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Factorial Structure and Invariance of the Conditions for Home-Based Teleworking Questionnaire in Chilean Population

Estructura Factorial e Invarianza del Cuestionario Condiciones para Teletrabajo en el Hogar en Población Chilena

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Due to the COVID-19 pandemic, a wide range of organisations have started using teleworking, without previously evaluating its optimal conditions, both due to the situation of emergency as well as the lack of instruments. This study analyzes the internal structure and invariance by sex of a questionnaire that assesses personal, family, work and home conditions that influence teleworking. The elaboration of the questionnaire, denominated Perception of Conditions for Telework Questionnaire, was based on research and experience reports related to this field. It was validated on a sample of 1,165 Chilean public servants between the ages of 30 and 65, in which the majority of the subjects were female (85%). Exploratory and confirmatory factor analysis were performed. Results indicate that the instrument achieves a robust factorial structure and a very high level of reliability (Cronbach's alpha of 0.96), with 32 items and 5 dimensions with significant and strong interrelationships, between 0.60 and 0.85, the invariance by sex presents significant differences between men and women. It is concluded that the instrument presents high reliability and validity, which allows its use in the measurement of relevant factors for the achievement of an adequate teleworking system. However, the difference between men and women should be reviewed, since the factors could be sensitive to cultural gender differences. Another limitation is that the study only carries out internal validation, lacking progress in the external validation of the construct.

Keywords: teleworking, job quality, psychology, psychometrics, human resources

A partir de la pandemia por COVID-19, el teletrabajo tuvo un uso extendido en diversas organizaciones, sin evaluar sus condiciones óptimas, tanto por la situación de emergencia como por la falta de instrumentos. Este estudio tuvo como objetivo analizar la estructura interna y la invarianza por sexo de un cuestionario que evalúa las condiciones personales, familiares, laborales y del hogar que influyen en el teletrabajo. Para ello se construyó el cuestionario Condiciones para el Teletrabajo en el Hogar, diseñado en base a estudios y reportes de experiencias desarrolladas en la temática. Participaron 1165 funcionarios públicos de tres ciudades de la región del Maule, Chile, siendo una amplia mayoría del género femenino (85%), con edades entre los 30 y 65 años. Se realizó análisis factorial exploratorio y confirmatorio. Los resultados señalan que el instrumento logra una estructura factorial robusta y un nivel de consistencia interna muy alto (alfa de Cronbach de 0,96), con 32 ítems y 5 dimensiones con interrelaciones significativas y fuertes, entre 0,60 y 0,85. la invarianza por sexo presenta diferencias significativas entre hombres y mujeres. Se concluye que el instrumento presenta alta consistencia interna y validez, lo que permite su utilización en la medición de factores relevantes para el logro de un adecuado sistema de teletrabajo. Sin embargo, se debe revisar la diferencia entre hombres y mujeres, pues los factores podrían ser sensibles a diferencias culturales. Otra limitación es que el estudio solo realiza la validación interna, faltando avanzar en la validación externa del constructo.

Palabras clave: teletrabajo, calidad laboral, psicología, psicometría, recursos humanos

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Telework is a mode of work that has been slowly and systematically introduced into the world since the 1970s, based on the massification of communication media (de Vries et al, 2019). It is defined as "the proportion of job-related functions performed by a worker at a location remote from both other colleagues and the employer's main physical centre of operations, using various forms of ICT to maintain a virtual presence" (Peralta Beltrán et al., 2020, p. 238).

Despite its importance, the development of regulatory frameworks to support its implementation and monitoring has been slow (Agudo Moreno, 2014; Muñoz Osorio et al., 2018; Sládek & Sigmund, 2021). Although countries such as Colombia and Peru had established laws regulating telework as a work modality, many other countries only began to incorporate it into regulatory frameworks specifically following the COVID-19 pandemic. In fact, this use of telework, originated by the health emergency, has been carried out on a massive scale without further research or analysis of the favourable conditions for the strengthening of this modality of work and an evaluation of its implementation.

There are advantages and disadvantages to the use of telework in organisations, evident at both institutional and individual level. Among the former, one can mention work commitment, cost savings, lower emission of pollutants, greater appreciation of the work-family balance, among others. Among the disadvantages are the low capacity to monitor tasks, lack of optimal ergonomic conditions and, finally, the perception of depersonalisation (de Vries et al., 2019; Ollo-López et al., 2021).

These advantages and disadvantages are related to the way in which the elements that make up the dynamics of telework are managed, as well as the proper management of these elements, which imply a higher performance and valuation of telework as a work modality (Baquero Aguilar, 2020; Ollo-López et al., 2021).

One of the difficulties encountered in the literature review is the low number of psychometrically validated instruments that have been used to analyse the satisfaction or effects of telework, as there has been a tendency to conduct literature review studies, surveys aimed at collecting socio-demographic and behavioural data from workers and instruments that measure related variables such as stress levels or the influence of family and work (Lebopo et al., 2020; Nakrošienė et al., 2019; Nguyen, 2021).

The present study aims to complement the psychometric resources that can be used to assess the conditions that influence the development of telework by means of a validated and reliable instrument, which considers organisational, personal, family and household aspects.

Telework as a Work Modality

The use of new technologies has had a major impact on organisations, both in their administrative functioning and in the labour relations within them, giving rise to new forms of labour contracting in addition to the traditional forms, which involve, for example, modifying the length of the working day or the location where services are provided (Caamaño Rojo, 2010).

