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RESEARCH ARTICLE

Leading from afar: Development and validation of the leadership competencies for telework scale

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Abstract
The shift to telework and hybrid arrangements has prompted organizations to reevaluate leadership competencies specific to remote environments. Therefore, we developed the Leadership Competencies for Telework (LCT) scale, designed for telework settings and addressing new challenges such as telework-life balance and virtual distance. The validation process included two studies: (1) Two content validity panels with 27 experts, and (2) validation of the 67-item scale through a survey of 543 Spanish teleworkers. Confirmatory factor analysis supported a five-factor structure: Digital Communication, Digital Trust-Building, Remote Goal Management, Remote Relationships Development, and Telework-Life Balance Support. The scale demonstrated high reliability ($\alpha < 0.90$ for all factors) and validity, correlating with key outcomes such as job satisfaction, professional isolation, telework-life conflict, and organizational citizenship behaviors. The LCT scale provides organizations with a validated tool for assessing and developing effective telework leadership. Future research could validate the scale through longitudinal studies, exploring its predictive power over time.

Keywords: competencies; hybrid work; leadership; leadership scale; telework

Introduction

Telework and hybrid modalities have gone from a measure of flexibility to a new way of configuring organizations worldwide (Moens, Lippens, Sterkens, Weytjens & Baert, 2021). According to the World Economic Forum (2023), 20.5% of global companies have indicated that offering more remote and hybrid work opportunities is part of their short-term strategies. In Europe, although the percentage of teleworkers decreased in 2023 compared to pandemic levels, it remains higher than in the pre-pandemic era (Eurostat, 2024). Thus, these changes imply several challenges for workplaces and, consequently, for leadership.

Leadership in telework plays a crucial role in supporting workers and maintaining their well-being during remote work (Peiró, Bravo-Duarte, González-Anta & Todolí-Signes, 2024). Additionally, their role is essential in remote goal management, where granting autonomy and providing direct support is crucial for ensuring teleworkers' performance (Bravo-Duarte, Tordera & Rodríguez, 2025a) and helping the team by offering tools to transition to this new arrangement (Bartsch, Weber, Büttgen & Huber, 2021). Moreover, leadership is crucial in promoting positive attitudes toward including people from different cultures and locations (Lauring & Jonasson, 2018) and supporting workers' work-life balance through remote work modalities (Anakpo, Nqwayibana & Mishi, 2023).

Nevertheless, several emerging challenges must be addressed. First, leaders must navigate a permanent continuum between telework and on-site work, which adds an extra burden to their responsibilities (Vartiainen & Vanharanta, 2024). In this scenario, leaders must ensure sustainable working conditions, prevent employee overload, and help them manage job demands within the context of limited face-to-face interactions (Hoch & Kozlowski, 2014; Lautsch & Kossek, 2011; Watson, 2007).

Second, research has emphasized the importance of developing strategies to help employees establish and maintain clear boundaries between work and personal life, particularly in high-intensity telework environments (Bell, McAlpine & Hill, 2023). This represents an additional challenge for leaders in promoting work-life balance within their teams in a remote setting (Bravo-Duarte, Tordera & Rodríguez, 2025b; Lundqvist & Wallo, 2023).

Third, in this new context, managers are responsible for equipping teams with appropriate technological infrastructure (i.e., media and digital tools) and knowledge to enhance work system adaptability and maintain high levels of performance (Bartsch et al, 2021; Bravo-Duarte et al, 2025a).

Fourth, leaders must provide both emotional and instrumental support for successful teleworking. Emotional support involves acknowledging personal issues that can make teleworking challenging and fostering autonomy, enabling employees to handle difficult situations independently (Bartsch et al, 2021). Instrumental support encompasses providing technical assistance and facilitating organizational connections through digital media (Bartsch et al, 2021; Bravo-Duarte et al, 2025a).

Fifth, the physical interaction space is replaced, at least in part, by a remote environment that requires leaders to consider the virtual distance between team members. According to Lojeski and Reilly (2020), virtual distance refers to the sense of detachment that individuals experience when they primarily use technology to communicate with others rather than engaging in face-to-face interactions. It can be specified as operational distance (e.g., lack of coordination), affinity distance (e.g., lack of personal interactions), and identity distance (e.g., lack of sense of belonging). Identity distance is especially significant in telework, as it becomes harder for workers to feel included and connected to their organization and teams (Lojeski & Reilly, 2020).

To face these challenges, leaders must acquire what Peiró and Martínez-Tur (2022) refer to as digitalized competencies: (re)learn how to manage misunderstandings, establish work-life boundaries, unify dispersed teams, and cultivate trust and engagement without in-person contact. It also requires leaders to know how to communicate effectively, develop a shared understanding of goals and tasks, collaborate, foster social cohesion, and coordinate work using available technologies, while overcoming the social challenges that arise (Bell et al, 2023; Bravo-Duarte et al, 2025a; Kozlowski, Chao & Van Fossen, 2021).

Consequently, a critical aspect for organizations is measuring the extent to which leaders have developed or need to develop these competencies, for which new models and instruments have been developed.

One of the most spread models is *e-leadership*, developed by Avolio, Walumbwa, and Weber (2009), who define it as 'a social influence process embedded in both proximal and distal contexts mediated by AIT [advanced information technology] that can produce a change in attitudes, feelings, thinking, behavior, and performance' (p.107). Roman et al (2018) created a scale to assess *e-leadership* based on this model. However, it is important to distinguish between the leaders' usage of information technology and the actual management of teleworking. The use of technology for communication does not necessarily equate to effective leadership in telework or hybrid work arrangements, as digital tools can also be implemented in in-office settings.

Another example is the *virtual leadership* model, which focuses primarily on leading virtual teams, examining the impact of transformational and transactional leadership as the main theoretical frameworks (Gilson, Maynard, Young, Vartiainen & Hakonen, 2014). In this context, Batırlık, Gençer and Akküçük (2022) developed the Virtual Team Leadership scale, which measures managerial qualities, interactivity, human relations, personal traits, rewards, and flexibility of leaders in remote work

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environments. However, this model is designed for team-level analysis, which makes it difficult to measure individual issues accurately. Additionally, it does not address behaviors aimed at reducing social and identity distance, such as promoting team identity and preventing worker isolation (Lojeski & Reilly, 2020). Furthermore, virtual team leadership can differ significantly from leadership in telework arrangements, where employees may follow hybrid work schedules that alternate between working from home and at the organization (Nakrošienė, Bučiūnienė & Goštautaitė, 2019; Vartiainen & Vanharanta, 2024). The model also does not address work-life balance issues, which have become increasingly relevant due to the blurred boundaries between work and personal life in these new arrangements (Bell et al, 2023).

