



## OPEN Psychometric properties of the perception of telework practices (PTP) scale: measuring advantages and drawbacks in the Lebanese context

Hala Sacre<sup>1</sup>, Chadia Haddad<sup>1,2,9</sup>✉, Maha Zakhour<sup>1,3</sup>, Joanne Karam<sup>1</sup>, Marwan Akel<sup>1</sup>, Sami El Khatib<sup>4,5</sup> & Pascale Salameh<sup>1,6,7,8</sup>

Telework, also known as remote work or telecommuting, has become increasingly prevalent in modern work environments, especially in response to global events such as the COVID-19 pandemic, reshaping traditional work practices and prompting questions about its impact on various aspects of work life, including the perceived advantages and drawbacks. This study aimed to develop and validate a scale that assesses the benefits and disadvantages of remote working. A web-based cross-sectional study was conducted between October 2022 and March 2023 using a self-report questionnaire. Snowball sampling enabled the enrollment of 230 participants aged 20 to 80, divided into three categories based on their employment type: face-to-face, telework, and hybrid. The exploratory factor analysis of the perception of telework practices total scale produced two subscales (subscales 1: Perceived Drawbacks and subscale 2: Perceived Advantages of Telework Practices). The advantages/drawbacks of telework were positively correlated with each other and with their own factors. A significant, weak, but positive correlation was found between telework drawback and advantage scores ( $r = 0.266$ ,  $p < 0.001$ ). Moreover, a positive correlation was also found between the E-Work Life (EWL) subscales and the Perceived Advantages of Telework Practices. The Perceived Drawbacks scale was overall less associated with the EWL satisfaction subscale, and no significant correlation was found with productivity or flexibility. This study developed and validated the Perception of Telework Practices (PTP) scale with excellent psychometric properties. The validated scale measures telework perceptions in developing country contexts, supporting evidence-based policy and organizational decisions in modern workplaces.

**Keywords** Telework, Advantage, Drawback, Scale validation

Telework has evolved steadily since the term “telecommuting” was introduced in 1972—emerging from remote work on NASA communications—with “flexplace” following in 1979<sup>1</sup>. The idea moved from practice to policy with the United States Telework Enhancement Act of 2010, which sought to improve security and efficiency for federal employees<sup>1</sup>. Together, these milestones established telework as a credible alternative to office-bound work and loosened organizations’ reliance on fixed locations and rigid hours<sup>2</sup>, leading to entirely different responses and preferences of workers and organizations<sup>3</sup>.

<sup>1</sup>Institut National de Santé Publique, d’Épidémiologie Clinique Et de Toxicologie-Liban (INSPECT-LB), Beirut, Lebanon. <sup>2</sup>Research Department, Psychiatric Hospital of the Cross, Jal Eddib, Lebanon. <sup>3</sup>Faculty of Science, Lebanese University, Fanar, Lebanon. <sup>4</sup>Department of Biomedical Sciences, School of Arts and Sciences, Lebanese International University, Bekaa, Beirut P.O. Box 146404, Lebanon. <sup>5</sup>Center for Applied Mathematics and Bioinformatics (CAMB), Gulf University for Science and Technology (GUST), Mubarak Al-Abdullah 32093, Kuwait. <sup>6</sup>Gilbert and Marie-Rose Chagoury School of Medicine, Lebanese American University, Byblos, Lebanon. <sup>7</sup>Faculty of Pharmacy, Lebanese University, Hadat, Lebanon. <sup>8</sup>Department of Primary Care and Population Health, University of Nicosia Medical School, 2417 Nicosia, Cyprus. <sup>9</sup>Faculty of Public Health, Lebanese University, Fanar, Lebanon. ✉email: chadia\_9@hotmail.com

The COVID-19 pandemic dramatically accelerated telework adoption worldwide, with millions experiencing remote work for the first time and regulatory activity increasing visibly throughout 2020<sup>4</sup>. This transformation from a flexible work option to an organizational necessity revealed both telework's potential and limitations, with adoption rates remaining significantly higher post-pandemic than pre-2020 levels<sup>4,5</sup>. In the Gulf Cooperation Council region, telework adoption surged dramatically during COVID-19, with Dubai increasing from 13 to 62%, Abu Dhabi from 18 to 51%, and other emirates from 15 to 56%<sup>6</sup>.

### Research evidence and measurement instruments

Research demonstrates that telework provides employees greater schedule control, improving work-life balance across generational cohorts, with Baby Boomers showing particularly high flexibility preferences<sup>7,8</sup>. Productivity benefits emerge from personalized work environments, reduced commuting stress, fewer workplace interruptions, and the ability to work during optimal hours<sup>9–11</sup>. Additionally, telework generates significant cost savings for both employees (reduced commuting, work attire, and meals) and organizations (decreased office space, utilities, and operational overhead), with the pandemic highlighting these financial advantages<sup>10,12</sup> (Table 1).

However, telework also presents substantial challenges. Social isolation and reduced colleague interaction represent primary concerns, as teleworkers miss informal conversations and social bonding crucial for workplace relationships and community building<sup>9,11,13</sup>. Technology dependence creates vulnerability to connectivity issues and workflow disruptions<sup>14,15</sup>. Communication barriers and misunderstandings can emerge, while professional isolation correlates negatively with job performance and engagement, reducing organizational identification and active team participation<sup>9,12,14</sup>. Furthermore, work-life boundary blurring often leads to burnout among remote workers<sup>7</sup> (Table 1).

These multifaceted advantages and drawbacks indicate the need for organizations to carefully consider the implications of telework for employee well-being, productivity, and job satisfaction<sup>16</sup>. Standardized scales assessing multiple facets are crucial for understanding and enhancing the telework experience, with instruments developed to improve productivity, reduce negative emotions like stress and fatigue, and promote positive work outcomes<sup>17,18</sup>. Studies have evaluated telework satisfaction across diverse dimensions, including workload and task nature, work hour organization, focus capabilities, family respect for workspace boundaries, supervisor and colleague support, information technology access, and physical work environment<sup>14,18–20</sup>. Beyond satisfaction measures, research has examined affective organizational commitment, professional isolation, and perceived organizational and supervisor support using single-item measures and Likert-type validated scales<sup>21</sup>.

Extensive exploration has covered job effectiveness<sup>22</sup>, well-being<sup>20</sup>, stress<sup>15</sup>, self-efficacy<sup>23</sup>, work-life balance<sup>24,25</sup>, work-family outcomes<sup>26</sup>, team performance<sup>27</sup>, productivity<sup>19</sup>, and work engagement<sup>28</sup>. The comprehensive E-Work Life (EWL) scale exemplifies this multifaceted approach, measuring job effectiveness, organizational relationships, well-being, and work-life balance<sup>29</sup>.

