proportion</i>
Worker (private)	956	31.72%	956	54.97%	956	68.04%
Worker (public)	199	6.60%	199	11.44%	199	14.16%
Employer/entrepreneur	250	8.29%	250	14.38%	250	17.79%
Record of temporary Employment regulation	50	1.66%	50	2.88%	50	---
Unemployed	281	9.32%	281	16.16%	281	---
Sick leave	43	1.43%	43	2.47%	43	---
Student	114	3.78%	114	---	114	---
Retiree	567	18.81%	567	---	567	---
Domestic work	115	3.82%	115	---	115	---
Others/NA	434	14.40%	434	---	434	---

Source: Own elaboration from data from [CIS \(2021\)](#).

Table 2. Questions and responses on explanatory factors in the sample.

Sociodemographic variables			
S1 = Gender	S2 = Age	S3 = Number of children	S4 = Academic degree
Female (44.41%)	>=55 [Boomer] (20.93%)	None (60%)	Primary/less/other (11.67%)
Male (55.59%)	>=35–55 [Gen X] (59.00%)	One (18.65%)	Secondary (32.81%)
	<35 [Others] (20.07%)	>=Two (21.35%)	Graduate (55.52%)
Perceptions about influences of working from home on daily life			
P1 = In my opinion, WFH has positive effects on me because		P2 = In my opinion, WFH has positive effects on me because	
Makes life easier for parents and children by conciliating work and family duties (41.33%)		Because it avoids commuting and avoids traffic congestion and contamination (48.83%)	
Makes life easier for workers organizing their agendas (37.51%)		Makes life easier for people who have to commute (44.48%)	
Allows spending more time with family (41.71%)		At least one item (50.39%)	
At least one item (61.21%)		Sum. mean = 0.93, SD = 0.96	
Sum. mean = 1.27, SD = 1.19			

Table 2. Cont.

Organizational/environmental factors	
<p><i>OEF1 = Quality of internet improved performance of many professional activities to a high-quality level</i> Yes (75.31%) No/NA (24.69%)</p> <p><i>OEF3 = WFH provides less opportunities of promotion</i> Yes (11.81%) No/NA (88.19%)</p> <p><i>OEF5 = Technological equipment/help from the employer</i> Had already equipped you with a laptop (19.50%) Gave you a portable computer (11.60%) You used an own computer until he/she provided one laptop (10.18%) Compensated you of hiring more internet capacity (1.14%) Organized technical support (29.61%) At least one item (54.75%) Sum: mean = 0.32; SD = 0.39</p>	<p><i>OEF2 = Homes are not ready to separate work and family</i> Agree (11.03%) Not agree/other (88.97%)</p> <p><i>OEF4 = Self-employed/employer</i> Yes (17.79%) No (82.21%)</p>
Job factors	
<p><i>JF1 = Working from home before the lockdown</i> Habitually (5.27%) 2/3 days a week (5.41%) Occasionally (13.74%) Never (75.59%)</p>	<p><i>JF2 = Work/communication workload</i> WFH hinders disconnecting form work (11.32%) WFH generates higher workload (11.82%) At least one item (13.66%) Sum. mean = 0.2313, SD = 0.606</p>
Output factors	
<p><i>Isolation = Working from home produces isolation</i> People isolation (17.30%) Problems linked to loneliness and isolation (13.52%) At least one item (17.87%) Sum. mean = 0.308, SD = 0.687</p>	<p><i>Stress = Working from home increases stress</i> Yes (9.25%) No/NA (90.75%)</p>

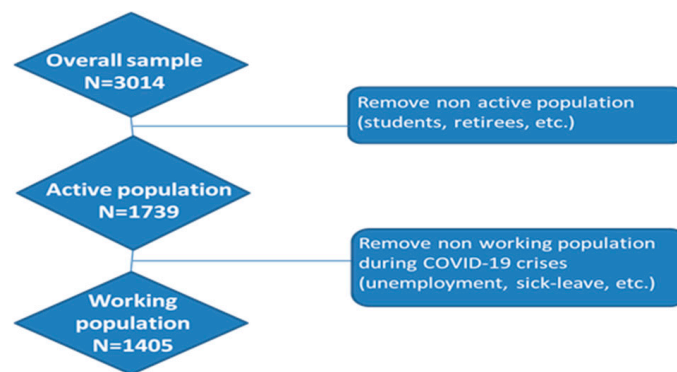


Figure 3. Process followed to select the answers to analyse from the survey “Tendencies in the digital society during COVID-19 pandemic in Spain”.

In regard to ethical issues, no permission has been demanded from any Ethical Board Committee, because the material used in this paper is secondary data obtained from the CIS webpage (<https://www.cis.es/cis/opencms/EN/index.html>, accessed on 18 October 2022), which is freely available.