In this sense, telework is considered an alternative form of work, which consists of an organisation of work activity in which the employee performs his or her functions and provides services in a place other than the company's physical location, albeit not necessarily the worker's home, during most of his or her working hours (Agudo Moreno, 2014). Although there is no single definition of telework, three central elements can be distinguished in its characterisation: the separation between the worker and the physical location of the organisation, the use of information and communication technologies (ICTs) and the autonomous organisation of work (Agudo Moreno, 2014; Steidelmüller et al., 2020).

Although telework has its beginnings in North America, it is in the countries of the European Union where its implementation and development has been favoured as a modality that has several advantages for people and organisations; this has contributed to its internationalisation, achieving its massification under the wing of the generation of labour regulations in the European space (Baquero Aguilar, 2020; Muñoz Osorio et al., 2018). The advantages identified have been related to higher indicators of job satisfaction and motivation on the part of workers, as well as greater inclusion of women and people with disabilities in jobs, groups that suffer many difficulties and exclusions in traditional work formats (Dima et al., 2019; Osio, 2010).

There are different ways of teleworking, ranging from the use of communication tools in satellite offices or workstations in countries other than the organisation's main location, through local or community work centres, mobile offices and work at the worker's home (Agudo Moreno, 2014; Osio, 2010). Of all these modalities, one of the most widely used is *home-based telework* (HbTw), due to its usefulness in situations of social crisis such as the current COVID-19 pandemic). (HbTw) offers the possibility of keeping workers in a space where they can protect themselves and carry out their tasks through ICT (Belzunegui-Eraso & Erro-Garcés, 2020; Donnelly & Proctor-Thomson, 2015).

Currently, several countries have promoted the use of telework on health and safetygrounds, as it allows maintaining social distance and confinement to avoid contagion under conditions of sanitary emergency. These instances of teleworking have been oriented especially in public or state administration settings, as well as in educational institutions (Baquero Aguilar, 2020; de Vries et al., 2019).

However, with regard to civil servants, a population with more formalised procedures and less flexible administrative structures than private company employees (Baquero Aguilar, 2020), it is observed that in the context of the pandemic, the policies and protocols available to regulate the way in which teleworking is carried out, the hours allocated to it and the strategies for balancing family and work responsibilities are almost non-existent. In general, much of the determination of conditions for teleworking is left to political authorities, without concern for considering the needs of civil servants (De Vries et al., 2019; Vergara Rojas, 2020).

It should be noted that this has been influenced by the context of the health emergency, as the percentage of people opting for telework as a work modality was low, finding, for example, that in the period 2009-2019 this percentage varied between 5% and 11% in countries of the European Union and the United States; while during the first year of the pandemic (2020), these values have increased to reach 50% or more of workers teleworking from home in some European countries (Carillo et al., 2021 Sostero et al., 2020).

In the case of Latin America, there are few reports on the level of telework, but Guaca et al. (2018) point out that Mexico, Brazil and Argentina are the countries with the highest number of teleworkers, with figures between 28% and 58% of workers performing occasional telework and between 6% and 9% of full-time teleworkers. However, the health emergency, together with the implementation of telework, led to increased levels of workload and stress. In Chile, 79% of the population recognise that they now spend more hours at work than before, while 70% suffer from stress, with reasons including increased workload (59%), lack of time (54%), job insecurity (47%) and increased pressure from direct management (47%; Sepúlveda, 2020).

Impact of Teleworking from Home on the Individual and the Organisation

It is important to consider that teleworking from home can generate positive and negative impacts like any other work situation and is influenced by the mandatory situation required by a health emergency. Therefore, it is important to consider whether major adjustments to working conditions should be made in a situation involving telework as a mandatory mode arising from a crisis or not (Carillo et al., 2021).

The reported advantages of home-based teleworking for the individual involve a better work-life balance and personal development, as well as limited commuting, which is good for the environment. In addition, the use of telework is seen as an employment opportunity for people, such as, for example, people with family care responsibilities, as it potentially allows greater flexibility in time management which could contribute to a better reconciliation between work and care tasks. It also reduces employee commuting time, allowing the integration of people with disabilities into the world of work, or providing greater autonomy to the worker (Dima et al., 2019; Viktorovich et al., 2020). For organisations, positive aspects have been observed, such as an increase in the involvement of employees in their work, a decrease in cases of workplace stress and a decrease in commuting costs, among others (Gutiérrez-Diez et al., 2018; Osio, 2010).

On the other hand, there are some disadvantages in the implementation of telework, because it leads to negative elements for the worker, such as, for example, the increase in working hours due to difficulties in adjusting schedules, as well as a decrease in interpersonal relationships linked to work, demotivation and social isolation and poor management of pre-existing diseases (Caamaño Rojo, 2010; Steidelmüller et al., 2020).

For some people, this modality implies falling into conditions of precariousness and reduced labour guarantees, as well as the imminent risk of not being able to separate personal spaces from work, decreased productivity, weakening of links between colleagues and difficulties in organising teamwork, extended working hours and time shortages, and a feeling of increased workload and lack of attention from non-teleworkers (Arellano, 2018; Soto Jara et al., 2018). On the part of the organisation, loss of control, low effectiveness of reward activities, loss of confidentiality of information, among others, can be highlighted (de Vries et al., 2019; Osio, 2010).

Although both advantages and disadvantages of teleworking from home can be listed, there is a perception that, for both individuals and organisations, the advantages outweigh the disadvantages and are more highly valued by workers (Baker et al., 2006; Muñoz Osorio et al., 2018).