### The Lebanese context: unique challenges and opportunities

Specific data on telework adoption in Lebanon remains scarce, highlighting a critical research gap. Lebanon presents a particularly compelling case for telework research due to its convergence of economic, political, sociocultural, and technological challenges. As a developing nation recently reclassified as a medium–low-income country by the World Bank<sup>35</sup>, Lebanon faces unprecedented economic instability, including currency depreciation exceeding 90% and ongoing political turmoil<sup>36</sup>. These conditions create a unique environment where telework may serve as both an economic necessity and an organizational adaptation strategy.

The Lebanese legal framework presents additional complexity for telework implementation. While no specific national legislation addresses remote work, existing labor regulations provide foundational support through the Labor Law (Act No. 128 of 1991), which outlines employee rights and employer responsibilities regarding working hours, compensation, and leave provisions that must be incorporated into remote work agreements<sup>37</sup>. Remote workers remain subject to social security contribution requirements, creating a regulatory foundation that supports but does not explicitly govern telework arrangements<sup>37</sup>. This legal ambiguity necessitates careful consideration of how telework advantages and disadvantages manifest within Lebanon's unique regulatory environment.

Furthermore, Lebanon's cultural context adds another layer of complexity, as collectivistic cultural values emphasizing family and community relationships may interact differently with telework's individualistic advantages compared to Western contexts. The traditional importance of social connections and hierarchical workplace relationships in Lebanese culture may amplify telework's social isolation drawbacks while potentially enhancing family-related benefits.

Advantages	Drawbacks
Increased flexibility: Schedule control and location independence <sup>7</sup>	Social isolation: Reduced face-to-face interaction and workplace community <sup>13</sup>
Enhanced work-life balance: Better integration of personal and professional responsibilities <sup>7</sup>	Technical connectivity issues: Infrastructure dependency and technology barriers <sup>30</sup>
Cost savings: Reduced commuting, clothing, and meal expenses <sup>12</sup>	Communication barriers: Misunderstandings and coordination challenges <sup>12</sup>
Increased productivity: Personalized environment and fewer interruptions <sup>8</sup>	Work-life boundary blurring: Difficulty separating professional and personal time <sup>7</sup>
Environmental benefits: Reduced fuel consumption and carbon footprint <sup>31</sup>	Reduced team cohesion: Weakened collaborative relationships <sup>32</sup>
Enhanced autonomy: Greater self-direction and responsibility <sup>33</sup>	Potential productivity loss: Home distractions and motivation challenges <sup>34</sup>
Increased flexibility: Schedule control and location independence <sup>7</sup>	Social isolation: Reduced face-to-face interaction and workplace community <sup>13</sup>

**Table 1.** Description of the most relevant advantages and drawbacks of telework.

## Research gap and rationale

Recent studies also link remote work with employee engagement and organizational culture, underscoring the need for context-appropriate instruments<sup>38,39</sup>; despite extensive telework research globally, existing measurement instruments may inadequately capture the complex Lebanese experience. Current validated scales, such as the remote working benefits and disadvantages scale developed in Italy<sup>40</sup> and the tele attitude scale from Portugal<sup>41</sup>, emerge from politically and economically stable contexts that differ substantially from Lebanon's circumstances. The E-Work Life (EWL) scale, measuring job effectiveness, organizational relationships, well-being, and work-life balance<sup>29</sup>, provides a comprehensive framework but lacks cultural adaptation for Middle Eastern contexts.

## Study objectives

This cross-sectional study among 230 Lebanese workers aims to develop and validate a culturally appropriate scale for assessing telework advantages and drawbacks in the Lebanese context. The research addresses critical gaps by:<sup>1</sup> examining how telework perceptions manifest within Lebanon's unique economic and cultural environment,<sup>2</sup> developing measurement tools that capture local telework experiences, and<sup>3</sup> providing evidence-based insights for policymakers and organizations implementing remote work arrangements.

The validation of this scale will contribute to scientific understanding of telework's positive and negative impacts on job satisfaction, productivity, and well-being among Lebanese workers, while informing policy development that considers local labor laws and technological infrastructure limitations.

## Materials and methods

### Study design and participants

A web-based cross-sectional study was conducted from October 2022 to March 2023 using a self-report questionnaire created on Google Forms and distributed via social media platforms (WhatsApp, Facebook, and Instagram). The sampling method was non-probability snowball sampling. Initial participants (workers recruited online) completed the survey and were then asked to refer others who met the inclusion criteria, thereby expanding access to a broader network of employees. This approach was chosen because the sample was geographically dispersed and teleworkers were difficult to reach. Additionally, leveraging teleworkers' networks made it more feasible to identify further individuals who met the inclusion criteria. The snowball sampling approach yielded 230 participants, divided into three categories based on employment type: face-to-face, telework, and hybrid. The inclusion criteria were work status, age 20 to 80 years, and internet access. Participation was entirely voluntary and unpaid.

### Minimum sample size calculation

According to the literature<sup>42</sup>, 5–10 observations per item are recommended for scale validation. Applying the lower bound of five observations per item to our instrument, which comprises two subscales, yielded a minimum required sample size of 170 participants. The final sample comprised 230 participants, exceeding this threshold.

### Survey tool

The questionnaire was available in Arabic and English, and participants could choose their preferred language. It comprised two sections: (1) demographic and work-related characteristics and (2) scales assessing perceptions of telework, including the study-developed scale with two subscales (perceived advantages and perceived drawbacks) and the E-Work-Life Scale (EWL) for convergent validity.

### *Translation procedure*

For the Arabic version of the new scale, one author prepared the initial forward translation. All other co-authors, fluent in both Arabic and English, independently reviewed the translation for accuracy, clarity, and cultural appropriateness. Discrepancies were resolved by consensus, yielding the final Arabic instrument. A formal back-translation was not performed because the items were newly developed by the research team, drawing on questions from the literature and adapted to the Lebanese context, rather than taken from previously validated tools. The EWL followed a forward–backward translation procedure. After an initial forward translation by a bilingual author, an independent bilingual translator blinded to the original English version performed a back-translation. Comparison of the back-translated and original English versions indicated satisfactory semantic equivalence, requiring only minor wording refinements.

### *Demographic and work-related variables*

The variables collected included age, sex (male vs. female), education level, monthly income, area of residence, marital status (married vs. other), household crowding index, the number of children, professional status (self-employed, temporary worker, freelancer, or employee), and working status (telework, in-person, or hybrid work).

### *Content validity of the perception of telework practices (PTP) scale*

The research team, comprising public health experts with extensive experience in occupational, social, and mental health, conducted a comprehensive literature review to develop the PTP scale. Items for both subscales—Perceived Advantages of Telework (PATS) and Perceived Drawbacks of Telework (PDTS)—were inspired by a study among teleworkers during the COVID-19 pandemic<sup>43</sup> and supplemented with items tailored to the Lebanese context. The resulting pool comprised 34 items: 12 advantages and 22 drawbacks.