3.2. Definition of the Variables Used in the Study

All the variables in the study are defined from questions in Table 2 in such a way that the analysis of the significance on their impact on stress and isolation will allow for testing the hypotheses in Section 2. We considered four sociodemographic variables, specifically gender, age, having children in care and the academic attainment of the surveyed person;

two factors related to the positive perception of WFH in the context of workers' personal lives, specifically work–life balance and the reduction in commuting; five work conditions and organizational items; and two factors related to jobs. With regard to sociodemographic variables, we differentiate the following:

GENDER: This is a dummy variable that takes 0 for men and 1 for women. It is defined from S1 in Table 2. It is supposed to positively influence stress (H1.1) and isolation (H2.1).

CHILDREN: This is a dichotomous variable that takes 1 if the surveyed person declares having at least one child and 0 otherwise. It is defined from S3 in Table 2. It is supposed to positively influence stress (H1.2) and isolation (H2.2).

B_BOOM: This is a dichotomous variable that stands for members of the baby boomer generation. Its value is 1 for persons who are 55 years or older. It is defined from S2 in Table 2.

XGEN: This is a dichotomous variable that stands for members of Generation X. Its value is 1 for persons who are between 35 and 54 years and 0 otherwise. It is defined from S2 in Table 2.

From H1.3 and H2.3, it is supposed that any (or both) variables must have a significant impact on stress and isolation.

A_DEGREE: This measures a worker's educational degree. It is a dichotomous variable that takes 1 for persons with a university degree and 0 otherwise. It is defined from Table 2. It is supposed to negatively influence stress (H1.4) and isolation (H2.4).

As far as personal perceptions are concerned, we have tested those linked with the perception of a better balance between work and family life.

B_W_FAM: This is a measure of the balance between work and life. It is the normalized value within the interval [0,1] of the sum of the items in P1, which varies between 0 and 3. It is supposed to negatively influence stress (H1.5) and isolation (H2.5).

COMMUTING: This measures the perception of how WFH reduces the need to commute to the workplace and of a reduction in traffic congestion and pollution. It is the normalized value within the interval [0,1] of the sum of the items in P2, which varies between 0 and 2 and is supposed to influence stress (H1.6).

Work conditions at home are defined from questions OEF1 and OEF2 in Table 2.

G_CONNECT: This is a dummy variable that takes 1 if the respondent perceived that the quality of internet allowed them to satisfactorily perform professional activities during COVID-19 crises and 0 otherwise. It is defined from OEF1. It is supposed to negatively influence stress (H1.7) and isolation (H2.6).

HOME_NO_A: This is a dichotomous variable that takes 1 if the respondent perceived that their home is not prepared to implement WFH and 0 otherwise. It is defined from OEF2. It is supposed to positively influence stress (H1.8) and isolation (H2.7).

Regarding organizational variables, we define the perception of how committed the organization is to remote working and separate the perception of employees and self-employed/entrepreneurs.

ORG_SUPP: This measures technical support of an organization during COVID-19 lockdowns. It is the normalized sum within [0,1] of the sum of the items in OEF5, which varies between 0 and 5. It is supposed to negatively influence stress (H1.9) and isolation (H2.8).

N_PROMOT: This is a dichotomous variable that takes 1 if the employee perceives that WFH inhibits the chances of promotions and premiums and 0 otherwise. It is defined from OEF3. It is supposed to positively influence stress (H1.10) and isolation (H2.9).

EMPLOYER: This is a dummy variable that takes 1 if the answer comes from an employer or self-employer. It is defined from OEF4 and is supposed to negatively influence stress (H1.11) and positively influence isolation (H2.10).

Job factors are defined from questions J1 and J2 in Table 2.

WFH_USU: This is a dichotomous variable that takes 1 if the surveyed person declared WFH habitually or 2/3 days a week and 0 otherwise. It is defined from J1 and is supposed to negatively influence stress (H1.12) and isolation (H2.11).

OVERLOAD: This measures the perception of how WFH is an enabler of work overload. It is the normalized value within the interval [0,1] of the sum of the items in J2, which varies between 0 and 2. It is supposed to positively influence stress (H1.13) and isolation (H2.12).

The output variables (ISOLATION and STRESS) are obtained from Table 2.

ISOLATION: This measures the perception of the capability of WFH to lead to isolation. It is a normalized value within the interval [0,1] of the sum of the items of isolation in Table 2, which varies between 0 and 2. It is supposed to positively influence stress (H1.14).

STRESS: This is a dichotomous variable that takes 1 if the surveyed person perceives that WFH produces stress and 0 otherwise.

3.3. Analytical Methodology

To test hypotheses H1.1–H1.14, which are linked with RQ1 and RQ2, we fit STRESS by using the framework depicted in Figure 1. Because STRESS is a dummy variable, it is estimated by means of a set of hierarchical logit regressions. We start considering only individual variables, and we thereafter introduce organizational and environmental factors, job factors and ISOLATION into the regression equation. Therefore, the results of estimating the regressions with individual factors, organizational and environmental variables and job factors will allow for testing hypotheses H1.1–H1.13 and thus answering RQ1. When introduced in the hierarchical logit regression ISOLATION, the sign and significance of its coefficient will allow for testing H1.14 and thus responding to RQ2.

To test hypotheses H2.1–H2.12 to answer RQ3, we fit ISOLATION by following Figure 2. Because ISOLATION takes values within the interval [0,1], we adjust it by means of a set of hierarchical tobit regressions. As in the case of stress, we start considering only individual variables, and we thereafter introduce environmental and organizational factors and, finally, job factors.