Factors Affecting Teleworking from Home

There are several elements that influence an adequate home-based telework experience, including work factors, such as the type of work and technology, organisational factors, such as organisational culture, and home and family factors (Belzunegui-Eraso & Erro-Garcés, 2020). In addition to the above, there are legal and protective factors that had to be improved since the COVID-19 pandemic (Belzunegui-Eraso & Erro-Garcés, 2020).

Agudo Moreno (2014) suggests that of the different elements that influence telework, those that contribute most to its effectiveness are organisational factors related to work culture, collaborative strategies, flexible management and the level of qualification of the worker. Organisational support is shared by Baker et al. (2006) as one of the main factors for the success of telework, such as supervisory support strategies, training in technology-mediated tasks and financial support for the completion of tasks. However, they also highlight as a main factor the concern about the use of technology, not only as a communication tool, but also as a cultural aspect that defines and/or restricts worker's sociability.

Together with the aspects mentioned above, consideration should be given to the level of competences of the teleworker and those that enable him/her to take advantage of the potential of this type of work, such as personal values and attributes for proactivity, self-regulation and ethical conduct, among others (Osio, 2010). In addition to these, it is necessary to consider the mastery of technological skills, both of devices (*hardware*) and applications and other *software*, communication skills and self-management of work (Osio, 2010).

In relation to these person-dependent aspects, the level of satisfaction with the telework modality can be included (Gutiérrez-Diez et al., 2018), since *engagement* and flexibility are fundamental for workers, especially younger ones, to generate efficiency in their work performance.

Another factor relevant to the success of home-based telework is its impact on the balance between familiy and work obligations. Although facilitating work-family conciliation is reported as one of the advantages of telework, evidence on its impact is ambivalent, as there would be other aspects moderating the relationship between work-family balance and telework effectiveness (Solis, 2017). Zhang et al. (2020) mention that variables such as marital status, presence of children or roles assumed at home have been little studied in their influence on the effectiveness or satisfaction of teleworking from home. In the same sense, another little studied element is the biological sex, since the experiences and needs of men and women in their family-work balance and how they adopt telework is different (Adisa et al., 2021; Baquero Aguilar, 2020).

Other understudied factors are those related to the availability of adequate equipment, including furniture when working from home .Although ergonomic aspects have traditionally been considered in this area, they apply to the work environment and not the home, so many home-based teleworkers do not have the knowledge and ergonomically optimal equipment for teleworking (Davis et al., 2020) and have not considered the effects this lack of proper equipment may have on their health and work performance (Reznik et al., 2022).

Some studies point out that the massification of teleworking from home as a compulsory modality due to the health emergencyhas provoked situations of stress and wear and tear of marital or parental relationships for some people, due to the difficulty of achieving a balance between family and work, making desirable to return to their traditional work setting (Palumbo, 2020; Zhang et al., 2020).

Added to this is the scarcity of policies and protocols to regulate the way in which civil servants telework, the hours allocated to it and the times allocated for workers to be away from their devices. The regulations are too broad and almost non-existent, often remaining in the hands of the management (Vergara Rojas, 2020).

The aim of this study was to assess the internal validity of the Conditions for Home Teleworking questionnaire, its reliability and invariance by gender, in order to have a reliable means for the study of home teleworking.

Method

Design

The study had an instrumental research design, focused on the analysis of psychometric characteristics based on empirical data (Montero & León, 2005).

Participants

The original participants in the study were 1333 civil servants from public entities in Chile: 85% were women, while 14% were men; 1% stated that they did not identify with gender categories. The age of the participants ranged from 30 to 65 years, with the largest age group being 30 to 45 years (49.3%), followed by 29 years or younger (31.9%) and 46 to 59 years (17.1%). Only 1.7% reported being 60 years of age or older.

The type of sampling used was by convenience. These participants were summoned to their workplaces (public institutions) through their managers, based on the criterion of availability. The sample included professionals, administrative and technical staff working in public health, education and social development institutions in three cities in the Maule region of Chile.

For the development of the analyses, 168 individuals were identified as presenting inadequate response patterns, in some cases, responding randomly with the same answer in the entire scale, or with partial answers, leaving answers unanswered; these represented 12.6% of the total, which were removed from the database to avoid random incidence in the analyses, leaving 1165 participants in the final sample for analysis. These atypical scores generate errors in the descriptive analyses, so it was necessary to eliminate them.

Family and work characteristics (relevant due to the nature of the dimensions of the instrument) indicate that 38% of the sample were single, 35% were married, 20% were in a steady relationship (other than marriage), 6% were divorced without a stable partner and 1% were widowed. In terms of family responsibilities, a significant proportion of the sample (53%) reported being responsible for school-age children, without having support to supervise them outside the home. A 41.7% reported living with family members suffering from chronic illnesses (diabetes, asthma or diseases affecting the immune system) that made them particularly susceptible to developing a severe case of COVID-19 if exposed to the virus, or with pregnant women; 16.3% reported living with an elderly relative.

In relation to working conditions, they were employed under different contractual regimes: the majority (72.5%) had a contractual regime (annual contract with the State that runs from January to December), 20.5% had a permanent contract (permanent staff) and 7% worked on a fee basis.

This final sample was divided into two groups, 582 subjects for an initial exploratory factor analysis (EFA) and 583 for a confirmatory factor analysis (CFA), the distribution being randomised.

Instrument

The Conditions for Teleworking at Home questionnaire was designed and constructed by the research team on the basis of theoretical considerations derived from the specialised literature. As mentioned above, the literature review did not report any scales in Spanish measuring variables such as the ones that are the focus of this study. Theoretical dimensions and items were selected from this literature, but contextualised according to the experience of workers in the Chilean public system. They were drawn from the analysis of approaches by various authors (Agudo Moreno, 2014; Baker, 2006; Zhang et al., 2020). The instrument, therefore, seeks to measure the perception of telework and the associated environmental, family and work factors.