A six-member expert panel validated the scale using the Delphi technique, achieving >90% consensus on all items. The panel comprised six members: one professor of epidemiology with expertise in medical epidemiology, clinical pharmacy, academic education, and public health research, and five public health academics familiar

with the advantages and disadvantages of telework in Lebanon. The panel reviewed the items for clarity and made specific revisions, such as rewording, to ensure comprehensive coverage of relevant issues.

The final questionnaire was piloted with ten working adults to assess clarity. No issues were identified, so no changes were made; accordingly, pilot responses were included in the final dataset.

All PTP items used a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Higher scores on PATS indicate greater perceived advantages; higher scores on PDTS indicate greater perceived drawbacks. Example PATS items include saving time and commuting costs, flexible hours/autonomy, increased productivity, and improved work-life balance. Example PDTS items include lack of a dedicated workspace, limited privacy, household noise, small workspace, and reduced communication with colleagues.

#### *The E-work life (EWL) scale*

Satisfaction with telework was assessed using the E-Work Life (EWL) scale<sup>29</sup>. This 17-item validated tool measures four domains: productivity, organizational trust, flexibility, and interference with work-life balance. Responses are scored on a 5-point Likert scale ranging from strongly disagree<sup>1</sup> to strongly agree<sup>5</sup>, with an option labeled “not applicable” (0). Higher scores indicate more satisfaction with teleworking. In this study, the scale demonstrated excellent internal consistency, with a Cronbach’s alpha of 0.938.

### Data analysis

Statistical analyses were performed using SPSS version 25.0. Descriptive statistics included means and standard deviations for quantitative variables and frequencies and percentages for categorical variables.

Construct validity of the PTP scale and subscales was examined using exploratory factor analysis<sup>44</sup>. Sampling adequacy was assessed with the Kaiser–Meyer–Olkin statistic and Bartlett’s test of sphericity. Factor retention was guided by eigenvalues > 1 and inspection of the scree plot. Varimax rotation was conducted in the PTP total scale, while a Promax rotation was applied when each scale was analyzed separately due to expected inter-factor correlations<sup>45</sup>. Items with loadings  $\geq 0.40$  were retained; no items were removed.

A Confirmatory factor analysis (CFA) was performed on a randomly selected 50% subsample using AMOS to assess the factor structure<sup>46</sup>. Goodness-of-fit indices included the chi-square to degrees of freedom ratio ( $\chi^2/df$ ), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Tucker Lewis Index (TLI). Acceptable fit was defined as  $\chi^2/df$  between 2 and 5, RMSEA < 0.11 (with < 0.05 indicating close fit), and CFI/TLI  $\geq 0.90$ .

Internal consistency was estimated with Cronbach’s alpha for the PTP total scale and each subscale<sup>47</sup>. Pearson correlations examined the PTP scale, its subscales, and convergent validity with other measures<sup>48</sup>.

Statistical significance was set at  $p < 0.05$ .

## Results

### Sample description

Table 2 presents sociodemographic and other characteristics of the 230 Lebanese adults in the sample. During the COVID-19 pandemic and economic crisis, 54.8% worked on-site, 20.4% worked exclusively from home, and 24.8% had a hybrid arrangement. Most participants were employees (60.4%), female (65.7%), single (60.4%), and university educated (93.5%). The majority lived in Beirut or Mount Lebanon (73.9%) and reported moderate-to-high income (80.5%). The mean age was  $30.55 \pm 10.80$  years, the mean household crowding index was  $1.08 \pm 0.54$ , the mean number of children was  $0.98 \pm 1.33$ , and the mean financial well-being score was  $36.90 \pm 16.73$ .

### Construct validity: factor analysis

Table 3 shows the exploratory factor analysis of the Perception of Telework Practices (PTP) scale. For the PTP total scale, the Varimax-rotated matrix produced two factors with eigenvalues > 1, explaining 53.34% of the variance (KMO = 0.925; Bartlett’s test of sphericity  $p < 0.001$ ; Cronbach’s alpha = 0.942). The Varimax solution supports a two-subscale structure—perceived advantages and perceived drawbacks.

For the perceived advantages subscale, the Promax rotated matrix produced two factors with eigenvalues > 1, explaining 65.25% of the variance (KMO = 0.906; Bartlett’s test of sphericity  $p < 0.001$ ; Cronbach’s alpha = 0.916). These components correspond to (1) increased flexibility and cost savings and (2) enhanced productivity and work/life balance.

For the perceived drawbacks subscale, the Promax rotated matrix produced three factors with eigenvalues > 1, explaining 62.67% of the variance (KMO = 0.943; Bartlett’s test of sphericity  $p < 0.001$ ; Cronbach’s alpha = 0.954). The factors correspond to (1) telework overall challenges, (2) decreased productivity, and (3) telework lifestyle impact.

The scree plots for the Perception of Telework Practices (PTP) scale and its subscales display the eigenvalues of extracted factors (Kaiser criterion, eigenvalues > 1). As shown in Fig. 1, a distinct elbow appears after the second factor for both the PTP total scale and the Perceived Advantages of Telework subscale (PATS), supporting a two-factor solution. For the Perceived Drawbacks subscale (PDTS), the elbow occurs after the third factor, supporting a three-factor solution.

Confirmatory Factor Analysis (CFA) was conducted on a randomly selected half of the sample to validate the factor structure of the scales used in the exploratory factor analysis (EFA). For the PTP total scale, fit indices were  $\chi^2/df = 2.56$ , CFI = 0.730, TLI = 0.712, and RMSEA = 0.116 (95% CI [0.108–0.123]). For the PATS, the model yielded  $\chi^2/df$  ratio of = 3.18, CFI = 0.868, TLI = 0.836, and RMSEA = 0.137 (95% CI [0.114–0.160]). For the PDTS, the model yielded  $\chi^2/df$  ratio of = 2.29, CFI = 0.864, TLI = 0.847, and RMSEA = 0.105 (95% CI [0.093–0.118]). Results are presented in Table 4.