In the adjustment of both output variables, to control whether the introduction of a new set of variables improves the quality of the estimation, we use the information criteria from Akaike (AIC), Schwartz (BIC) and Hannan and Quinn (HQIC). If the new set of variables effectively completes the explanatory capability of the previous set, the information criterion must decrease its value. The best model is that which minimizes the information criteria and so attains a better balance between the number of adjusted parameters and the adherence to data.

4. Results

4.1. Descriptive Statistics

Table 2 presents the questions used to quantify the explanatory factors. Regarding individual factors, the age of respondents (S2) is divided into generations: baby boomers (20.93%), Generation X (59%), and millennials and others (20.07%). Here, 40% of surveyed persons declared having at least one child to care for, and more than 50% (55.52%) were university graduates. In P1, 60.21% of those in the sample outlined at least one favourable effect of WFH on work–life balance, and 50.39% declared perceiving at least one advantage regarding the reduction in commuting.

In total, 75.31% of responses indicated that connectivity was good enough to develop job tasks, but a percentage above 10% outlined that homes were not prepared to separate work and family. Only 11.81% of respondents reported that working from home leads to fewer promotion opportunities, and 43.25% did not outline an item linked to support from the firm given to teleworkers (equipment, technical help, etc.). A total of 17.79% of our sample declared being employers or self-employers.

Only a percentage slightly greater than 11% of persons answered having WFH as a systematic work arrangement before the COVID-19 pandemic, and on the other hand, 75.59% never worked from home. Of the respondents, 13.66% perceived at least one item linked to communication and work overload. Regarding isolation, 17.87% of people

perceived at least one of its items. Likewise, 9.25% of respondents reported feeling that WFH may produce stress.

4.2. Regression Analysis

The results of the regression analysis on stress are displayed in Table 3. The four models have statistical significance given that their log-likelihood ratios are $p < 0.0001$. We observed in our hierarchical adjustments that the subsequent model always improves the prior estimate. All information criteria suggest that Model 4 is the best estimate.

Table 3. Hierarchical logit regressions for stress.

	Model 1		Model 2		Model 3		Model 4	
	Marg. Effect	p-value	Marg. Effect	p-value	Marg. Effect	p-value	Marg. Effect	p-value
Individual variables								
<i>Sociodemographical</i>								
GENDER	−0.193	0.325	−0.225	0.3075	−0.438	0.2049	−0.449	0.2016
CHILDREN	0.133	0.6399	0.233	0.5194	0.106	0.7744	0.159	0.6716
B_BOOM	−0.317	0.272	−0.513	0.1172	−0.415	0.4247	−0.274	0.6098
XGEN	−0.428	0.094	−0.521	0.0709	−0.912 *	0.0475	−0.877 *	0.0444
A_DEGREE	0.119	0.570	0.099	0.6777	0.003	0.996	−0.060	0.9162
<i>Individual perceptions</i>								
B_W_FAM	−1.374 ***	<0.0001	−1.193 ***	<0.0001	−0.742 *	0.0225	−0.684 *	0.0369
COMMUTING	0.226	0.168	0.557 **	0.0031	0.427	0.1764	0.687 *	0.04
Organizational environmental factors								
<i>Infrastructure</i>								
G_CONNECT	---	---	−0.522 *	0.0297	0.367	0.3579	0.193	0.6383
HOME_NO_A	---	---	1.507 ***	<0.0001	−0.368	0.3021	−0.273	0.4502
<i>Organizational issues</i>								
ORG_SUPP	---	---	0.163	0.6245	0.040	0.9399	−0.060	0.909
N_PROMOT	---	---	1.716 ***	<0.0001	0.698	0.1156	−0.472	0.4248
EMPLOYER	---	---	−1.106 **	0.0017	−1.377 **	0.0072	−1.321 **	0.0097
Job factors								
WFH_USU	---	---	---	---	−0.939	0.1657	−1.018	0.1549
OVERLOAD	---	---	---	---	5.771 ***	<0.0001	5.825 ***	<0.0001
ISOLATION	---	---	---	---	---	---	1.838 **	0.002
	Measure		Measure	Δ	Measure	Δ	Measure	Δ
McFadden’s R ²	15.06%		30.11%	15.05%	68.25%	38.14%	69.40%	1.15%
AIC	751.97		631.53	−120.44	305.09	−326.44	297.12	−7.97
BIC	793.96		699.76	−94.20	383.81	−315.94	381.09	−2.72
HQIC	767.67		657.03	−110.64	334.51	−322.52	328.51	−6.01
LR-ratio	130.48 ***		260.92 ***	-	591.36 ***		601.33 ***	

Notes: (1) *, ** and *** stand for significance at 5%, 1% and 0.01%, respectively. (2) AIC—Akaike’s information criteria; BIC—Schwartz information criteria; HQIC—Hannan-Quinn criteria; LR-ratio log-likelihood ratio. (3) “Δ” stands for the sequential improvement of goodness-of-fit measures in hierarchical regressions.