From the theoretical review, five dimensions have been proposed for the instrument, specified as: Organisational Support, which describes situations of organisational support for telework tasks, both material and managerial (e.g. when I need professional advice on an issue in my job, I have someone to turn to); Satisfaction with the Telework Modality, which describes situations of personal satisfaction with the telework tasks (e.g. I feel that it has benefited me). When I need professional advice on a work-related issue I have someone to turn to); Satisfaction with the Telework Modality, which describes situations of personal satisfaction with the telework tasks (e.g. I feel that this telework modality has been beneficial for me as a civil servant); Work-Family Conciliation, oriented to measure the impact of family domestic tasks on telework and vice versa (e.g. I can organise my time well between telework tasks and work in the home). I can organise well the time between telework tasks and my family); Technological Management Support, which describes situations of knowledge and support in technological elements necessary for telework (e.g. I have sufficient technological conditions to perform my work); and, finally, Home Environmental Factors, related to elements of space, infrastructure and privacy (e.g. I have a noise-controlled space to perform my telework tasks).

A theoretical proposal of items was made for each dimension, which was then subjected to a factor analysis to determine the factorial organisation of the instrument. Originally the test had 40 items, which were evaluated by expert judgement. Content validity was based on the analysis of seven academics in the field of psychology with experience in organisational development, who responded based on indicators of relevance, clarity and coherence of the items, finding an adequate coincidence index (Kappa of 0.6 to 0.8) in the indicators. Four items were eliminated from this evaluation because of poor concordance due to their readability. The proposal has 36 items and their responses are organised on a Likert-type scale, ranging from *Not at all agree* (value 1) to *Strongly agree* (value 5).

This version was piloted with 10 academics from the fields of education and social sciences at a Chilean public university to analyse the readability and clarity of the items. No linguistic or comprehension difficulties requiring item modification were reported from this pilot application.

It is worth mentioning that during the application it was found that item 23 had an error in the wording and was therefore removed from the analysis, so that the final instrument only considered 35 questions.

Procedure

The research project was reviewed and approved by the ethics committee of the Health Service of the Maule region, prior to data collection.

The instrument incorporates written informed consent, in which participants were informed of the objectives of the research, as well as the voluntary character of participation, as well as the measures taken to comply with the non-maleficence principle in scientific research and to guarantee the anonymity of the data collected.

Participants responded to the instrument at their workplace or home, as it was available in an *online* format, accessed via email. The application took place between December 2020 and May 2021.

Data Analysis

Descriptive statistical techniques were used to analyse the distribution and dispersion of the values of the variables, applying measures of central tendency (arithmetic mean), dispersion (standard deviation) and distribution (skewness and kurtosis with Fisher's F). In addition, a corrected item-test analysis was applied to see the relationship between the scores of each question with the total score, to analyse the reliability of the instrument, through Cronbach's alpha (α), and in a complementary way, through Omega (ω).

An exploratory factor analysis (EFA) was conducted to identify probable dimensions and patterns, and then a confirmatory factor analysis (CFA) was applied to assess the factor structure of the construct. Within the factor analysis analyses, we first assessed whether the statistical conditions for the analysis were met by applying the KMO statistic and Bartlett's test of sphericity. The Goodness of Fit Index (GFI) and the Standardised Root Mean Square Residual (SRMR) were used as measures of adequacy in the AFE. Polychoric correlation matrices were used according to the nature of the variables, which are ordinal (Domínguez Lara et al., 2014), regarding the optimal number of components to extract in the analysis. PROMIN rotation was also applied, in accordance with the suggestion of Ferrando Piera and Lorenzo Seva (2014), for the analysis of the configuration of the items in the factors.

On the other hand, the unweighted least squares estimation method was considered in the CFA. As goodness-of-fit indicators,χ^2, the Goodness-of-Fit Index (GFI) and the Adjusted Jöreskog Goodness-of-Fit Index (AGFI), the Root Mean Squared Error of Approximation (RMSEA), the Standardised Root Mean Residual (SRMR) and the Bentler-Bonett Comparative Fit Index (CFI) were selected. The adequate values considered for the indicators were:χ^2 (<.05), GFI and AGFI (> ,90), RMSEA (<.07), SRMR (<.05) and CFI (>.95), these values are considered adequate according to Salgado (2009) and Flores et al. (2017).

In addition, the weighted least squares estimation method (DWLS) was applied for the analysis of the items corresponding to the most relevant factor model, because the multivariate normality criterion was not met (Lloret-Segura et al., 2014), in addition to the fact that the items are measured on an ordinal scale. In addition, the Composite Reliability index and the Extracted Variance index were used to analyse the adequacy of the items to the factors. Finally, Pearson's correlation was applied to analyse the relationship between the factors and items derived from the CFA.

Finally, a gender invariance analysis was applied, due to the disparity in the number of male and female participants. For this purpose, CFAs were carried out for each group, estimating the change withχ^2, evaluating the configurational, metric and scalar invariance. Configurational invariance is the most elementary form of invariance and the basic model of analysis in any equivalence study, whose objective is to verify that the constructs have the same pattern of free and fixed loadings; metric invariance allows the comparison between factorial variances and regressor slopes, establishing the fact that each element contributes to the construct in the groups in a similar way. Finally, scalar invariance indicates that, when comparing construct or latent factor means, their difference captures such a difference considering the common variability of the items. In addition, the differences between groups (sex) in each of the factors are analysed by means of Student's t-tests.