	Frequency (%)
Gender	
Male	79 (34.3%)
Female	151 (65.7%)
Marital status	
Single	139 (60.4%)
Married	85 (37.0%)
Divorced	6 (2.6%)
Monthly income	
Low	45 (19.6%)
Moderate	82 (35.7%)
High	103 (44.8%)
Area of residence	
Beirut	92 (40.0%)
Mount Lebanon	78 (33.9%)
North	27 (11.7%)
Beqaa	23 (10.0%)
South	10 (4.3%)
Education level	
Complementary	5 (2.2%)
Secondary	10 (4.3%)
University	215 (93.5%)
Professional status	
Self-employed	33 (14.3%)
Temporary worker	39 (17.0%)
Freelancer	19 (8.3%)
Employee	139 (60.4%)
Working status during the economic crisis or COVID-19	
Working from home	47 (20.4%)
Going to work	126 (54.8%)
Hybrid work	57 (24.8%)
	Mean $\pm$ SD
Age	30.55 $\pm$ 10.80
Household crowding index	1.08 $\pm$ 0.54
Number of children	0.98 $\pm$ 1.33

**Table 2.** Sociodemographic characteristic of the participants (N = 230).

### Description of the scales

Table 5 summarizes the descriptive statistics (median, mean, SD, and range) for all study scales. For the PTP total scale, the mean was  $113.20 \pm 22.95$  and the median was 119.00 [min 36; max 161]. For the PATS, the median was 41.00 [min 12; max 60] and the mean was  $40.22 \pm 9.62$ . For the PTDS, the median was 77 [min 24; max 110] and the mean was  $72.98 \pm 18.43$ . Regarding the E-Work Life Scale, the mean was  $46.78 \pm 16.75$ , and the median was 51.00 [min 0; max 84]. Overall, awareness of telework's advantages and drawbacks was relatively high (70%), whereas satisfaction with telework on the EWL was moderate, reaching only 56%.

### Structural validity: correlation analysis

Pearson correlations showed that PTP, PATS, and PDTS total scores were positively intercorrelated and each correlated positively with their constituent factors (all  $p < 0.05$ ). Within PATS, the total score correlated very strongly with Factor 1 ( $r = 0.906$ ,  $p < 0.001$ ) and Factor 2 ( $r = 0.904$ ,  $p < 0.001$ ); the two factors were strongly intercorrelated ( $r = 0.638$ ,  $p < 0.001$ ). The PTP total score was moderately correlated with PATS Factor 2 ( $r = 0.444$ ,  $p < 0.001$ ). Within PDTS, the total score correlated very strongly with Factor 1 ( $r = 0.952$ ,  $p < 0.001$ ), Factor 2 ( $r = 0.902$ ,  $p < 0.001$ ), and Factor 3 ( $r = 0.870$ ,  $p < 0.001$ ). Strong correlations were also observed among PDTS factors: F1–F2 ( $r = 0.794$ ), F1–F3 ( $r = 0.736$ ), and F2–F3 ( $r = 0.703$ ) (all  $p < 0.001$ ; Table 6).

### Bivariate analysis

No significant differences by work status were observed for PTP, PATS, or PDTS (all  $p > 0.05$ ). Mean PTP scores were highest among hybrid workers ( $115.21 \pm 19.57$ ), followed by on-site workers ( $112.65 \pm 24.14$ ) and those working from home ( $112.27 \pm 23.78$ ;  $p = 0.748$ ). For PATS, means were  $40.71 \pm 10.57$  (hybrid),  $40.19 \pm 10.37$

		Loading		Communalities	
		Factor 1	Factor 2		
<b>Total Scale: Perception of Telework Practices (Varimax Rotation) (a)</b>					
	Frequent electricity outages	0.777		0.616	
	No time allocated for work (inability to disconnect from work)	0.772		0.616	
	Unstable/inconsistent internet access (slow connection speed, technical problems, poor connectivity, etc.)	0.763		0.586	
	Lack of electronic devices/adequate electronic devices	0.756		0.595	
	Feeling of isolation	0.754		0.603	
	Losing interest in getting dressed and going out (more sedentary lifestyle)	0.753		0.570	
	Undesired or disruptive noise in your workspace	0.732		0.619	
	Lack of communication with colleagues	0.731		0.540	
	Inability of balancing with home tasks	0.721		0.583	
	Distraction caused by unscheduled visits of neighbors and friends	0.718		0.555	
	No dedicated workspace	0.704		0.568	
	Decreased physical activities	0.699		0.489	
	Less knowledge of changes in the company	0.695		0.495	
	Small workspace	0.690		0.577	
	Difficulty focusing on work at home	0.688		0.597	
	Uncomfortable work environment (uncomfortable desk or chair, lack of stationary, etc.)	0.687		0.576	
	Increased costs (increased use of electricity, internet, etc.)	0.686		0.472	
	Limited access to data when working from home	0.672		0.512	
	Lack of privacy	0.672		0.526	
	Trend towards overworking (potential for excessive working hours)	0.579		0.336	
	Unhealthy eating	0.525		0.297	
	Increased smoking and alcohol consumption	0.500		0.255	
	More focused time		0.763	0.631	
	Quieter work environment		0.743	0.571	
	Better balance of home and work life		0.713	0.562	
	Fewer interruptions		0.699	0.513	
	Flexible working hours and autonomy at work		0.668	0.643	
	Increased productivity		0.657	0.482	
	Avoiding office rules (working hours, break times, dress code, etc.)		0.626	0.587	
	Healthier eating habits		0.585	0.429	
	Saving money when not going to work (e.g., transportation, clothes, etc.)		0.555	0.602	
	Having parents at home for children (saving on daycare or a babysitter, etc.)		0.544	0.522	
	Saving time going to work		0.510	0.489	
	Limiting the spread of COVID-19 and other respiratory diseases		0.475	0.520	
		<b>Factor 1</b>	<b>Factor 2</b>	<b>Communalities</b>	
<b>Subscale 1: Perceived Advantages of Telework Practices (b)</b>					
1	Saving money when not going to work (e.g., transportation, clothes, etc.)	0.956		0.801	
2	Saving time going to work	0.919		0.704	
3	Limiting the spread of COVID-19 and other respiratory diseases	0.838		0.638	
4	Flexible working hours and autonomy at work	0.755		0.719	
5	Avoiding office rules (working hours, break times, dress code, etc.)	0.636		0.607	
6	Having parents at home for children (saving on daycare or a babysitter, etc.)	0.603		0.550	
7	Fewer interruptions		0.946	0.745	
8	Quieter work environment		0.900	0.725	
9	More focused time		0.859	0.751	
10	Healthier eating habits		0.638	0.508	
11	Increased productivity		0.637	0.529	
12	Better balance of home and work life		0.425	0.553	
		<b>Factor 1</b>	<b>Factor 2</b>	<b>Factor 3</b>	<b>Communalities</b>
<b>Subscale 2: Perceived Drawbacks of Telework Practices (c)</b>					
1	Inability of balancing with home tasks	0.861			0.703
2	Limited access to data when working from home	0.811			0.635
3	Difficulty focusing on work at home	0.762			0.699
4	Distraction caused by unscheduled visits of neighbors and friends	0.686			0.606
Continued					