Traditional leadership models have also been employed to measure leadership in remote work or telework settings, such as transformational leadership (e.g., Meiryani et al, 2022; Tautz, Felfe, Klebe & Krick, 2024) or servant leadership (e.g., Lamprinou, Tasoulis & Kravariti, 2021). Although these models may also offer useful frameworks for addressing leadership in telework, they neither capture the context sensitivity nor consider the communication media used for interactions, representing a significant change in leader-employee dynamics (Contreras, Baykal & Abid, 2020). Furthermore, they do not address specific aspects of teleworking and the challenges presented by digital transformation in work contexts (Bauwens & Cortellazzo, 2024). For example, these models overlook critical behaviors related to media selection (particularly in hybrid arrangements) and trust-building through digital media (especially in full telework settings) (Allen, Golden & Shockley, 2015; Bell et al, 2023; Bravo-Duarte et al, 2025a; Peiró & Martínez-Tur, 2022). Moreover, they do not consider leaders' behaviors related to reducing the identity distance created by telework (Lojeski & Reilly, 2020) or capture the behaviors necessary to address work-family conflict issues that arise when employees work remotely (Bell et al, 2023), as previously mentioned.

Consequently, existing leadership models fail to comprehensively address the range of behaviors essential for effective leadership in telework environments. This limitation extends beyond merely adapting existing leadership models to remote contexts; leadership required in telework environments involves mastering digitalized competencies that differ substantially from traditional face-to-face leadership (Peiró & Martínez-Tur, 2022; Peiró, 2024). These digitalized competencies emerge through integrating psychosocial skills with actions required in digital contexts and interactions with digital devices (Peiró & Martínez-Tur, 2022; Peiró, 2024). Furthermore, telework necessitates a complete reconfiguration of work processes, communication patterns, and management approaches (Contreras et al, 2020). This reconfiguration demands a fundamental shift in how leadership competencies are conceptualized in digital environments, necessitating a new expanded framework for measuring leadership in telework. This expanded framework should also address the fundamental behaviors that enhance teleworkers' well-being and performance, particularly considering the novel challenges and organizational dynamics that have emerged in the post-pandemic era (Bell et al, 2023).

Considering the limitations of existing models and the need for a more comprehensive instrument, we have developed the Leadership Competencies for Telework (LCT) scale.

This scale comprehensively assesses leadership competencies for telework, defined as the group of core behaviors leaders must exhibit in remote contexts to facilitate high levels of well-being and performance among their workers. This scale also offers a framework to measure and train digitalized leadership competencies in response to this new context.

The development of the LCT scale departs from three previous qualitative studies, which provided the initial model and items: two systematic reviews identifying leadership competencies that favor teleworkers' performance (Bravo-Duarte et al, 2025a) and well-being (Bravo-Duarte et al, 2025b), and a study focused on interviews and focus groups with teleworkers, leaders, and HR managers from various sectors, including digital marketing, sales platforms, publishing, technology, consulting, and government (Puentes, Lorente & Peiró, 2022). Based on these sources, we created a set of behaviors theoretically grouped into five competencies that emerged as critical factors for effective telework leadership (see Table 1).

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Table 1. LCT scale factor definitions

Factor	Description	Item example
Digital communication	Leaders' ability to elaborate and transmit messages through digital media, generate spaces for active listening, and reduce the virtual distance with the work team. It involves establishing interaction principles, planning meetings, managing synchronous and asynchronous media, and performing bidirectional feedback with the team.	'*[The leader] knows how to choose the appropriate communication media for the type of message being conveyed.*'
Digital trust-building	Leaders' ability to generate an environment of psychological safety through technology, i.e., a context in which leaders know that teleworkers will do their work and these, in turn, know that they will receive support from their leader. It implies promoting reliability (that what is said is fulfilled), generating spaces of psychological security, and demonstrating professional competence.	*'[The leader] treats people equally, regardless of geographic distance or mode of work.'*
Remote goal management	Leaders' ability to adapt task planning and follow-up to favor teleworkers' autonomy. This involves promoting self-management and fulfilling commitments, providing structural support, and sharing leadership responsibilities. It also implies creating a structure for teleworking, following up on objectives and tasks, and promoting team autonomy.	*'[The leader] uses the appropriate digital tools to organize work in the team.'*
Remote relationships development	Leaders' ability to foster team spirit through virtual means, unifying the efforts of all individuals towards a shared objective and generating high-quality interactions, will increasingly strengthen the team's cohesion and identity. It involves strengthening mutual support, social cohesion, and team identity using available technologies.	*'[The leader] reinforces the importance of cooperation within the team in virtual meetings.'*
Telework-life balance support	Leaders' ability to identify emotional support needs and generate conditions of balance between telework and personal life, considering individual needs and the demands of these areas. It also involves being aware of the importance of his/her behavior as a model of conciliation for the team. It implies showing empathy, favoring balanced conditions, and modeling (serving as an example for) work disconnection behaviors.	*'[The leader] structures the work of the remote team in a way that facilitates work-life balance.'*

Following the development of the LCT scale, this current research focuses on its validation through a process organized into two distinct studies. The first study involves content validation through assessment by academic experts and human resources professionals, providing evidence of construct validity. The second study consists of applying the final version of the instrument to a Spanish sample

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of teleworkers and examining its psychometric properties (construct, convergent, divergent, and concurrent validity). In this second study, we examined the LCT scales' convergent and divergent validity by comparing it with another leadership measure: Leader–Member Exchange (LMX). LMX has been shown to correlate with worker performance in both traditional (Scandura & Graen, 1984) and telework settings (Gajendran & Joshi, 2012; Golden & Veiga, 2008; Kuruzovich, Paczkowski, Golden, Goodarzi & Venkatesh, 2021). This relationship stems from leader behaviors, including decision-making involvement, open communication, support of member actions, and member reciprocity, as well as increased availability and commitment from members (Scandura & Graen, 1984). However, telework leadership encompasses behaviors beyond the general exchange relationship, such as facilitating work-life balance and promoting media usage. Moreover, in hybrid contexts, certain aspects of LMX may differ from those in traditional in-office settings (Gajendran & Joshi, 2012), particularly in terms of leader communication patterns and member availability. Consequently, the LCT scale is anticipated to demonstrate measurable differences from traditional LMX scales. Thus, we used LMX to test the convergent validity (expected relationships) and divergent validity (distinct measurements) of our LCT scale.