For these analyses, SPSS 22 software was used to carry out the analysis and selection of elements for each sub-sample and the general statistics; FACTOR for the AFE and RStudio for the AFC and the invariance analysis.

Results

Regarding the descriptive analysis, it is observed that the complete instrument obtained in this sample a total mean of 131 points (SD = 27.2) in the questionnaire, with a range between 35 and 175 points. The overall internal consistency obtained was $\alpha = 0.962$ and $\omega = 0.964$ for the complete questionnaire.

Then, analysing item by item, the descriptive statistics are shown. Table 1 shows that items scored on average between 2.5 and 4.4. There were disparate behaviours in terms of distribution, with 15 items falling within ranges of skewness and kurtosis, within ±1; and 18 items between 1 and 1.5 or between -1 and -1.5, which would be adequate to ensure a moderately normalised distribution (Tabachnick & Fidell, 2007).

With regard to the corrected item-test correlations, no items were recorded with values lower than 0.2, so none had to be removed for this reason, and the analyses were carried out with all 35 items.

The AFE shows that the determinant of the correlation matrix is 0.000000000000681, while the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) obtained a value of 0.974, both values considered to be very good (Hair et al., 1999). Additionally, Bartlett's test of sphericity also presented an adequate result for the questionnaire,χ^2 (528, n = 1165) = 15973.6, $p < 0.001$, indicating sufficient intercorrelation of the items, consistent with the application of factor analysis to the sample data. These values indicate that the basic assumptions of the proposed analysis are met.

Regarding the indicators of factor extraction, according to the Kaiser criterion (Hair et al., 1999), which considers the magnitudes of the highest eigenvalues associated with the correlation matrix, the existence of between four and five factors is suggested, indicating 73.03% and 75.75% of the explained variance, respectively. PFAs were performed by extracting one- to five-factor solutions. The values of the one-factor solution are considerably less advantageous than the two- to five-factor solutions, so this solution was left out of the analysis.

Table 1
Item Descriptive Data

Item	*M*	*DE*	Asymmetry	Kurtosis	Correlation item-test corrected
Item 1	3,57	1,15	-0,499	-0,502	0,641
Item 2	3,36	1,18	-0,244	-0,793	0,549
Item 3	4,16	1,15	-1,290	0,736	0,605
Item 4	4,19	1,10	-1,350	1,020	0,686
Item 5	4,06	1,09	-1,170	0,809	0,671
Item 6	4,02	1,21	-1,070	0,077	0,669
Item 7	3,61	1,22	-0,456	-0,788	0,693
Item 8	3,53	1,27	-0,418	-0,968	0,612
Item 9	3,85	1,15	-0,806	-0,100	0,652
Item 10	4,01	1,07	-1,050	0,622	0,719
Item 11	2,69	1,32	0,280	-1,050	0,354
Item 12	3,38	1,32	-0,337	-1,020	0,622
Item 13	3,48	1,21	-0,309	-0,873	0,656
Item 14	4,17	1,06	-1,330	1,190	0,696
Item 15	4,38	1,01	-1,790	2,640	0,659
Item 16	3,90	1,19	-0,918	-0,028	0,716
Item 17	4,18	0,99	-1,290	1,410	0,716
Item 18	3,49	1,36	-0,448	-1,040	0,626
Item 19	4,17	1,10	-1,240	0,667	0,681
Item 20	4,16	1,11	-1,320	0,975	0,701
Item 21	3,87	1,19	-0,864	-0,116	0,700
Item 22	3,91	1,07	-0,827	0,095	0,748
Item 24	3,05	1,35	-0,002	-1,170	0,526
Item 25	3,71	1,24	-0,685	-0,472	0,653
Item 26	3,81	1,20	-0,923	0,054	0,594
Item 27	3,62	1,27	-0,631	-0,593	0,654
Item 28	4,06	1,17	-1,200	0,587	0,696
Item 29	2,50	1,39	-1,110	-1,060	0,317
Item 30	3,59	1,20	-0,551	-0,511	0,705
Item 31	3,84	1,12	-0,914	0,253	0,752
Item 32	4,17	1,10	-1,340	1,090	0,744
Item 33	4,38	0,96	-1,760	2,910	0,727
Item 34	3,45	1,28	-0,342	-0,970	0,520
Item 35	4,05	1,10	-1,140	0,705	0,681
Item 36	3,03	1,30	-0,028	-1,080	0,506
TOTAL	131,00	27,20	---	---	---

For the AFE, the goodness-of-fit indicators (GFI and SRMR) are presented in table 2, where the factor solutions obtained are shown with their respective goodness-of-fits, which progressively increase until they reach a maximum point. These results suggest that the five-factor structure is the most appropriate for this sample, since it presents better goodness-of-fit values.

Table 2
Goodness-of-Fit Indicators for Exploratory Factor Analysis

N° factors	GFI	SRMR
1	0,986	0,0710
2	0,992	0,0533
3	0,996	0,0382
4	0,998	0,0268
5	0,999	0,0218

The item loading analysis shows the final distribution conceptually described below, where three items (5, 15 and 33) were eliminated, given their low factor loadings and the fact that they targeted characteristics covered by the other items.

First Factor: composed of items 3, 4, 9, 10, 14, 17, 20, 21, 26, 28, 31, 32 and 35, the factor loadings fluctuate between 0.725 and 0.912, generating an explained variance between 53% and 83%. According to the original structure of the scale, these are the same items of the Organisational Supports dimension, except for 15 and 33, which were excluded because they did not present a clear relationship with the dimensions, as well as high distribution values (≥ 1.5 or -1.5).