		Factor 1	Factor 2	Factor 3	Communalities
<b>Subscale 2: Perceived Drawbacks of Telework Practices (c)</b>					
5	No time allocated for work (inability to disconnect from work)	0.684			0.669
6	Feeling of isolation	0.672			0.650
7	Lack of electronic devices/adequate electronic devices	0.642			0.641
8	Uncomfortable work environment (uncomfortable desk or chair, lack of stationary, etc.)	0.563			0.583
9	Increased smoking and alcohol consumption	0.534			0.460
10	Frequent electricity outages	0.500			0.622
11	No dedicated workspace		0.848		0.723
12	Undesired or disruptive noise in your workspace		0.836		0.762
13	Lack of privacy		0.819		0.673
14	Unstable/inconsistent internet access (slow connection speed, technical problems, poor connectivity, etc.)		0.646		0.631
15	Small workspace		0.600		0.618
16	Lack of communication with colleagues		0.464		0.553
17	Unhealthy eating			0.806	0.554
18	Decreased physical activities			0.801	0.689
19	Losing interest in getting dressed and going out (more sedentary lifestyle)			0.703	0.704
20	Increased costs (increased use of electricity, internet, etc.)			0.652	0.578
21	Trend towards overworking (potential for excessive working hours)			0.602	0.482
22	Less knowledge of changes in the company			0.480	0.555

**Table 3.** Factor analysis of the telework perception scales. (a) Kaiser-Meyer-Olkin (KMO) 0.925, Bartlett's test of sphericity < 0.001, Percentage of variance explained 53.34%, Cronbach alpha: .942 (b) Kaiser-Meyer-Olkin (KMO) 0.906, Bartlett's test of sphericity < 0.001, Percentage of variance explained 65.25%. Cronbach alpha: .916 Factor 1: Increased flexibility and cost saving; Factor 2: Enhanced productivity and work/life balance (c) Kaiser-Meyer-Olkin (KMO) 0.943, Bartlett's test of sphericity < 0.001, Percentage of variance explained 62.67%, Cronbach alpha: .954 Factor 1: Telework overall challenges; Factor 2: Decreased productivity; Factor 3: Telework lifestyle impact.

(work-from-home), and  $40.00 \pm 8.93$  (on-site;  $p = 0.899$ ). For PDTS, means were  $74.49 \pm 15.60$  (hybrid),  $72.08 \pm 18.95$  (work-from-home), and  $72.64 \pm 19.49$  (on-site;  $p = 0.767$ ) (Fig. 2).

Pearson correlations indicated that PTP, PATS, and PDTS total scores were positively intercorrelated and each correlated positively with their constituent factors (all  $p < 0.05$ ). The strongest association with PTP was PDTS ( $r = 0.915$ ,  $p < 0.001$ ), followed by PATS ( $r = 0.633$ ,  $p < 0.001$ ), as expected given their contribution to the total score. PTP also showed weak but significant correlations with the EWL total and its subscales ( $r = 0.206$ – $0.304$ ), suggesting that EWL captures related but distinct aspects of the e-work experience (Table 7).

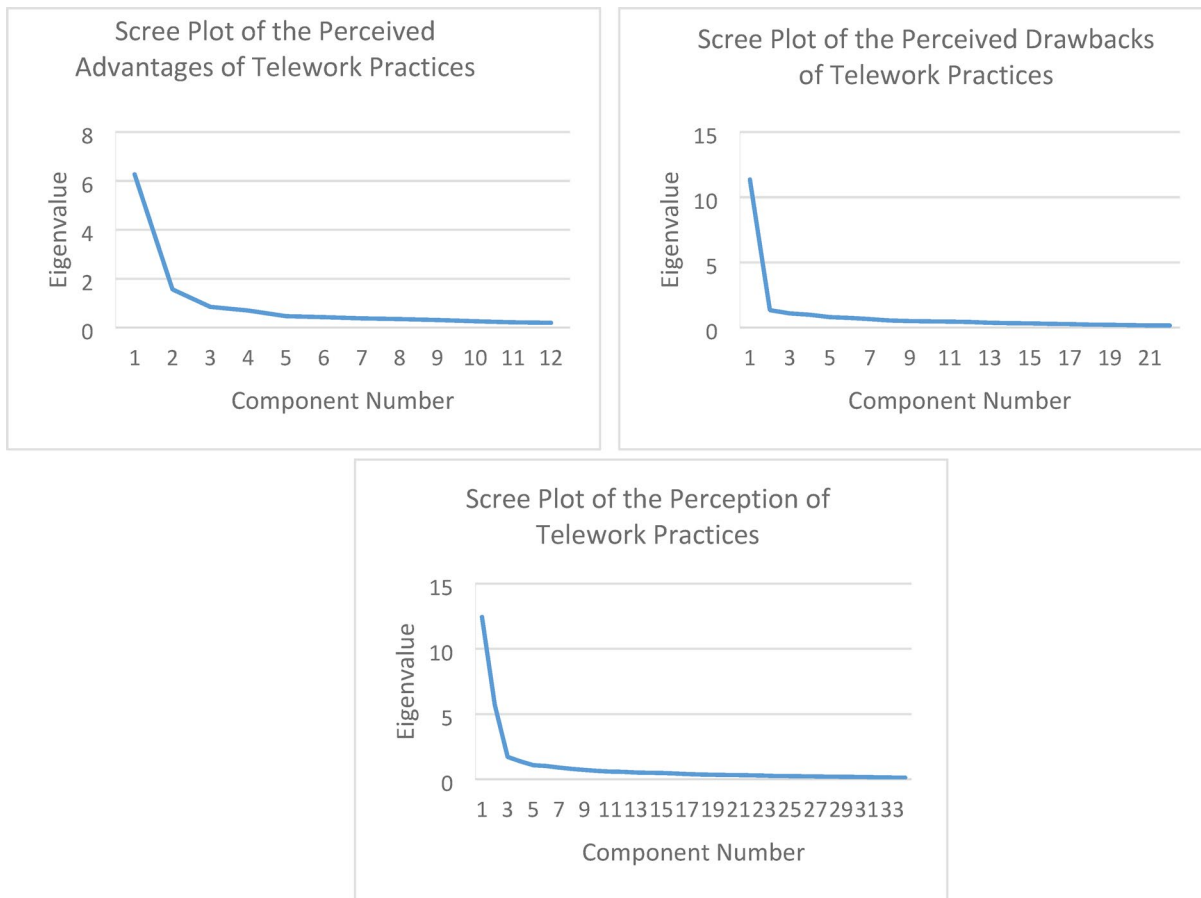
When PATS was the focus, a moderate positive correlation emerged with EWL-Productivity ( $r = 0.444$ ,  $p < 0.001$ ), indicating that perceiving more advantages of telework is associated with higher self-reported productivity. Additional weak but significant correlations were observed with the EWL total ( $r = 0.336$ ,  $p < 0.001$ ), EWL-Flexibility ( $r = 0.297$ ,  $p < 0.001$ ), and EWL-Work-Life Interference ( $r = 0.244$ ,  $p < 0.001$ ). A very weak correlation with EWL-Organizational Trust ( $r = 0.183$ ,  $p = 0.005$ ) was also noted. PATS and PDTS were weakly but significantly correlated ( $r = 0.266$ ,  $p < 0.001$ ), indicating that respondents can recognize both benefits and challenges concurrently.