Moreover, we tested whether our scale effectively correlates with variables associated with the well-being and performance of teleworkers, thereby assessing its criterion validity. We examined the association of our scale with well-being outcomes, including positive and negative emotions at work and job satisfaction, which have been identified as key areas of study in well-being within telework contexts (Dahlstrom, 2013). Moreover, given that professional isolation is a variable highly influenced by telework (Bell et al, 2023; Bentley et al, 2016), we also examined whether leadership competencies are negatively correlated with this variable. Additionally, as we have observed that one of the greatest challenges is work-life conflict in a telework context (Allen et al, 2015; Bell et al, 2023; Delanoeije, Verbruggen & Germeys, 2019), we also examined the association between our scale and this construct. In the performance case, we investigated the association between our scale and an extra-role performance variable, organizational citizenship behavior (OCB). It has been observed that telework affects OCB by reducing opportunities for interaction among individuals (Gajendran & Harrison, 2007). This can be counteracted by leader actions that promote these behaviors. Therefore, we wanted to determine whether our LCT scale effectively correlates to OCB in this context.

In sum, the present research aims to validate a scale that measures the leadership competencies that positively impact the well-being and performance of teleworkers. By doing so, we intend to advance the field by addressing the new challenges and needs of remote work arrangements, such as reducing virtual distance and coping with work-family issues, while providing a valuable tool for organizations and researchers to assess and develop effective leadership practices in telework contexts, ultimately contributing to the performance and quality of life of this type of workers.

As stated before, we will describe the process through two studies: the first focuses on the item creation process and content validation by experts, while the second examines the reliability analysis, and the construct, convergent, divergent, and concurrent validity of the LCT scale.

Study 1: LCT scale content validity

This initial study focuses on the content validation phase, which is critical to establishing the initial scale for measurement. It comprises two validation panels, which will be described in the following sections.

Method

Sample

A total of 27 experts participated in the study, which included two validation panels. The first panel consisted of eight experts in leadership and the digitalization of Spanish universities, who were recruited from the research institute network. The second panel consisted of 19 practitioners and

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academics, also recruited from the research institute network. The practitioners were senior HR professionals with proven experience in implementing telework in their companies, while the academics were professors researching HR and/or leadership.

Procedure

For this content validation process, we executed two expert panels to ensure that the items created for each dimension were theoretically adequate and relevant to the measured construct (Leadership for Telework).

The first panel was asked to classify the 88 initial items that composed the first version of the LCT scale into one of the five defined factors and evaluate the adequacy of each item to the chosen factor. We assessed the level of agreement according to Howard and Melloy (2016) guidelines, which have been demonstrated to improve previous methods for item sort tasks (Anderson & Gerbing, 1991). This approach is statistically accurate and provides robust criteria for determining item-factor agreement in scale development. With a sample of eight experts, six is the minimum number of attributions necessary to consider that an item statistically belongs to a specific dimension. This adequation index ranges from 1 to 5, and a score greater than 2.5 is considered adequate.

Then, we conducted a second expert panel, in which the experts were asked first to evaluate the relevance of each item and, secondly, the clarity of each one. Both indexes were asked on a scale of 1 to 4, and a score greater than three is considered adequate.

Results

In this first panel, three items were eliminated due to their low adequation to the factor (score below 2.5), and three items were added based on experts' recommendations, maintaining the same final number of items (88).

In the second panel, 21 non-relevant items (scores less than 3) were removed from the final scale. Three items considered relevant (score above 3 in relevance) but unclear (score below 3 in clarity) were revised based on the experts' suggestions. First, the item '(The leader) establishes mechanisms to communicate with him/her in exceptional or emergency situations.' was reworded to '(The leader) agrees with the team on how they should communicate in exceptional circumstances.' Second, the item '(The leader) shows the team, in virtual and visible media, that it does what he/she says' was reworded to '(The leader) shows the team that their own commitments are fulfilled.' Third, the item '(The leader) makes visible the competence of people to do their work' was reworded to '(The leader) highlights the capabilities of each member of the team.'

Based on the results, 67 items were selected and constituted the LCT scale (see Table 2), which is validated in the next study.

Table 2. Final selection of translated items and content validity results

Item	English translation	Adequation index – First step (1 to 5)	Relevance index – Second step (1 to 4)	Clarity index – Second step (1 to 4)
DComm1	Knows how to choose the appropriate communication media for the type of message being conveyed	4.30	3.53	3.35
DComm2	Ensures that the quantity of information received by the team is neither excessive nor insufficient	4.40	3.53	3.41

(*Continued*)

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Table 2. (*Continued.*)

Item	English translation	Adequation index – First step (1 to 5)	Relevance index – Second step (1 to 4)	Clarity index – Second step (1 to 4)
DComm3	Agrees with the team on how they should communicate in exceptional circumstances	4.13	3.21	3.53
DComm4	Ensures that new team members are aware of the digital media being used	Created after 1st step	3.68	3.82
DComm5	Ensures that new team members are aware of the digital media being used	4.30	3.26	3.71
DComm6	Plans group meetings to facilitate communication within the group	3.70	3.58	3.94
DComm7	Shows a good use of non-verbal communication in the digital context (e.g., use of emoticons, gesticulation in front of the camera, tone of voice)	4.00	3.53	3.29
DComm8	Promotes listening and respect each other's turns to speak in virtual meetings	Created after 1st step	3.26	3.94
DComm9	Ensures active participation in virtual meetings	4.00	3.53	3.94
DComm10	Makes sure to document and share whatever is agreed in important meetings and conversations	3.40	3.26	3.47
DComm11	Plans feedback opportunities using the most appropriate method of communication	4.60	3.58	3.65
DComm12	Generates opportunities to receive feedback from the team	4.50	3.58	3.65
DComm13	Agrees with the team on the principles for giving and receiving constructive feedback	4.60	3.37	3.76
DComm14	Ensures that all team members can provide feedback	4.10	3.26	3.65
DTrust1	Promotes that people fulfill the commitments made with the team	3.90	3.53	2.71
DTrust2	Shows the team that their own commitments are fulfilled	4.00	3.63	3.18
DTrust3	If he/she is unable to fulfill a commitment, gives sufficient warning	4.30	3.58	3.71
DTrust4	Treats people equally, regardless of geographic distance or mode of work	3.60	3.68	3.65
DTrust5	Uses methods of communication that allow confidentiality when dealing with delicate subjects or sensitive information	4.00	3.74	3.71
DTrust6	Shows honesty to the group (e.g., by acknowledging when they don't know something or when a mistake is made)	4.30	3.74	3.47
DTrust7	Promotes a climate in which everyone feels free to express their own points of view	4.40	3.79	3.71
DTrust8	Generates sufficient trust for disagreements or conflicts to be voiced	4.10	3.68	3.65
DTrust9	Establishes digital mechanisms so that people can ask for help if needed	3.90	3.58	3.82