Second Factor: composed of items 6, 12, 18 and 24, it registered factor loadings between 0.785 and 0.934 with an explained variance between 62% and 87%. According to the original structure of the scale, it coincides with the dimension Home Environmental Factors.

Third Factor: composed of items 25, 27 and 30, with loadings between 0.897 and 0.955, giving an explained variance between 80% and 91%. With respect to the original structure, it coincides with the Satisfaction with the Telework Modality dimension, except for item 5, which was discarded because it did not load completely on this factor.

Fourth Factor: made up of items 11, 29, 34 and 36. It obtained factor loadings between 0.485 and 0.799, with an explained variance between 24% and 64%. Items 11 and 29 had the lowest weights of all the items in the model. According to the original scale, it coincides with the dimension Support for Technological Management.

Fifth Factor: the last factor included items 1, 2, 7, 8, 13, 16, 19 and 22. It had factor weights between 0.689 and 0.892 with variance explanatory magnitudes between 47% and 80%. As for the original structure, it coincides with the Work-Family Reconciliation dimension.

On the other hand, CFA was performed on the basis of models of one to five factors, according to the initial theoretical proposal endorsed by the EFA. As shown in Table 3, the values obtained indicate that the five-factor model presents a very adequate goodness-of-fit index.

Table 3
Goodness of Fit Indicators for Confirmatory Factor Analysis

Model	χ^2	*gl*	χ^2 /*gl*	IFC	GFI	AGFI	RMSEA	SRMR
5 factors	1400,7	454	3,09	0,996	0,994	0,992	0,052	0,047

Table 4 shows the reliabilities and variances extracted for the five-factor factor structure, showing that all factors have a composite reliability index above 0.7 and, with the exception of Factor 4, all are above 0.91. With respect to the variance extracted, they are all above 0.69, with the exception of Factor 4, where it is 0.423.

Table 4
Composite Reliabilities and Extracted Variances

Model	Factor	Items of which it is composed	Index of composite reliability	Index of variance extracted
5 factors	F1	3/4/9/10/14/17/20/21/26/28/31/32/35	0,967	0,696
	F2	6/12/18/24	0,915	0,731
	F3	25/27/30	0,943	0,847
	F4	11/29/34/36	0,741	0,423
	F5	1/2/7/8/13/16/19/22	0,945	0,686

Regarding the relationships between the factors, it can be seen in Table 5 that the correlations between the factors are significant at 1% and have magnitudes greater than 0.60, which would indicate a close link between the factors that make up this construct.

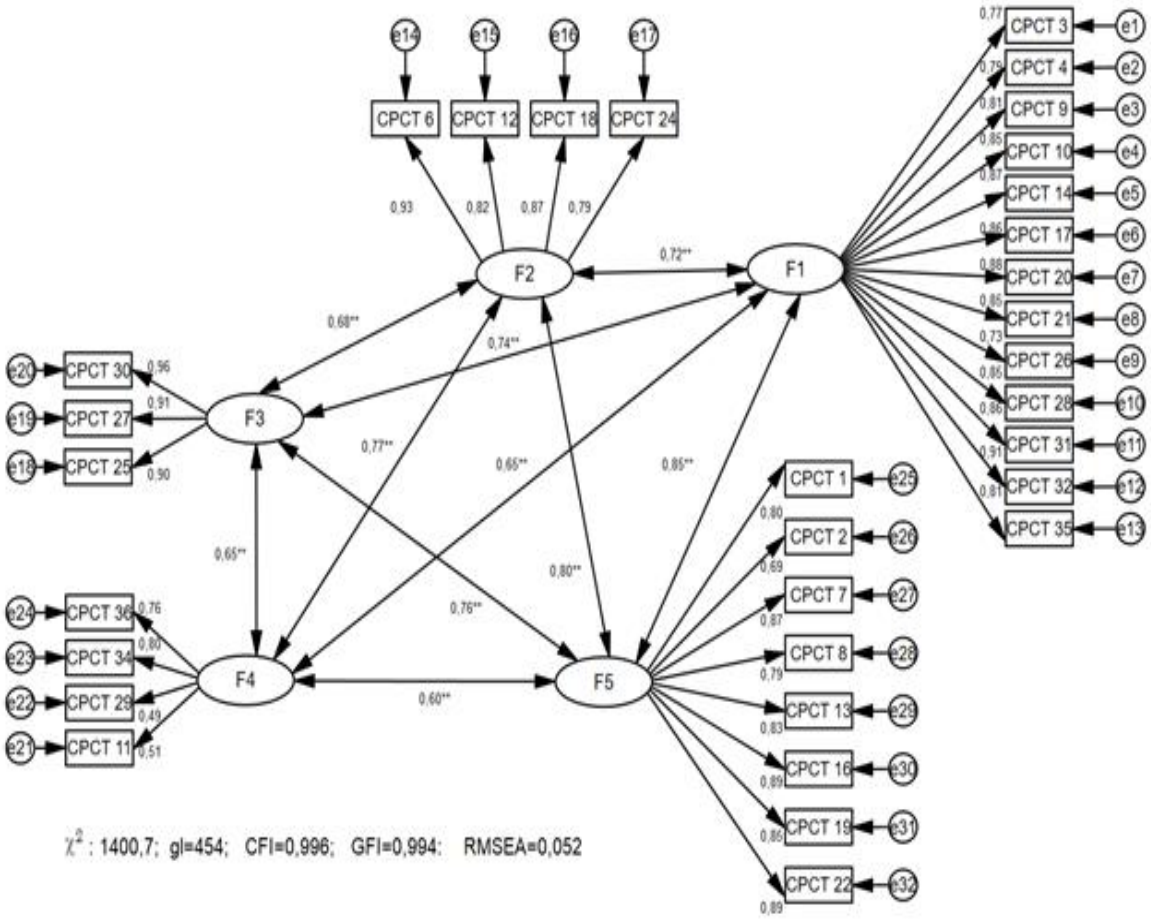
Table 5
Correlations between the Dimensions Obtained