For PDTS, weak but significant correlations were found with the EWL total ( $r = 0.203$ ,  $p < 0.001$ ) and EWL-Work-Life Interference ( $r = 0.246$ ,  $p < 0.001$ ), and a very weak correlation with EWL-Organizational Trust ( $r = 0.167$ ,  $p = 0.011$ ). PDTS was not significantly correlated with EWL-Productivity ( $r = 0.107$ ,  $p = 0.104$ ) or EWL-Flexibility ( $r = 0.102$ ,  $p = 0.123$ ) (Table 7).

## Discussion

This study successfully validated the Perception of the Telework Practices (PTP) scale among 230 Lebanese workers from diverse backgrounds, comprising two robust subscales: the Perceived Advantages of Telework Subscale (PATS) and the Perceived Drawbacks of Telework Subscale (PDTS). The validation results demonstrate that this instrument effectively captures Lebanese workers' perceptions of telework within their unique socioeconomic context, providing a reliable tool for businesses, individuals, and managers to assist teleworkers in creating well-being management plans.

The developed scale demonstrated excellent psychometric properties with high construct validity (KMO = 0.925 for the total scale, 0.906–0.943 for subscales), structural validity (evidenced by strong correlations between subscales and factors), and reliability (Cronbach's alpha = 0.942 for the total scale, 0.916–0.954 for subscales). These robust psychometric indicators align with and exceed benchmarks established by comparable international studies. The telework perception scale (Tele-Cov-19) for Peruvian schoolteachers demonstrated good content-based validity, internal structure, and reliability<sup>49</sup>, while the Remote Working Benefits & Disadvantages scale showed good construct validity, confirmatory indices, reliability indices, and convergent



**Fig. 1.** Scree Plot of Eigenvalues for the Perception of Telework Practices scales.

	X2	df	X2/df	CFI	TLI	RMSEA (95% CI)
Perception of Telework Practices	1347.51	526	2.56	0.730	0.712	0.116 [0.108; 0.123]
Perceived Advantages of Telework Practices	168.99	53	3.18	0.868	0.836	0.137 [0.114; 0.160]
Perceived Drawbacks of Telework Practices	473.63	206	2.29	0.864	0.847	0.105 [0.093; 0.118]

**Table 4.** Confirmatory factor analysis conducted on a random half-subsample.

	Median	Mean	Mean%*	SD	Minimum	Maximum
Perception of telework practices total scale	119.00	113.20	70.31%	22.95	36.00	161.00
Advantages of telework subscale	41.00	40.22	67.03	9.62	12.00	60.00
Drawbacks of telework subscale	77.00	72.98	66.34	18.43	24.00	110.00
E-Work Life Scale	51.00	46.78	55.69	16.75	0.00	84.00

**Table 5.** Description of telework-related scales in the study.

and discriminant validity<sup>40</sup>. The E-Work Life scale was created to measure remote e-working<sup>29</sup>, and other studies have evaluated perception aspects of telework advantages and disadvantages<sup>50–52</sup>. However, existing instruments either focus on narrow populations (teachers), limited dimensions (satisfaction only), or were developed in stable economic contexts that cannot capture infrastructure-related challenges. The PTP scale’s comprehensive approach—integrating personal, professional, social, and environmental dimensions within a resource-constrained context—establishes its unique utility for exploring telework perceptions in developing country populations.

The PTP scale and subscales include items addressing personal, professional, social, and environmental aspects specific to Lebanon’s multi-crisis context, aligning with global studies across various worker populations<sup>13,53–55</sup>. The inclusion of electricity outages and unstable internet connection items—rarely or not cited in other studies—

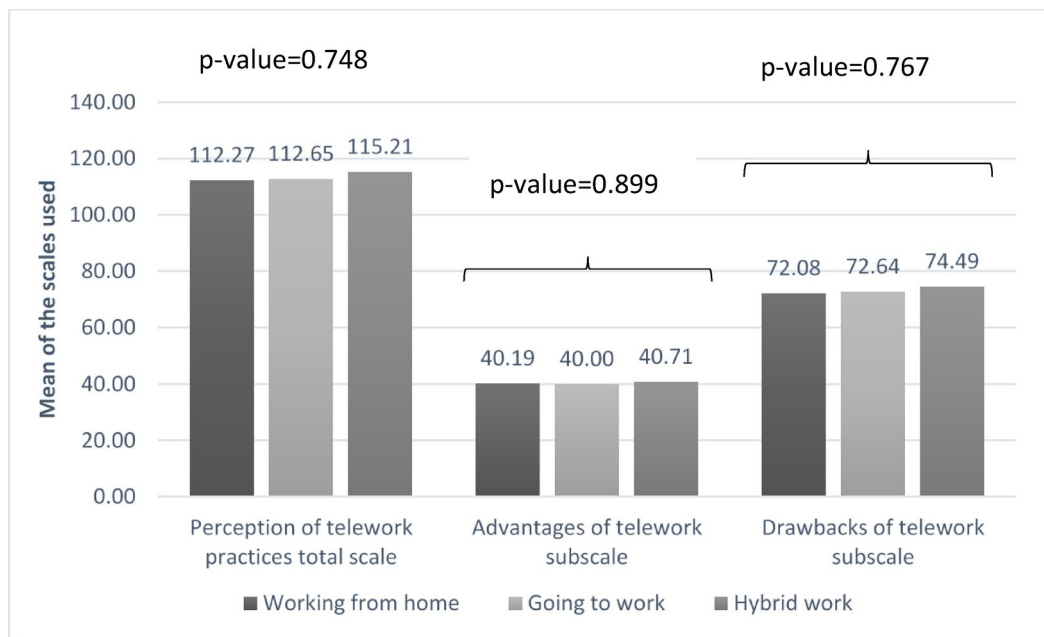
	Advantages of telework subscale	Advantages of telework Factor 1	Advantages of telework Factor 2	
Advantages of telework Factor 1: Increased flexibility and cost saving	0.906	–		
<i>p-value</i>	<0.001	–		
Advantages of telework Factor 2: Enhanced productivity and work/life balance	0.904	0.638	–	
<i>p-value</i>	<0.001	<0.001	–	
Perception of telework practices total scale	0.633	0.700	0.444	
<i>p-value</i>	<0.001	<0.001	<0.001	
	Drawbacks of telework subscale	Drawbacks of telework Factor 1	Drawbacks of telework Factor 2	Drawbacks of telework Factor 3
Drawbacks of telework Factor 1: Telework overall challenges	0.952	–		
<i>p-value</i>	<0.001	–		
Drawbacks of telework Factor 2: Decreased productivity	0.902	0.794	–	
<i>p-value</i>	<0.001	<0.001	–	
Drawbacks of telework Factor 3: Telework lifestyle impact	0.870	0.736	0.703	–
<i>p-value</i>	<0.001	<0.001	<0.001	–
Perception of telework practices total scale	0.915	0.855	0.810	0.838
<i>p-value</i>	<0.001	<0.001	<0.001	<0.001