Of the sociodemographic variables, only belonging to Generation X is significant. Its marginal effect (me) is -0.877 ($p = 0.044$). Therefore, H1.3 is accepted. Both perceptions about the personal advantages of WFH are significant in that for B_W_FAM, $me = -0.684$ and $p = 0.0369$, and in the case of COMMUTING, $me = 0.687$ and $p = 0.04$. This finding supports accepting H1.7 but rejecting H1.8.

In Model 4, there is no variable linked with the infrastructure that is significant enough to explain STRESS. With regard to organizational variables, being an employer is negatively linked with stress ($me = -1.321$, $p = 0.0097$). Within job factors, OVERLOAD is highly significant in that $me = 5.825$ and $p < 0.0001$. The introduction of ISOLATION in Model 4

improves Model 3 in that all information criteria reduce, and ISOLATION shows statistical significance ($me = 1.838, p = 0.002$).

The results of tobit regressions on ISOLATION are displayed in Table 4. That table shows that the three regression models have statistical significance in that their log-likelihood ratios are $p < 0.0001$. Although BIC suggests that Model 2 (and thus not including job factors) attains the best balance between adjustment and parsimony: AIC and HQIC indicate that the best regression model is the third one, which is obtained after expanding the second model to include job factors. Likewise, OVERLOAD has fair statistical significance ($me = 1.189, p = 0.002$). Therefore, we assume that the third regression model provides better adjustment quality.

Table 4. Results of hierarchical tobit regressions for stress.

	Model 1		Model 2		Model 3	
	Marg. Effect	p-value	Marg. Effect	p-value	Marg. Effect	p-value
Individual variables						
<i>Sociodemographical</i>						
GENDER	0.061	0.855	0.204	0.422	0.190	0.447
CHILDREN	0.174	0.631	0.005	0.985	0.021	0.938
B_BOOM	−0.748	0.143	−0.975 *	0.014	−0.956 *	0.015
XGEN	−1.036 *	0.026	−0.849 *	0.015	−0.849 *	0.013
A_DEGREE	−0.679	0.160	−0.118	0.766	−0.133	0.735
<i>Individual perceptions</i>						
B_W_FAM	−3.442 ***	<0.0001	−1.885 ***	<0.0001	−1.740 ***	<0.0001
Organizational/environmental factors						
<i>Infrastructure</i>						
G_CONNECT	---	---	−0.755 **	0.008	−0.686 *	0.014
HOME_NO_A	---	---	1.781 ***	<0.0001	1.416 ***	<0.0001
<i>Organizational issues</i>						
ORG_SUPP	---	---	−0.098	0.807	−0.048	0.903
N_PROMOT	---	---	6.924 ***	<0.0001	6.565 ***	<0.0001
EMPLOYER	---	---	1.086 **	0.002	1.160 **	0.001
Job factors						
WFH_USU	---	---	---	---	−0.665	0.159
OVERLOAD	---	---	---	---	1.189 **	0.002
	Measure		Measure	Δ	Measure	Δ
AIC	1278.10		958.19	−319.95	949.35	−8.84
BIC	1320.09		1026.41	−293.68	1028.06	1.65
HQIC	1293.80		983.69	−310.11	978.77	−4.92
LR-ratio	59.96 ***		70.48 ***		71.48 ***	

Notes: (1) *, ** and *** stand for significance at 5%, 1% and 0.01%, respectively. (2) AIC—Akaike’s information criteria; BIC—Schwartz information criteria; HQIC—Hannan-Quinn criteria; LR-ratio log-likelihood ratio. (3) “Δ” stands for the sequential improvement of goodness-of-fit measures in hierarchical regressions.

With regard to individual variables, both age variables (B_BOOM, $me = -0.956, p = 0.015$; XGEN, $me = -0.849, p = 0.013$) have a significant negative impact on ISOLATION. Perceiving that WFH allows for balancing work and personal duties is negatively linked with ISOLATION ($me = -1.74, p < 0.0001$). Both factors linked with material work conditions have a significant impact on ISOLATION and with the expected sign. For G_CONNECT, we found that $me = -0.686$ and $p = 0.014$, and for HOME_NO_A, $me = 1.416$ and $p < 0.0001$. Regarding variables linked to support from an organization to work from home, we fitted for N_PROMOT, where $me = 6.565$ ($p < 0.0001$), and for EMPLOYER, where $me = 1.160$ ($p = 0.001$). Finally, within the job factors, only OVERLOAD is significantly linked with ISOLATION.

Table 5 summarizes our decision on the hypotheses regarding the influence of input variables on the perception of stress, and Table 6 does so for isolation.

Table 5. Decision on the acceptance of hypothesis regarding stress perception (H1.1–H1.14).