Model	Factor	F1	F2	F3	F4	F5
5 factors	F1	1,00				
	F2	0,72	1,00			
	F3	0,74	0,68	1,00		
	F4	0,65	0,77	0,65	1,00	
	F5	0,85	0,80	0,76	0,60	1,00

$p < 0{,}001$

Finally, Figure 1 shows the factorial distribution and correlations of dimensions and items in a graph of the construct.

Figure 1
CFA Diagram with Five Factor Model



Note. The values in each arrow correspond to the factor loadings showing the correlation between the factors and the observed variables (with p=0.05 * and p=0.01**).

Thus, the final questionnaire consisted of 32 items and five factors (Table 6), showing very good fit values and high consistency indices. This confirms the theoretical proposal initially generated, strengthening its validity.

Table 6
Dimensions and Items of the Instrument

Factor	Quantity of items
Organisational support	13
Household environmental factors	4
Satisfaction with teleworking	3
Support for technology management	4
Work-family conciliation	8

Regarding the analysis of invariance by sex, the results obtained are as follows: the analysis of measurement invariance between males and females (Table 7) reported that the configurational invariance meets the goodness-of-fit indices as in the specification of the factors, indicating that the number of latent variables is appropriate. Then, for the metric invariance, the result indicates that the difference inχ^2 is statistically significant ($p < 0.001$), suggesting that, after restricting the factor loadings to be equal between males and females, the fit of the model would change substantially; however, according to the complementary indices indicated in the table, it would be similarly good as in the configurational case. Next, scalar invariance was assessed, and comparing with the previous step, the result indicates that the difference inχ^2 is statistically significant ($p < 0.001$). This suggests that, after restricting factor loadings and intercepts to be all equal by gender, the model fit changes substantially, modifying the structure and its values (leaving ΔCFI = 0.058, ΔRMSEA = 0.174 and ΔSRMR = 0.083).

Table 7
Invariance Analysis Results (Men vs. Women)

Type of invariance	χ^2	*gl*	$\Delta\chi^2$	IFC	ΔCFI	SRMR	RMSEA	95% CI of RMSEA
Configurational	1708,16	908	-	0,997		0,052	0,055	[0,051, 0,059]
Metric	2202,05	935	493,89	0,995	0,002	0,058	0,068	[0,064, 0,072]
Climb	17355,99	966	15153,94	0,937	0,058	0,141	0,242	[0,239, 0,245]

The results obtained show that there are differences between sexes in the means of the items, that cannot be explained by the properties of the scale, but only by sex. Finally, it is observed that in the comparisons of means between men and women, most of the dimensions show significant differences according to sex, except for the Technological Support Factors.

Table 8
Difference in Means between Men and Women on the Questionnaire Factors

Factor	Man			Woman			*t*	*p*	*d*	95% CI
	M	*DE*	*gl*	*M*	*DE*	*Gl*				
Organisational support	3,49	0,73	1163	4,19	0,93	1163	8,481	0,001	0,87	[0,540; 0,867]
Household environmental factors	3,24	1,26	1163	3,53	1,04	1163	3,045	0,001	0,27	[0,102; 0,476]
Satisfaction with teleworking	3,17	1,25	1163	3,85	0,94	1163	7,336	0,001	0,68	[0,497; 0,863]
Support for technology management	2,97	1,08	1163	2,90	0,91	1163	-0,827	0,401	0,07	[-0,228; 0,093]
Work-family reconciliation	3,21	1,07	1163	3,77	0,86	1163	6,938	0,001	0,62	[0,399; 0,715]

Discussion

From the data found, it can be concluded that the proposed objective has been fully achieved. The Conditions for Home-based Teleworking instrument has high internal consistency and good goodness-of-fit indicators; it also has five factors incorporating organisational, personal, family and household aspects, making it a relevant and consistent questionnaire for measuring conditions for home-based teleworking.

It is considered that this study contributes positively to the area of research, since it has been found that there are few validated instruments with known psychometric properties, most of them being surveys or *checklists* (Daenen et al., 2022; International Labour Organization, 2020; Monroe & Haug, 2022; Morgan, 2004; Ward & Shabha, 2001). It is considered relevant to have an instrument that allows the evaluation of the conditions for telework in public employees, given that, in Chile at least, the entry into force of the Supreme Decree 18/2020 of the Ministry of Labour and Social Security, which recognises the telework modality, incorporates a scope of evaluation of conditions of this work modality, but only based on a self-assessment (Complements the instructions of Circular No. 3.532, 2020).

Similarly, existing instruments mostly consider organisational elements (resource management and policies), occupational health, individual characteristics and social interaction processes at work, while very few take into account family and domestic factors (International Labour Organization, 2020), which are important for assuming a positive or negative attitude and assessment towards home-based telework (Filardi et al., 2020; Nguyen, 2021).

It is observed that the Organisational Supports factor presents good indicators of internal consistency. This relevantbecause telework inescapably requires to have a support system for tasks, collaborative strategies, communication channels and clear rules (Agudo Moreno, 2014; Baker et al., 2006; Belzunegui-Eraso & Erro-Garcés, 2020).