**Table 6.** Pearson correlation analysis between the Advantages/ drawbacks of telework subscales and their own factors.

Colors represent the strength of correlation coefficients: Dark red indicates very strong correlations (0.80–1.00), red indicates strong correlations (0.60–0.79), orange indicates moderate correlations (0.40–0.59), Yellow indicates weak correlations (0.20–0.39), light yellow to white indicates very weak or negligible correlations (0.00–0.19)

directly addresses infrastructure challenges prevalent in Lebanon's current economic crisis<sup>36,56</sup>. The high cost of improving these services makes them inaccessible to substantial population segments, a reality captured in the PTP scale's factor structure and reflected in participants' responses.

This study revealed a significant perception-satisfaction disparity that provides crucial insights into Lebanese telework experiences. While participants demonstrated solid awareness of teleworking advantages and drawbacks (67%), satisfaction levels reached only 56%—notably lower than European and Brazilian studies<sup>53,54</sup>. This finding suggests Lebanese participants experienced more negative telework conditions compared to their international counterparts, with infrastructure limitations providing a plausible explanation directly supported by PTP's Lebanon-specific items. Another potential factor could be the voluntariness of working remotely, as described in a study conducted before and after the COVID-19 pandemic<sup>57</sup>, revealing that pre-pandemic participants, who were more likely to choose remote work voluntarily, reported fewer disadvantages the more they engaged in telework. However, this pattern was not the same for employees during COVID-19, supporting



**Fig. 2.** Associations Between Perception of Telework Practices, Telework Advantages/Drawbacks and Working Status.

	Perception of telework practices total scale	Advantages of telework subscale	Drawbacks of telework subscale
	Correlation coefficient	Correlation coefficient	Correlation coefficient
E-Work Life Scale	0.304	0.336	0.203
<i>p-value</i>	<0.001	<0.001	0.002
Work-Life interference	0.300	0.244	0.246
<i>p-value</i>	<0.001	<0.001	<0.001
Productivity	0.272	0.444	0.107
<i>p-value</i>	<0.001	<0.001	0.104
Organizational trust	0.211	0.183	0.167
<i>p-value</i>	0.001	0.005	0.011
Flexibility	0.206	0.297	0.102
<i>p-value</i>	0.002	<0.001	0.123
Drawbacks of telework subscale	0.915	0.266	–
<i>p-value</i>	<0.001	<0.001	–
Advantages of telework subscale	0.633	–	–
<i>p-value</i>	<0.001	–	–

**Table 7.** Bivariate analysis taking the advantages and drawbacks of telework as the dependent variables. Colors represent the strength of correlation coefficients: Dark red indicates very strong correlations (0.80–1.00), red indicates strong correlations (0.60–0.79), orange indicates moderate correlations (0.40–0.59), Yellow indicates weak correlations (0.20–0.39), light yellow to white indicates very weak or negligible correlations (0.00–0.19)

our interpretation that crisis-driven, involuntary telework adoption in Lebanon—compounded by infrastructure limitations—created particularly challenging conditions reflected in our 56% satisfaction rate.

The low but significant correlation between advantage and drawback scales reveals that few participants simultaneously agreed on both positive and negative aspects, indicating nuanced perceptions shaped by contextual realities. The convergent validity analysis with telework satisfaction (EWL) demonstrates that participants with positive telework perceptions (high PATS scores) exhibited satisfaction across all EWL dimensions—work-life balance, productivity, flexibility, and organizational trust. Conversely, those with negative perceptions (high PDTS scores) specifically devalued productivity and flexibility aspects, directly linking to reported disadvantages, including personal health issues, professional inability to conduct work properly, environmental inappropriateness, and social communication barriers. These patterns echo European findings<sup>54</sup>, which emphasized work-life balance, improved work efficiency, and greater work control as advantages, while disadvantages included home office constraints, work uncertainties, and inadequate tools. However, the Lebanese data reveal infrastructure challenges as fundamental moderators of these relationships.

Our findings directly inform understanding of Lebanese institutional responses to telework. Despite global telework trends<sup>58</sup> and the lack of clear regulations<sup>59</sup>, the uncertainty of many Lebanese institutions about teleworker productivity in current conditions led to the imposition of physical presence after the lifting of lockdown. This response, as our data suggests, may reflect legitimate concerns related to productivity and infrastructure rather than mere organizational resistance.

For Lebanese institutions and employers, our findings indicate that addressing infrastructure support is a prerequisite to successful telework implementation. The demonstrated impact of infrastructure adequacy on our participants' productivity and flexibility perceptions suggests that organizational telework policies must account for technological limitations that fundamentally alter the telework experience compared to resource-rich environments.

For Lebanese policymakers, our validation provides empirical evidence supporting infrastructure investment priorities. Given our finding that electricity outages and connectivity issues directly impact telework satisfaction, government encouragement of necessary infrastructure and skills investments becomes critical for optimizing telework benefits in terms of workers' productivity and well-being, as demonstrated by telework's established productivity improvements<sup>60</sup> extending beyond pandemic constraints.

For Lebanese researchers, our validated scale provides a culturally appropriate instrument for investigating telework dynamics within Middle Eastern contexts, addressing the limitations of instruments developed in politically and economically stable environments that cannot capture local infrastructure and cultural realities.

### Implications of the study

This cross-sectional study of 230 Lebanese workers developed and validated standardized scales that capture perceived benefits and drawbacks of telework, helping to address the current shortage of robust measurement tools. Grounded in Lebanon's economic, cultural, and infrastructure realities yet adaptable for international use, the instrument enables policymakers to refine labor provisions on remote work and to prioritize connectivity investments because employee experience is now quantified. Employers can audit perceptions, identify pain points, and tailor hybrid policies, workload planning, management practices, and IT/ergonomic support, while tracking changes over time to monitor productivity, job satisfaction, and well-being. Researchers can examine links between telework and organizational effectiveness and generate evidence-based recommendations; educators and students can use the scales to interrogate advantages (e.g., flexibility, cost savings) and drawbacks (e.g., communication barriers, isolation). Employees can draw on the findings to articulate needs, negotiate workable arrangements, and inform career decisions, and practitioners can design targeted support programs and training that maximize benefits and mitigate drawbacks in the Lebanese context.