	Hypothesised Sign	Model 1	Model 2	Model 3	Model 4
Individual variables					
<i>Sociodemographical</i>					
GENDER	Positive	Not supp.	Not supp.	Not supp.	Not supp.
CHILDREN	Positive	Not supp.	Not supp.	Not supp.	Not supp.
B_BOOM	Only influence	Not supp.	Not supp.	Not supp.	Not supp.
XGEN	Only influence	Not supp.	Not supp.	Supported	Supported
A_DEGREE	Negative	Not supp.	Not supp.	Not supp.	Not supp.
<i>Individual perceptions</i>					
B_W_FAM	Negative	Supported	Supported	Supported	Supported
COMMUTING	Negative	Not supp.	Not supp.	Not supp.	Not supp.
Organizational/environmental factors					
<i>Infrastructure</i>					
G_CONNECT	Negative	---	Supported	Not supp.	Not supp.
HOME_NO_A	Positive	---	Supported	Not supp.	Not supp.
<i>Organizational issues</i>					
ORG_SUPP	Negative	---	Not supp.	Not supp.	Not supp.
N_PROMOT	Positive	---	Supported	Not supp.	Not supp.
EMPLOYER	Negative	---	Supported	Supported	Supported
Job factors					
WFH_USU	Negative	---	---	Not supp.	Not supp.
OVERLOAD	Positive	---	---	Supported	Supported
ISOLATION	Positive	---	---	---	Supported

Table 6. Decision on the acceptance of hypothesis regarding isolation perception (H2.1–H2.14).

	Hypothesised Sign	Model 1	Model 2	Model 3
Individual variables				
<i>Sociodemographical</i>				
GENDER	Positive	Not supp.	Not supp.	Not supp.
CHILDREN	Positive	Not supp.	Not supp.	Not supp.
B_BOOM	Only influence	Not supp.	Supported	Not supp.
XGEN	Only influence	Supported	Supported	Supported
A_DEGREE	Negative	Not supp.	Not supp.	Not supp.
<i>Individual perceptions</i>				
B_W_FAM	Negative	Supported	Supported	Supported
Organizational/environmental factors				
<i>Infrastructure</i>				
G_CONNECT	Negative	---	Supported	Supported
HOME_NO_A	Positive	---	Supported	Supported
<i>Organizational issues</i>				
ORG_SUPP	Negative	---	Not supp.	Not supp.
N_PROMOT	Positive	---	Supported	Supported
EMPLOYER	Positive	---	Supported	Supported
Job factors				
WFH_USU	Negative	---	---	Not supp.
OVERLOAD	Positive	---	---	Supported

5. Discussion

This paper evaluates the factors that inhibit the Spanish working population from perceiving or enable their perceiving that working from home (WFH) produces stress

and isolation. Although WFH was a marginal practice in Spain before March 2020, it became a generalized work mode during the COVID-19 pandemic. Therefore, practically all the respondents whose jobs were compatible with WFH have experienced this work arrangement. In any case, the surveyed persons had remotely performed some tasks for their jobs and for some common activities of daily life. Therefore, it is expected that a great proportion of the Spanish working population has formed an opinion on WFH.

RQ1 was “*What are the explanatory factors of workers’ perceptions that working from home causes stress?*” This question was answered by performing hierarchical logit regressions on stress. We sequentially introduced individual variables, organizational and environmental factors, job factors and isolation. We checked whether a better model includes all kinds of variables and reaches a McFadden’s R^2 close to 70%, which can be considered excellent. However, this finding does not imply that all the variables are significant. Whereas XGEN, B_W_FAM, COMMUTING, EMPLOYER, OVERLOAD and ISOLATION showed statistical significance in the best (the fourth) model, this did not follow for the other factors (GENER, CHILDREN, B_BOOM, A_DEGREE, G_CONNECT, HOME_NO_A, ORG_SUPP, N_PROMOT, WFH_USU).

We found that within sociodemographic variables, only belonging to Generation X presented a significant impact, which was negative. This discovery does not mean that the perception of stress has an inverse monotonous relation with age, as reported by [Sutarto et al. \(2021\)](#); [Lange and Kayser \(2022\)](#); [Van Zoonen and Sivunen \(2022\)](#). On the other hand, this finding is compatible with [López-Igual and Rodríguez-Modroño \(2020\)](#), who found greater adherence to WFH among members of Generation X.

Neither gender nor having a child in care presents a significant impact on feelings of stress. This result contradicts several reports, such as those by [Beckel and Fisher \(2022\)](#), [Calleja and Mota \(2022\)](#), [Pataki-Bittó and Kun \(2022\)](#) and [de Sousa et al. \(2022\)](#), regarding the link between being female and mental issues. [Macciotta et al. \(2022\)](#), [Heiden et al. \(2021\)](#), [Mendonça et al. \(2022\)](#), [Pataki-Bittó and Kun \(2022\)](#), [Maillot et al. \(2022\)](#) and [Niu et al. \(2021\)](#) found a significant relationship between having children to care for and stress. However, our findings are not an exception. While [Adamovic \(2022\)](#), [Palma-Vasquez et al. \(2021\)](#) and [Giudice et al. \(2022\)](#) did not find gender to be a relevant factor, [Giudice et al. \(2022\)](#) also outlined that having children at home was not impactful, and even [Danker et al. \(2022\)](#) pointed out that being a man without family obligations is the profile with a greater risk of stress. Likewise, we believe that the nonsignificance of gender in stress perception could be a symptom that Spanish family culture has evolved in the past decades toward a more balanced distribution of household duties between men and women.