(*Continued*)

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Table 2. (*Continued.*)

Item	English translation	Adequation index – First step (1 to 5)	Relevance index – Second step (1 to 4)	Clarity index – Second step (1 to 4)
DTrust10	Has a level of competence at work that generates trust in the team	4.50	3.00	2.94
DTrust11	Highlights the capabilities of each member of the team	3.90	3.00	2.71
DTrust12	Shows competence in the use of digital tools	3.60	3.16	3.88
DTrust13	Ensures that people are competent in the use of digital tools	2.90	3.61	3.41
RGoals1	Uses the appropriate digital tools to organize work in the team	4.30	3.63	3.65
RGoals2	Plans work to reduce interruptions and multitasking	4.00	3.42	3.59
RGoals3	Ensures a simple and clear virtual work management system	3.80	3.53	3.47
RGoals4	Checks, through digital tools, that the objectives and roles of each team member are clear to everyone	4.30	4.00	3.76
RGoals5	Uses digital tools to track the accomplishment of objectives and tasks	4.60	3.89	3.65
RGoals6	Regularly monitors the team's work using digital media	4.00	3.68	3.76
RGoals7	Ensures that people have the necessary equipment for remote work	4.40	4.00	3.88
RGoals8	Ensures that people have the software and documentation needed	4.40	3.74	3.65
RGoals9	Detects difficulties that may affect remote work in advance	4.00	3.58	3.76
RGoals10	Facilitates work that requires high concentration to be carried out without interruptions	4.00	3.32	3.88
RGoals11	Agrees on work objectives that facilitate autonomy in remote working	4.90	3.74	3.82
RGoals12	Facilitates that people organize and manage their time when working remotely	4.80	3.47	3.71
RGoals13	Facilitates people's autonomy to make decisions at work	3.30	3.28	3.31
RRelations1	Reinforces the importance of cooperation within the team in virtual meetings	3.80	3.63	3.65
RRelations2	Organizes virtual activities to develop cooperation and support among team members	3.80	3.68	3.82
RRelations3	Makes sure that no one in the remote team is isolated	4.50	3.79	3.65
RRelations4	Facilitates the integration of new members through virtual welcome activities	4.60	3.84	3.94
RRelations5	Facilitates opportunities for interaction that recreate face-to-face situations (e.g., virtual cafes, online games)	4.80	3.47	3.82

(*Continued*)

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Table 2. (*Continued.*)

Item	English translation	Adequation index – First step (1 to 5)	Relevance index – Second step (1 to 4)	Clarity index – Second step (1 to 4)
RRelations6	Plans virtual social events so that team members can get to know each other's more human and personal sides	4.60	3.37	3.59
RRelations7	Helps people to identify aspects they have in common with their teammates	4.50	3.68	3.53
RRelations8	Performs actions, through digital media, to reinforce team membership	4.40	3.74	3.65
RRelations9	Performs actions, through digital media, to reinforce belonging to the organization	4.30	3.68	3.65
RRelations10	Celebrates group achievements using available media	4.40	3.63	3.71
RRelations11	Reinforces the shared values of the team using virtual media	3.80	3.42	3.59
RRelations12	Ensures that people are aware of how each person's work	3.30	3.47	3.24
RRelations13	Facilitates virtual interaction with other teams to foster a sense of organizational belonging	4.60	3.16	3.65
TWLBalance1	Builds trust so that personal issues can be dealt with virtually	4.10	3.47	3.59
TWLBalance2	Shows interest in people´s needs in the context of remote working	3.50	3.79	3.59
TWLBalance3	Stimulates empathy between team members in a virtual context	3.90	3.26	3.59
TWLBalance4	Demonstrates concern for people's emotional state in digital interactions	4.30	3.68	3.65
TWLBalance5	Ensures that the team is aware of the resources available to deal with emotional problems	4.00	3.58	3.65
TWLBalance6	Shows people in their team that they can understand their personal situations	4.30	3.89	3.82
TWLBalance7	Looks for alternatives, together with the team members, to resolve work-life conflicts	4.50	3.58	3.41
TWLBalance8	Shows conciliation behaviors between his/her personal life and teleworking	Created after 1st step	3.74	3.47
TWLBalance9	Considers work-life balance needs in work planning	5.00	3.84	3.82
TWLBalance10	Ensures that team members can access the organization's work-life balance practice	4.80	3.63	3.76
TWLBalance11	Structures the work of the remote team in a way that facilitates work-life balance	4.10	3.89	3.76
TWLBalance12	Agrees with the team rules for work disconnection	4.90	3.89	3.88

(*Continued*)

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Table 2. (*Continued.*)

Item	English translation	Adequation index – First step (1 to 5)	Relevance index – Second step (1 to 4)	Clarity index – Second step (1 to 4)
TWLBalance13	Exemplifies, through their daily actions, respect for work disconnection	4.80	3.79	3.88
TWLBalance14	Respects times when the team is disconnected from work	4.60	4.00	3.94

Note. DComm = Digital Communication, DTrust = Digital Trust-Building, RGoals = Remote Goals Management, RRelations = Remote Relationships Development, TWLBalance = Telework-life Balance Support.