A second crucial factor with good internal consistency indicators is the Work-Family Balance factor, which focuses on analysing the balance achieved by the individual between work activities and household roles. There is a strong correlation between the achievement of work-family balance and organisational support, which would reaffirm the idea that those who have achieved an adequate work-family relationship can take better advantage of the working conditions and norms required for successful teleworking from home (Nguyen, 2021; Solis, 2017). This is an important dimension to assess in teleworking conditions, especially for those working from home; this is more often the case for women, so it is essential from a gender perspective.

The factors Satisfaction towards Telework and Home Environment Conditions also show good internal consistency indices, although somewhat lower compared to the previous factors, which could indicate greater variability in their perception. Teleworker satisfaction is a factor considered relevant by some studies (Nakrošienė et al., 2019; Ngamkroeckjoti et al., 2022); however, many telework experiences have been guided more by organisational policies than by workers' choice, which relativises their impact (Osio, 2010). Similarly, while the importance of home environment and conditions for successful telework has been documented (Cuerdo-Vilches et al., 2021; Nakrošienė et al., 2019), this factor has not always been considered in studies analysing the elements involved in telework.

On the other hand, there is a high correlation between the Work-Family Balance factor and the Home and Environmental Conditions factor, which emphasises the need to adapt the home environment to achieve such a balance in order to be able to perform adequately in work and home tasks, especially when teleworking by women. This issue, however, is the least researched (Adisa et al., 2021) and there is a lack of reflection on how much adjustment to the work environment needs to be achieved in home-based teleworking and how much of this adjustment is the responsibility of the individual and how much of it is the responsibility of the organisation (Caamaño Rojo, 2010; Carillo et al., 2021).

This aspect is one of the most complex in the recent situation of forced or compulsory teleworking due to the COVID-19 pandemic, as many institutions (and many teleworkerstoo) were not able to balance the processes of performance and goal control with family schedules and family dynamics (Liebermann et al., 2021), not yet being able to generate adequate legal regulations to regulate this situation (Marica, 2018).

The analysis of invariance by sex shows differences in the results of men and women, a situation that could be explained, in superficial terms, by the marked difference between the number of men and women participants; however, as it is evident that the differences are not found in the configurational and metric invariance, it is considered that there could be another reason for the variability of the results, which could be related to the nature of the dimensions measured by the instrument, which are sensitive to cultural variables associated with sex (Adisa et al, 2021; Baquero Aguilar, 2020; Nguyen & Armoogum, 2021; Zhang et al., 2020). This should lead to the development of differentiated scales for men and women, considering that there could be a different valuation of the situations presented according to gender; that is, the situation would be valued in a similar way, but with a different intensity depending on the role occupied.

The verification of these relationships opens up an important opportunity for the future study of the determinants of work-family balance (or tension) in telework conditions and its implications for issues such as gender equality and the perception of equal treatment by organisations of their employees.

Conclusions

The contribution of this study is to have a reliable instrument with adequate internal validity, which allows to establish some important factors for the evaluation of teleworking from home; thus, it is considered that the objective proposed above has been achieved. One of the strengths of this instrument is to have achieved adequate indicators of fit in the overall model, maintaining the structure of five factors proposed from the theory, which consider organisational, family and personal management areas, being a broader proposal than that found in other instruments (Palumbo, 2020; Vergara-Rojas, 2020).

It is considered crucial to have a questionnaire to assess aspects of the person, family, work and technology, which have been identified as the main components that affect successful telework performance (Belzunegui-Eraso & Erro-Garcés, 2020). Similarly, the interest in studying the aforementioned variables in civil servants lies in the early implementation of a novel work modality that was inevitable in the face of the unforeseen scenario of the health crisis (Palominos, 2020).

On the other hand, it can be pointed out that the instrument is a contribution to this new modality, given that the different institutions in the country had to adapt quickly to the use of ICTs so that civil servants could carry out their work from home. With its application, it is possible to evaluate not only the infrastructure necessary to have decent working conditions at home, but also the capacities that officials have when handling the technological tools to do so, as well as the interaction with the family and personal environment and the support from their organisation in general.

Although in many cases the conditions of job insecurity, overload of demands and lack of time associated with this modality of work are maintained, with the identification of these factors, progress can be made in the development of better experiences and regulations for the development of teleworking from home. Recent research indicates that both women and men perceive home-based telework as equally important, but men are more likely to ignore these tasks, delegating responsibility to their female partners (Collins et al., 2020).

The limitations of the study are related to the variability of the sample, since it responds to a limited geographical area, which, in addition, was by availability and not random, and, therefore, an over-representation of women over men was observed. In addition, aspects of personality, mental health and legal regulations that may affect the development of telework and which have been reported as relevant elements for the implementation of telework, in view of the health emergency situation due to COVID-19 (Belzunegui-Eraso & Erro-Garcés, 2020; Reznik et al., 2022), were not incorporated. It also remains to make further progress in the validation of the instrument, both convergent and discriminant, in order to provide the questionnaire with greater statistical support, which has been hampered by the scarcity of instruments measuring the factors reported.

The differences found in the analysis of invariance by sex have generated an aspect that should be deepened, since it is still necessary to advance in the development of differentiated scales according to sex, given the results observed, since, beyond the different number of male and female participants, there seems to be a diversity of assessments regarding some situations of telework, especially considering the socio-cultural weight of family roles.

Regarding the technical advantages, it is possible to mention the ease of dissemination of the instrument, since fortunately the participants had an adequate internet connection and technological skills to answer the questionnaire, which allowed the correct completion of the questionnaire, despite the conditions of confinement and the distance of the participants.

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