Contrary to [Sutarto et al. \(2021\)](#), we did not find a significant influence of academic level on the perception that WFH produces stress. The reason may be that nowadays it is easy to find a wide variety of positions that can be easily adapted to WFH, such as telephone operation and after sales, that does not necessarily require a high academic education, although efficiently performing their duties requires experience and some skills.

We have checked whether perceptions about personal benefits from WFH are relevant to explaining stress perceptions. As we expected, perceiving that WFH improves work–life balance inhibits the perception of stress. Therefore, this result confirms the theoretical statement in [Baruch \(2001\)](#) and the empirical findings by [Ferrara et al. \(2022\)](#), [Beckel and Fisher \(2022\)](#), [Golden \(2012\)](#), [Pataki-Bittó and Kun \(2022\)](#) and [Maillot et al. \(2022\)](#) on that influence. Surprisingly, perceiving that an advantage of WFH is avoiding commuting has a positive significant relation with stress. This unexpected sign could be explained by the extraordinary context in which WFH has been performed in our survey. WFH was mandatory during 2020 in Spain and so avoiding commuting was not optional but obliged. There is a profile of employees who appreciate face-to-face interactions, who perceive them as a satisfying consequence of their work ([Maillot et al. 2022](#)). To join these interactions, of course, moving from home to the workplace is needed, and thus, not commuting is linked to the negative feeling of losing person-to-person relationships. However, that relationship

does not seem to be robust, given that the p -value of commuting presents great variability between models.

Variables linked to home infrastructure impact on stress with the expected sign (negative if it is perceived as good connectivity and positive if the home is not adequate for WFH). Even though in Model 2, these variables are significant, the p -value does not denote statistical significance in the models with better adherence to data (i.e., Models 3 and 4, which have the lowest values of AIC, BIC and HQIC). Therefore, in contrast to [Gajendran and Harrison \(2007\)](#), [Weinert et al. \(2015\)](#), [Nakrošienė et al. \(2019\)](#), [Niu et al. \(2021\)](#), [Sutarto et al. \(2021\)](#), [Soubelet-Fagoaga et al. \(2022\)](#), [Macciotta et al. \(2022\)](#), [Maillot et al. \(2022\)](#) and [Pelissier et al. \(2021\)](#), we have not found clear evidence of the direct impact of home equipment on perceiving that conducting one's job at home can produce stress. The weak influence of G_CONNECT and HOME_NO_A on STRESS could be partially explained by the limited variability in these variables. In regard to G_CONNECT, 75% of answers reported having satisfactory or good internet service. Similar considerations can be conducted for the relationship between HOME_NO_A and STRESS.

As far as variables linked to organizational issues are concerned, technical and material help by the organization has no significant influence on the perception that working from home produces stress. This finding contradicts [Nakrošienė et al. \(2019\)](#), [Danker et al. \(2022\)](#), [Soubelet-Fagoaga et al. \(2022\)](#) and [Deschênes \(2023\)](#). However, we must also outline that [Beauregard et al. \(2019\)](#) and [Niebuhr et al. \(2022\)](#) reported the stressor effect of organizational support because it may push workers to feel that employers are exerting greater control and surveillance. We cannot rule out that the absence of a significant impact of organizational support on feelings of stress could be because the positive effects of material and technical help are dissolved by the perception of greater surveillance.

Perceiving that WFH could be a barrier to career promotion has a significant positive impact on stress in the second logit model. However, when job variables and isolation are introduced, the significance of that impact is lost. In short, we have not found a significant direct impact from variables linked to organizational support and an organization's position about WFH on the perception that it causes stress. On the other hand, being an employer has a negative relation with the perception that WFH produces stress. The reason may be that in fact, in many firms, home teleworking is still a new arrangement, and employers may have problems measuring workers' productivity ([Mello 2007](#)); therefore, a loss of trust in employees could lead employers to believe that employees are not productive enough because they are not being supervised in person ([Fairweather 1999](#)), and therefore, their job-related effort decreases ([Mello 2007](#)).

We have found that whereas having experience in WFH before the COVID-19 crisis does not have a significant impact on stress, information and work overload is the most relevant variable. The first finding does not confirm that employees who had already performed their jobs from home will have a lower probability of feeling stress, as pointed out by [Maillot et al. \(2022\)](#) and [Lange and Kayser \(2022\)](#). The ICTs used to perform teleworking are essentially the same those used in many daily activities, such as teleshopping and joining social networks. Thus, a very relevant requirement to avoid stress, such as self-efficacy ([Lange and Kayser 2022](#)), has been achieved by many workers with the daily use, in their personal sphere, of ICTs, so previous experience in telecommuting was not highly relevant.