Study 2: LCT scale validity and reliability

This second study examines the reliability and validity of the LCT Scale within a Spanish sample. First, the results of the Confirmatory Factor Analysis (CFA) are presented, followed by reliability analysis, convergent and divergent validity analysis, and finally, concurrent analysis examining the relationships between the LCT scale and positive and negative emotions at work, job satisfaction, professional isolation, telework-life conflict, and OCB outcomes.

Method

Sample

The participants were 543 Spanish workers who met the following criteria: (a) working remotely for at least 12 h per week (equivalent to 30% or more of a standard 40-h workweek), (b) having a full-time or part-time employment contract with an organization, and (c) having a direct supervisor. We considered Spanish teleworkers as they represent a significant case in Europe's remote work landscape, particularly following the early implementation of comprehensive telework regulations (Gobierno de España, 2021). Additionally, this population was particularly suitable for our study as the measurement scale was developed and validated in Spanish, ensuring linguistic and cultural appropriateness for the target population.

The sample consisted of 50.5% women and 49.5% men, with a mean age of 40.3 years (SD = 9.65). A total of 89.7% work full-time and 10.3% part-time. Regarding organizational tenure, 47.9% had worked in their current organization for more than five years, 41.6% for between 1 and 5 years, and 10.5% for less than one year. The organizations represented in the sample operate across various sectors: IT (19.9%), industrial (11.8%), finance (10.1%), public administration (9.0%), consultancy (8.5%), marketing (8.1%), education (7.0%), health (4.4%), tourism (3.2%), and others (18.0%).

Regarding educational level, most participants held a university degree (52.1%), followed by those with a bachelor's or technical degree (22.7%), and postgraduate qualifications such as master's or doctorate degrees (21.7%). A smaller proportion reported secondary education (3.1%) or elementary education (0.4%) as their highest educational level.

Related to telework patterns, participants were distributed across different remote work intensities: less than 50% of working hours (47.1%), between 50% and 69% (25.0%), between 70% and 89% (12.7%), and 90% or more (15.1%). In terms of weekly frequency during the 3 months prior to data collection, 41.1% worked remotely for an average of 2 days per week, 21.1% worked 3 days, and 37.8% worked 4 or more days remotely.

Procedure

The data collection employed a cross-sectional design, utilizing an online survey platform. Participants were recruited through random sampling from a professional panel company, and the survey targeted teleworkers from all regions of Spain. Before beginning the survey, participants

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provided informed consent through a checkbox form and were assured that their responses would be treated confidentially. The survey was conducted in December 2022.

Measures

LCT: The measurement was based on the 67-item scale that resulted from Study One. It employs a 5-point Likert response scale, with options ranging from 1 (completely disagree) to 5 (completely agree). The factors and their descriptions are presented in Table 1, while the items related to each factor are outlined in Table 2.

LMX: Measured using the Spanish version of Scandura and Graen's (1984) seven-item scale. Respondents indicated their agreement with statements about their supervisor on a 4-point Likert scale. An example item is 'To what extent do you feel your supervisor recognizes your potential?' The scale showed adequate internal consistency (Cronbach's $\alpha = 0.89$; Cortina, 1993).

Positive and negative emotions at work: Assessed using Warr's (1990) six-item scale (Spanish translation), comprising two factors: positive emotions ('cheerful,' 'optimistic,' 'lively') and negative emotions ('tense,' 'nervous,' 'anxious'). Respondents rated their work-related feelings over the past week on a 5-point scale from 1 (Nothing) to 5 (Much). Internal consistency was strong for both positive (Cronbach's $\alpha = .89$) and negative emotions (Cronbach's $\alpha = 0.91$).

Job Satisfaction: Measured using Bravo, García, Peiró and Prieto (1993) five-item Spanish scale. Respondents rated their satisfaction with various job aspects on a 5-point scale from 1 (Very dissatisfied) to 5 (Very satisfied). A sample item is 'Overall, how satisfied are you with your job?' The scale demonstrated adequate reliability (Cronbach's $\alpha = 0.80$).

Professional isolation: Assessed using Golden, Veiga and Dino (2008) seven-item scale, translated to Spanish through back-translation by two native English-spoken members of our research team. Respondents indicated their agreement with statements on a 5-point scale from 1 (Completely disagree) to 5 (Completely agree). A sample item is 'I miss the face-to-face contact with my co-workers.' The translated scale showed adequate reliability (Cronbach's $\alpha = 0.80$).

Telework-life conflict: Measured using the six-item dimension from Charalampous, Grant and Tramontano (2023) revised E-work Life scale, also back-translated to Spanish by our research team. Respondents rated their agreement with telework situations on a 5-point scale from 1 (Completely disagree) to 5 (Completely agree), with higher scores indicating greater conflict. A sample item is 'When e-working remotely I do often think about work-related problems outside of my normal working hours.' The translated scale demonstrated good reliability (Cronbach's $\alpha = 0.86$).

OCB: Assessed using Henderson, Foster, Matthews and Zickar (2020) six-item revised scale, which was also back-translated into Spanish by our research team. Respondents indicated the frequency of specific workplace behaviors over the past month on a 5-point scale from 1 (Never) to 5 (Always). A sample item is '*I took a personal interest in other employees*.' The scale showed good reliability (Cronbach's $\alpha = 0.86$).

Data analysis

To ensure the reliability and validity of the LCT scale, we conducted a series of statistical tests, including confirmatory factor analysis (CFA), internal consistency evaluation, convergent validity, discriminant validity, and criterion validity testing.

Before conducting the study, Harmans' single-factor test was conducted to assess the potential presence of common method bias, including all items from the study. The results indicated that the first factor explained 35.76% of the total variance, while 14 factors with eigenvalues greater than one were identified, accounting for a cumulative 64.48% of the total variance. Since the first factor did not account for most of the variance (less than 50%), we can conclude that common method bias does not significantly threaten the validity of the results according to Podsakoff, MacKenzie, Lee and Podsakoff (2003). Therefore, the rest of the study could proceed.