On the other hand, the great and significant impact of work and information overload on perceiving WFH as a source of stress has been reported in the mainstream literature ([Cai et al. 2021](#); [Mendonça et al. 2022](#); [Fonner and Roloff 2012](#); [Ferrara et al. 2022](#); [Chen 2022](#); [Grant et al. 2013](#); [Heiden et al. 2021](#); [Bentley et al. 2016](#); [Spurgeon et al. 1997](#); [Millán et al. 2017](#)). However, authors such as [Maillot et al. \(2022\)](#) and [Macciotta et al. \(2022\)](#) suggest that to explain the stress perception, clarity on work objectives is more relevant than work overload, and [Novianti and Roz \(2020\)](#) suggest that workload does not impact job satisfaction.

RQ2 was “Does isolation have a significant impact on stress?” We found that the perception of working from home as an enabler of isolation positively impacts the opinion that remote work causes stress. Although this result is in accordance with the mainstream findings (Sahai et al. 2020; Leigh-Hunt et al. 2017; Bentein et al. 2017; Ferrara et al. 2022; Van Zoonen and Sivunen 2022), not all studies report significant empirical connections between isolation and stress (Maillot et al. 2022).

RQ3 was “What are the explanatory factors of workers’ perception that working from home causes isolation?” To answer this research question, we fitted a set of hierarchical tobit regressions on ISOLATION. Individual factors, organizational and environmental variables and job factors were sequentially introduced, and we checked whether the better model has factors of all types as its explanatory variables. This does not imply that all the variables have statistical impact. While B_BOOM, G_CONNECT, HOME_NO_A, N_PROMOT, EMPLOYER and OVERLOAD are significant to explaining ISOLATION at standard statistical levels, this does not follow for GENDER, CHILDREN, A_DEGREE, ORG_SUPP or WFH_USU.

We found that among sociodemographic factors only variables linked to age (B_BOOMER and XGEN) have a significant negative impact on perceived isolation. Therefore, we can conclude that younger generations (such as millennials) are more sensitive to isolation in remote work arrangements. Note that even though this finding is in accordance with the empirical literature (Carillo et al. 2021; Van Zoonen and Sivunen 2022), paradoxically, the millennial is the first generation to be considered digital natives (Akçayır et al. 2016).

As in the case of stress, we have not found a significant impact on gender and having children to care for on the perception that home telecommuting may produce isolation. This suggests that in our sample, there is evidence of neither an increase in gender inequalities during the COVID-19 crisis, which was reported by Fang et al. (2022), nor a greater perception by women that WFH produces conflicts between work and home, as Macciotta et al. (2022) outlined. This fact is also in accordance with the nonsignificant impact of these factors on STRESS and reinforces our conjecture about a balanced between men and women in performing household tasks. Our results also contradict reports such as Calleja and Mota (2022) that point out that a woman with children in care is a profile that experiences stress and isolation.

We observed that the perception of WFH as an enabler to attain a satisfactory balance between work and a personal life is negatively linked with the perception of isolation. This result is in accordance with Weinert et al. (2015). In fact, this is the individual variable with the greatest marginal effect on isolation.

Environmental and organizational variables are the most influential factors in the perception of the relationship between isolation and remote work. Feeling that ICTs were adequate to develop work with enough quality had a significant negative impact on isolation perception. Perceiving that home is not adequate to implement WFH is positively linked with experimenting isolation. Both findings are in accordance with our expectations, which were grounded in the reports by Van Zoonen and Sivunen (2022), Beauregard et al. (2019), Mello (2007), Even (2020) and Giudice et al. (2022). The marginal effect of home adequacy is much greater than that of ICT infrastructure. These results are in accordance with Fana et al. (2020) on the adequacy of ICT infrastructure in performing teleworking in Spain and in accordance with Cuervo-Vilches et al. (2021), who reported that on variables linked with infrastructures, physical space is a more critical issue than technological space.

The perception that WFH inhibits career development displays a significant positive influence on the feeling that it produces isolation. In fact, this is the variable with a greater marginal effect on isolation perception. It is in accordance with the reports on the relevance of so-called distance to power: distance makes the worker invisible to managers (Orhan et al. 2016; Sahai et al. 2020) and is a barrier to influencing colleagues and events in the workplace; therefore, it is an obstacle to being promoted and rewarded (Baruch 2001; Adamovic 2022). On the other hand, although technical and material support by organizations has been outlined as a key factor in avoiding workers’ isolation (Van Zoonen

and Sivunen 2022; Even 2020; Sahai et al. 2020), we did not find statistical significance in that variable. A possible explanation is that available resources for ICTs in households before March 2020 were perceived good enough, and this allowed satisfactory mediated interactions with coworkers and supervisors. Thus, it is logical to suppose that the lack of organizational support in this regard was not an issue for workers' well-being, because it was not perceived as necessary.

Being an employer is positively linked with the opinion that WFH may be a source of isolation. This finding is in accordance with the arguments explaining employers' reluctance to adopt remote work because of the problems linked to the physical isolation (Baruch 2000; Kurland and Cooper 2002; Martínez-Sánchez et al. 2007; Aguilera et al. 2016).

Overload is a significant factor in explaining isolation. The reason may be that jobs that are more virtual may produce more isolation (Sahai et al. 2020). Likewise, we found that having experience with working from home before the COVID-19 crisis did not display significance, which contradicts Van Zoonen and Sivunen (2022). A plausible explanation could be that technologies of mediated communication, which are crucial instruments to avoid worker isolation, in 2020 were in common use for personal and recreational purposes. Thus, adapting to mediated communication in a job setting was not an issue for many employees.