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First, to assess the construct validity of our scale, it is important to note that research has consistently shown that leadership constructs often emerge as a second-order factor, as leadership scales typically capture various facets of a leaders' overall competency profile (Mumford, Zaccaro, Connelly & Marks, 2000). This hierarchical structure occurs because different leadership dimensions share common variance represented by a higher-order factor (Avolio, Bass & Jung, 1999). Based on this theoretical framework and previous validation studies (Carless, 1998), we hypothesized that different leadership competencies would serve as indicators of general leadership competence in telework contexts. To test this, and according to Anderson and Gerbing (1988), we conducted a confirmatory factor analysis (CFA) comparing three models: (a) an unidimensional model with all the LCT items, (b) a five-factor uncorrelated model, and (c) a second-order model with telework leadership as the underlying factor. Following established guidelines for CFA indexes interpretation (Brown, 2015), model fit was evaluated using X^2, CFI–TLI (adequate fit > 0.90), and RMSEA (adequate fit < 0.08).

Moreover, we assessed the internal consistency of the factors using Cronbach's alpha and composite reliability (CR) coefficients, with values above 0.70 considered sufficient (Cortina, 1993).

To test the convergent validity, we examined the correlation between LMX overall scores and our LCT scale overall score, where correlations between 0.50 and 0.80 indicate adequate convergent validity (Brown, 2015). To test the discriminant validity, we followed Anderson and Gerbing (1988) recommendations by comparing a one-factor model with a two-factor model using CFA. The one-factor model treated LMX and LCT as a single factor, whereas the other treated them as separate factors. Fit indexes such as X^2, CFI, TLI, and RMSEA were compared. The model treating them as separate factors should demonstrate better fit indices, supporting discriminant validity (Brown, 2015).

Finally, we tested criterion validity using hierarchical multiple regression analysis. In the first step, demographic variables (gender, age, education, organizational tenure) and the percentage of telework were entered as control variables. In the second step, the overall LCT scale score was added as a predictor of well-being measures (positive/negative emotions, job satisfaction, professional isolation, and work-life conflict) and extra-role performance (OCB).

Regarding data analysis software, we used IBM AMOS 28 for confirmatory factor analysis due to its robust structural equation modeling. Jamovi software (The Jamovi Project, 2022) was selected for reliability and validity testing due to its ability to efficiently handle complex regression analyses.

Results

Descriptive analysis

The descriptive statistics for the LCT scale and its factors (see Table 3) show all mean scores above the midpoint of 3, indicating generally favorable evaluations. The highest mean was observed for Remote Goal Management ($M = 3.97$, $SD = 0.70$), potentially reflecting the heightened emphasis on goal-setting and monitoring in telework environments. In contrast, Remote Relationships Development had the lowest mean ($M = 3.78$, $SD = 0.81$), suggesting potential challenges in fostering interpersonal connections in remote settings. Skewness values were consistently negative (-0.96 to -1.18), suggesting a tendency toward higher scale scores, while positive kurtosis values (0.99 to 1.98) indicate responses clustered closer to the upper range of the scale. These patterns suggest participants generally provided favorable ratings. Standard deviations (0.70 to 0.81) indicated moderate response variability across factors, with Remote Relationships Development showing the highest variability ($SD = 0.81$).

Confirmatory factor analysis

The confirmatory factor analysis (CFA) compared three models: (1) an unidimensional model with all items, (2) a five-factor model with uncorrelated factors, and (3) a model treating telework leadership as a second-order factor. The unidimensional model showed inadequate fit ($X^2 = 4812$, CFI $= 0.891$,

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TLI = 0.888, RMSEA = 0.048), falling below the recommended thresholds (Brown, 2015). In contrast, the five-factor model demonstrated adequate fit (X^2 = 4412, CFI = 0.907, TLI = 0.904, RMSEA = 0.044). Nevertheless, the second-order factor model demonstrated an even better fit (X^2 = 3470, CFI = 0.972, TLI = 0.971, RMSEA = 0.034). These results support the factor validity of the LCT scale, supporting the conceptualization of telework leadership as a higher-order construct comprising five distinct but related competencies. Factor loadings ranged from 0.65 to 0.89, exceeding the recommended threshold of 0.50 (Brown, 2015), further supporting the scales' factorial validity. The model with standardized factor loadings per item and factor is shown in Figure 1.

LCT scale reliability analysis

The LCT scale demonstrated high reliability, with Cronbach's alpha values of 0.98 for the overall scale and above 0.90 for all factors: Digital Communication (α = 0.94), Digital Trust-Building (α = 0.93), Remote Goals Management (α = 0.92), Remote Relationships Development (α = 0.93), and Telework-life Balance Support (α = 0.94). CR coefficients were identical to Cronbach's alpha for each factor, providing additional evidence of strong internal consistency among indicators within each factor.

Convergent and discriminant validity

Convergent validity was supported by a moderate positive correlation between the LCT scale and the LMX scale (r = 0.62; $P < 0.01$), which falls within the recommended range of 0.50 to 0.85 (Brown, 2015). For discriminant validity, a one-factor model combining LCT and LMX (X^2 = 6358, CFI = 0.861, TLI = 0.857, RMSEA = 0.051) showed a worse fit than a two-factor model treating them as distinct constructs (X^2 = 5511, CFI = 0.893, TLI = 0.889, RMSEA = 0.045). These results confirm that LCT and LMX measure distinct but related leadership constructs.

Criterion validity

The LCT scale demonstrated significant relationships with all the theoretically relevant outcomes (see Table 4). It showed the strongest correlations with job satisfaction and positive emotions, the lowest with organizational citizenship behavior (OCB), and significant negative correlations with negative emotions, professional isolation, and telework-life conflict. Although some control variables exhibited significant relationships, the variance explained in step 1 was not significant (R^2 ranging from 0.01 to 0.03). The substantial increase in explained variance after adding the LCT scale (ΔR^2 ranging from 0.06 to 0.32, $p < 0.001$) provides strong support for the criterion validity of the LCT scale.

Discussion

The present study aimed to validate a scale that measures the leadership competencies that positively impact the well-being and performance of teleworkers.

The LCT scale demonstrated reliability and validity across multiple dimensions, including content validity, internal consistency, and structural validity through CFA, supporting its use in the Spanish population.

The five-factor structure of the LCT scale is particularly significant as it captures both traditional leadership dimensions (i.e., relationship development and trust) related to existing leadership measures such as transformational leadership and LMX. Nevertheless, it encompasses competencies uniquely suited to telework, such as telework-life balance support (Bell et al, 2023; Lundqvist & Wallo, 2023), as well as specific behaviors, including digital media promotion and facilitation (Bartsch et al, 2021; Bravo-Duarte et al., 2025a). It aligns with previous models on e-leadership or digital leadership; however, it offers an alternative to them when practitioners or researchers want to focus on key competencies for managing virtual distance in telework and hybrid arrangements.

Additionally, the emergence of telework leadership as a second-order factor suggests that effective remote leadership necessitates a holistic integration of multiple competencies, rather than isolated

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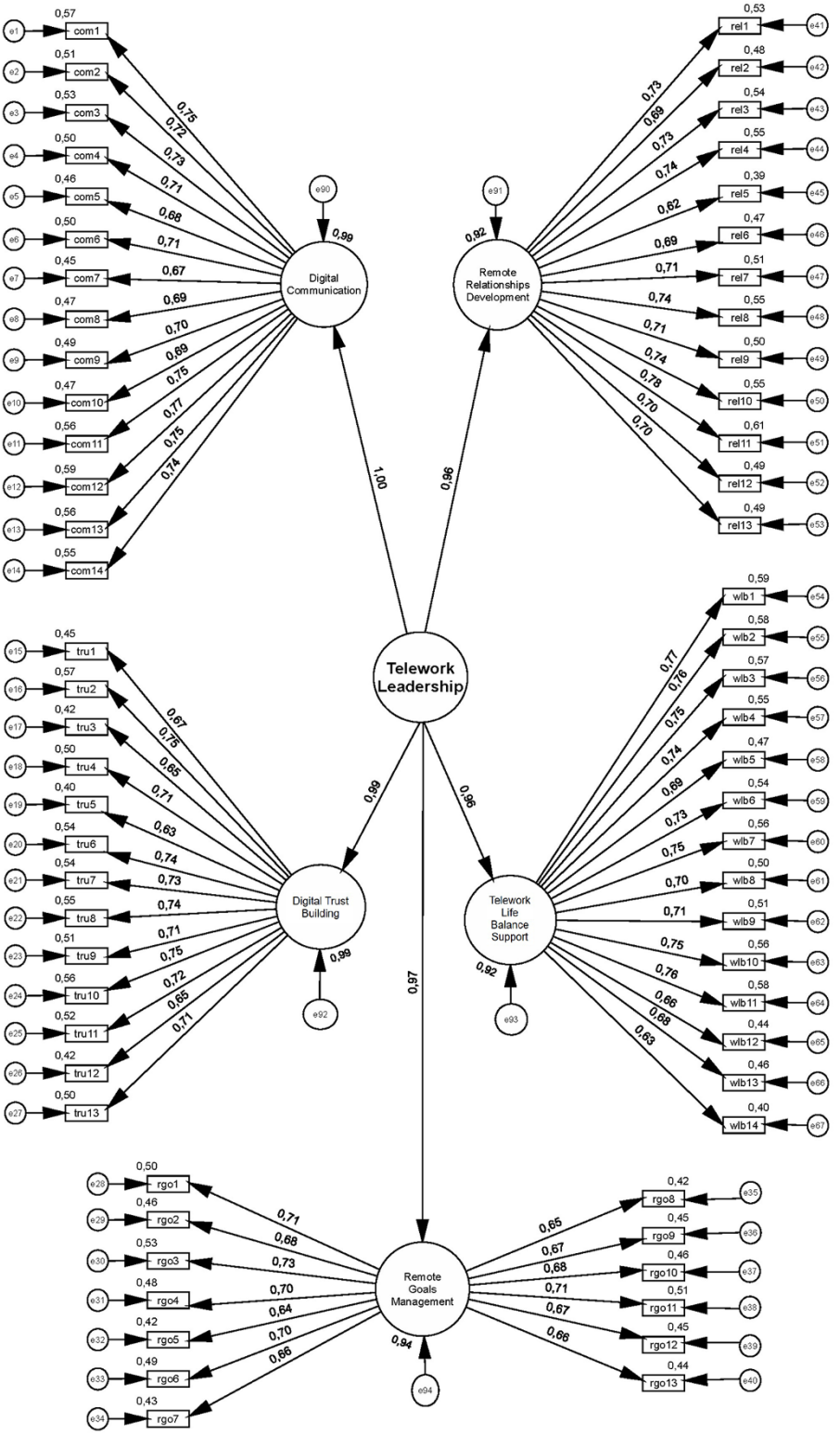

Figure 1. LCT scale model with standardized factor loadings per item.

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Table 3. Descriptive statistics for LCT scale

	LCT (overall)	Digital communication	Digital trust-building	Remote goals management	Remote relationships development	Telework-life balance support
N	543	543	543	543	543	543
Mean	3.89	3.92	3.96	3.97	3.78	3.84
Median	3.97	4.00	4.08	4.00	3.92	4.00
SD	0.72	0.75	0.74	0.70	0.81	0.80
Asymmetry	−1.06	−1.18	−1.07	−1.05	−0.97	−0.96
Kurtosis	1.56	1.98	1.49	1.68	1.14	0.99

Table 4. Multiple regressions for well-being and extra-role performance outcomes for LCT scale

	Positive emotions at work	Negative emotions at work	Job satisfaction	Professional isolation	Telework-life conflict	OCB
Step 1						
Constant	1.75*** (0.31)	4.01 (0.40)	1.44*** (0.26)	4.30*** (0.37)	4.49*** (0.38)	2.25*** (0.26)
Gender	−0.11 (0.07)	0.11 (0.08)	−0.02 (0.05)	−0.32*** (0.08)	−0.21** (0.08)	−0.04 (0.06)
Age	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.01** (0.01)	0.00 (0.00)
Education	−0.06 (0.04)	0.01 (0.05)	0.01 (0.04)	0.02 (0.05)	0.05 (0.05)	0.00 (0.04)
Organizational tenure	−0.01 (0.05)	−0.10 (0.07)	0.10* (0.04)	−0.07 (0.06)	0.03 (0.06)	0.11** (0.05)
Telework (%)	−.07* (0.03)	0.09 (0.04)	−0.03 (0.02)	0.04 (0.04)	−0.05 (0.04)	−0.03 (0.03)
R^2	0.03	0.02	0.01	0.03	0.02	0.01
Step 2						
LCT scale	0.53*** (0.04)	−0.40*** (0.06)	0.61*** (0.04)	−0.34*** (0.05)	−0.32*** (0.06)	0.31*** (0.04)
R^2	0.26	0.10	0.33	0.09	0.08	0.11
ΔR^2	0.27***	0.08***	0.32***	0.07***	0.06***	0.10***