To explain stress, the most influential variables are, by decreasing importance, work and information overload (marginal effect = 5.825) and isolation (marginal effect = 1.838); the variables with greater capability to explain isolation are linked with material work resources and how WFH impacts professional career development. The balance between family and work, and age, are also significant variables (but less) to explain both outputs. Although organizational and environmental variables did not display statistical significance to explain stress in the logit models when we introduced overload and isolation in the regression equation, some of those variables were significant if overload and isolation were not considered. This result suggests that home infrastructure factors and the perception that WFH inhibits obtaining a promotion produce stress. Even though both explanatory factors have weak direct impacts on stress, they may have significant mediated influences by means of exacerbating the perceptions of overload and isolation.

Practical Implications

Our findings have clear, practical implications. We found that infrastructure is perceived as a crucial variable to avoid isolation in working from home. In this regard, practically 50% of responses reported neither material nor technological help from their employers. Therefore, Spanish legislation on telework in Royal Decree 28/2020 of September 22 did not solve the imbalance of rights and obligations between companies and workers pointed out by Corral and Isusi (2020). In any case, it is not exclusive to Spain. The lack of legal frameworks for how workplaces in the home office should be equipped is a common problem in many countries (Niebuhr et al. 2022). Likewise, it is commonly agreed that there is a lack of regulation at a collective level (Williamson and Pearce 2022). The results in this paper reveal that more regulation on these issues is needed.

Information and work overload has been revealed to be a key issue in explaining the perception of stress and isolation. Of course, the employee must be protected against this drawback by means of labour regulations such as the right of digital disconnection, which in Spain is regulated by Royal Decree 28/2020 of September 22. Additionally, there is a need for measures at a firm level to manage communication overload. They must include rationalizing the information stream and communication channels because its diversification may cause overflow. It is also necessary to help employees to efficiently manage, and to inform them about, ICTs in a WFH setting.

Firms committed to the use of telecommuting and WFH as work modes must solve many challenges to reach an optimal organization: training workers in new modes to implement tasks, changing organizational culture, modifying organizational infrastructure, etc. (Herrera et al. 2022). Similarly, teleworkers face a situation where work-home balance

is of particular relevance (Kohont and Ignjatović 2022). When developing a WFH scenario, home is not only a place to spend personal time but also an extension of the office. Therefore, spatial and temporal boundaries must be stated to ensure that a balance between personal life and professional life, which is relevant to explaining stress and isolation, is reached. Training is needed for the management of limited home physical spaces in a WFH setting.

Spanish labour authorities have introduced some regulations to prevent work overload. However, legal efforts will never be enough without cultural changes in organizations and workers. The organizational culture must focus on criteria with alternative criteria to presentism, such as measurable objectives and trust. If WFH is perceived as less productive than work conducted in the workplace, teleworkers may be forced to work longer hours and with more intensity than those in the conventional workplace. On the other hand, employees assume more responsibility to be productive. In this regard, authors such as Harris (2003) have outlined the relevance in a teleworking arrangement of a so-called implicit psychological contract that reflects the recognition between employee and employer of their respective inputs to the job in relation to implementing WFH practices.

6. Conclusions

This paper is inquiry into the factors that Spanish workers perceive relevant to explaining stress and isolation 1 year after the COVID-19 crisis started. Whereas the most relevant factors to explain stress are overwork and isolation, perceiving fewer professional development opportunities, infrastructure dotation and overwork are the most influential variables on isolation. Age and work–life balance have significant impacts on both output variables, but with much less weight.

The limits of this paper can be objects of further research. We analysed a cross-sectional survey that took place in Spain in March 2021. At that time, COVID-19 was a great concern for the health authorities of many countries, and the population had low vaccination coverage. To take a complete perspective on workers' feelings, a longitudinal assessment covering more-advanced phases of the SARS-CoV-2 crisis is necessary. For example, when the population was fully vaccinated or when COVID-19 became an endemic illness, working from home was no longer mandatory.

WFH was widely extended when the survey was carried out, but it was an exceptional period. First, WFH was not optional but instead mandatory. Likewise, in Spring 2020, there was a lockdown for schools, and thus, the challenge of adopting a new work mode was added to the difficulty of facing it with children at home during working hours. Third, feelings of stress and isolation from the COVID-19 constraints and quarantines may bias perceptions about the effect of WFH on well-being. These questions reinforce the need for a longitudinal study to obtain a more complete picture.

Our work focused on Spain, which had a similar labour culture and similar telecommuting coverage before March 2020 to that of other Mediterranean countries, such as Italy or Greece. However, both issues were unlike those of other countries, such as Anglo-Saxon or Nordic states. Therefore, the statements made in this paper must be considered with caution before extrapolating them to other territories. Similar studies may be performed in other geographical areas to identify patterns that may be similar or dissimilar in regard to the perception of factors that enable or inhibit teleworkers' isolation and stress.

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