N = 543. *Unstandardized regression coefficients are reported. Standard errors are reported in parentheses. Step 1 coefficients belong to the final model (including the LCT scale). Gender: 0 = male 1 = female. Education: 1 = Elementary; 2 = High school; 3 = Technical or college; 4 = Bachelors' degree; 5 = Masters' degree or above; % of telework: 1 = 30–49%; 2 = 50–69%; 3 = 70–89%; 4 = 90–100%. Organizational tenure: 1 = < 1 year; 2 = 1–5 years; 3 = > 5 years. *P < 0.05 (two-tailed); **P < 0.01 (two-tailed); *** P < 0.001 (two-tailed).*

skills, thereby contributing to a deeper theoretical understanding of leadership complexity in digital contexts. This also aligns with established leadership measurement models (Avolio et al, 1999; Carless, 1998), as the CFA supported the five-factor structure with telework leadership as a second-order factor.

The results also support the convergent and discriminant validity of the LCT scale with LMX measures, aligning with theoretical expectations that effective telework leadership competencies should relate to quality LMXs (Graen & Uhl-Bien, 1995; Martin, Guillaume, Thomas, Lee & Epitropaki, 2016). However, it also supports the statement that telework leadership, while related to traditional leadership measures, captures unique aspects of remote management.

Furthermore, the results also support criterion validity, demonstrating positive and significant relationships with well-being indicators, including job satisfaction and positive emotions at work, as well as extra-role performance measures such as OCB. The scale also shows expected negative relationships with telework-life conflict and professional isolation. These results align with previous research on telework leadership (Bell et al, 2023; Cortellazzo, Bruni & Zampieri, 2019; Gohoungodji, N'Dri & Matos, 2022; Inceoglu, Thomas, Chu, Plans & Gerbasi, 2018; Kozlowski et al, 2021), which

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has shown that leadership plays a crucial role in employee well-being and performance. Our results further support that leadership is a key factor influencing well-being and performance in teleworking environments.

Theoretical implications

Our research contributes to the growing body of literature on telework and leadership by proposing a comprehensive framework for measuring leadership competencies tailored to the telework context. The LCT model extends existing leadership theories by proposing a set of digitalized competencies essential for telework management.

It also underscores the evolving demands of leadership in digitalized work environments and advances the understanding of leadership competencies adaptation to telework and hybrid work arrangements, challenging traditional conceptualizations that may not fully capture the specific behaviors of remote leadership. The transformation of non-digital traditional competencies into digitalized competencies has received limited explicit and independent attention beyond purely digital aspects (Peiró et al, 2024). By explicitly operationalizing how traditional leadership competencies transform when exercised in digital environments, our LCT scale addresses this significant theoretical gap.

Practical implications

Organizations can utilize the LCT scale in several ways. First, they could use the LCT scale during leadership training to identify gaps in digital competencies, thereby tailoring programs to better prepare leaders for managing remote teams; for example, guiding them to maintain a strong identification with the team, ensure job satisfaction in remote, prevent members isolation or dealing with new work-life issues. Moreover, it can be incorporated into assessment processes for leadership positions involving remote team management and evaluating leadership effectiveness in virtual environments.

Additionally, the scale is particularly relevant for addressing hybrid work challenges, as it helps organizations evaluate and develop leaders' abilities to balance remote and in-office dynamics (Bell et al, 2023), manage virtual distance, and maintain team cohesion across different work arrangements.

Therefore, organizations can rely on the LCT scale to benchmark their leadership development initiatives and systematically enhance their remote leadership capabilities, ultimately supporting the well-being and performance of teleworkers in an increasingly teleworking landscape.

Limitations and future research

Despite its contributions, this study has some limitations that future research could address. First, the cross-sectional nature of our data limits causal inferences about the relationships between leadership competencies and outcomes. Longitudinal studies would provide more substantial evidence for these relationships and help establish the scale's predictive validity over time (Hu & Bentler, 1999). Second, our reliance on self-reported measures may introduce common method bias. Future research should incorporate multi-source ratings, including objective performance indicators and peer assessments.

Third, it is important to consider that validating the LCT scale in a Spanish context provides unique insights into the cultural dimensions of telework leadership. Spanish organizational culture, characterized by their tendency to avoid autonomous leadership (Dickson, Hartog & Mitchelson, 2003), high levels of improvisation (Aram & Walochik, 1996), and reliance on strong interpersonal relationships (Zander, 2024), may influence how leadership competencies manifest in telework settings. This cultural context potentially shapes the interpretation and application of specific competencies, particularly those related to remote goal management and remote relationships management. For example, individualist cultures have generally embraced remote work more readily than collectivist cultures, where in-person collaboration and group cohesion are highly valued (Peters, Ligthart, Bardoel &

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Poutsma, 2016). Additionally, cultural attitudes toward power distance might also influence the effectiveness of telework leadership. For instance, high-power-distance cultures may face more significant challenges in transitioning leadership authority to virtual contexts, where traditional symbols of hierarchy are less visible (Peters et al, 2016; Raghuram & Dong, 2013). These cultural differences may affect how telework leadership competencies are prioritized and expressed. Therefore, the generalizability of our findings to other cultural contexts requires further investigation. Future research should validate the scale across different cultural contexts, particularly in countries with varying hierarchies and relationship-building approaches.

Additionally, industry-specific validation, especially in sectors heavily dependent on remote work (e.g., IT, education), would enhance the scale's practical utility. Moreover, given the global nature of telework (World Economic Forum, 2023), validating the scale in English and Portuguese will enable organizations in diverse cultural and linguistic contexts to leverage this tool for leadership development.

Conclusions

In conclusion, the LCT scale provides a robust, evidence-based tool for assessing the competencies required to lead in telework settings. Its validation in a Spanish sample underscores its reliability and validity, while its five-factor structure bridges traditional leadership competencies with the emerging demands of the digital workplace. Future research should focus on cross-cultural validation and longitudinal studies to deepen our understanding of its predictive power. As telework becomes an integral component of modern work, the LCT scale offers a timely contribution to both research and practice, equipping leaders to navigate the complexities of remote team management effectively.

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Competing interests. The author(s) declare no competing interests.

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