### Limitations of the study

Despite the advantages identified, this validation study lacks several procedures essential for confirming the validity and reliability of the scales. It is thus recommended to conduct a confirmatory factor analysis on a different sample of teleworkers. A small sample size was selected in this study, with the majority of participants having a university education level, which might decrease the generalizability of the results to broader populations. The education characteristics probably represent the group of people who use telework the most frequently. A larger sample size is generally required to ensure robust factor analysis and the generalizability of the results. Expanding the sample size is a top priority for future studies to fully validate the instrument. Although a CFA was conducted on a randomly selected 50% subsample to support the results of the EFA, the overall sample size was relatively small, and the fit indices were only partially satisfactory. A future analytical study with a distinct and sufficiently large sample, including CFA, will be necessary for a more robust and comprehensive validation of the scale. The snowball sampling technique used in this study is a non-random sampling method, which may lead to the selection of participants sharing similar characteristics (young, female, university-educated individuals). This could introduce selection bias and limit the representativeness of the sample, affecting the generalizability of the findings. In addition, selecting individuals with remote work experience or hybrid work experience is recommended to assess the pros and cons of remote work. Furthermore, concerning the rigor of scale construction, the number of participants is preferred to be over three hundred valid questionnaires, as in the literature, the factor analysis requires 5–10 times the number of items. Also, the sample was not representative of all remote workers, as the majority were women with a university education level. The choice of remote video software was not taken into consideration, which might affect job satisfaction. Assessing test–retest, inter-rater, and intra-rater reliability would further strengthen the reliability analysis. Lastly, expanding the sample to include older individuals is also advised, given the predominantly young age of the studied population.

## Conclusion

This study successfully developed and validated the Perception of Telework Practices (PTP) scale with excellent psychometric properties: construct validity (KMO = 0.925–0.943), reliability (Cronbach's alpha = 0.916–0.954), and robust factor structures explaining 53–65% of variance. The gap between high telework awareness (70%) and lower satisfaction (56%) indicates contextual challenges in resource-constrained environments. Priority research directions include confirmatory factor analysis on larger samples, cross-cultural validation, and longitudinal assessment.

The scale validated in this study provides a reliable tool for measuring telework perceptions in developing country contexts, supporting evidence-based policy and organizational decisions in modern workplaces. Cross-cultural implementation will require adapting context-specific items while preserving the validated factor structure, particularly considering infrastructure variations that fundamentally shape telework experiences in different settings.

## Data availability

The dataset supporting the conclusions of this article is available from the corresponding author on reasonable request.

Received: 20 March 2025; Accepted: 15 September 2025

Published online: 17 October 2025

## References

- Allied Telecom. *The History of Telecommuting*. Allied Telecom. 2016. <https://www.alliedtelecom.net/the-history-of-telecommuting/> [Accessed 22nd August 2025].
- Campbell, J. & McDonald, C. Defining a conceptual framework for telework and an agenda for research in accounting and finance. *Int. J. Bus. Inf. Syst.* **4**(4), 387. <https://doi.org/10.1504/IJBIS.2009.024502> (2009).
- Mele, V., Belardinelli, P. & Bellé, N. Telework in public organizations: A systematic review and research agenda. *Public Adm. Rev.* **83**(6), 1649–1666. <https://doi.org/10.1111/puar.13734> (2023).
- International Labour Organization. *Teleworking during the COVID-19 pandemic and beyond: A Practical Guide*. 2020 p. 41. [https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed\\_protect/@protrav/@travail/documents/instructionalmaterial/wcms\\_751232.pdf](https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_protect/@protrav/@travail/documents/instructionalmaterial/wcms_751232.pdf)
- Bolisani, E., Scarso, E., Ipsen, C., Kirchner, K. & Hansen, J. P. Working from home during COVID-19 pandemic: lessons learned and issues. *Manag. Market.* **15**(s1), 458–476. <https://doi.org/10.2478/mmcks-2020-0027> (2020).
- Mathews AS. *Remote Work Statistics in GCC: Insights & Trends*. 2024. <https://rcademy.com/remote-work-statistics-in-gcc/> [Accessed 23rd August 2025].
- Gajendran, R. S. & Harrison, D. A. The good, the bad, and the unknown about telecommuting: Meta-analysis of psychological mediators and individual consequences. *J. Appl. Psychol.* **92**(6), 1524–1541. <https://doi.org/10.1037/0021-9010.92.6.1524> (2007).
- Ivasciuc, I. S., Epuran, G., Vuță, D. R. & Tescașiu, B. Telework implications on work-life balance, productivity, and health of different generations of Romanian employees. *Sustainability.* **14**(23), 16108. <https://doi.org/10.3390/su142316108> (2022).
- Catană, Ș.A., Toma, S. G., Imbrișcă, C. & Burcea, M. Teleworking impact on wellbeing and productivity: A cluster analysis of the Romanian graduate employees. *Front. Psychol.* <https://doi.org/10.3389/fpsyg.2022.856196> (2022).
- Garavand, A., Jalali, S., Hajipour Talebi, A. & Sabahi, A. Advantages and disadvantages of teleworking in healthcare institutions during COVID-19: A systematic review. *Inf. Med. Unlocked.* **34**, 101119. <https://doi.org/10.1016/j.imu.2022.101119> (2022).
- Golden, T. D. The role of relationships in understanding telecommuter satisfaction. *J. Organ. Behav.* **27**(3), 319–340. <https://doi.org/10.1002/job.369> (2006).
- Mann, S. & Holdsworth, L. The psychological impact of teleworking: stress, emotions and health. *N. Technol. Work. Employ.* **18**(3), 196–211. <https://doi.org/10.1111/1468-005X.00121> (2003).
- Vayre, É., Morin-Messabel, C., Cros, F., Maillot, A. S. & Odin, N. Benefits and Risks of Teleworking from Home: The Teleworkers' Point of View. *Information* **13**(11), 545. <https://doi.org/10.3390/info13110545> (2022).
- Deschênes AA. Professional isolation and pandemic teleworkers' satisfaction and commitment: The role of perceived organizational and supervisor support. *European Review of Applied Psychology = Revue Européenne De Psychologie Appliquée.* 2023;73(2): 100823. <https://doi.org/10.1016/j.erap.2022.100823>.
- Singh, P., Bala, H., Dey, B. L. & Filieri, R. Enforced remote working: The impact of digital platform-induced stress and remote working experience on technology exhaustion and subjective wellbeing. *J. Bus. Res.* **151**, 269–286. <https://doi.org/10.1016/j.jbusres.2022.07.002> (2022).
- Athanasiadou, C. & Theriou, G. Telework: systematic literature review and future research agenda. *Heliyon.* **7**(10), e08165. <https://doi.org/10.1016/j.heliyon.2021.e08165> (2021).
- Blahopoulou, J., Ortiz-Bonnin, S., Montañez-Juan, M., Torrens Espinosa, G. & García-Buades, M. E. Telework satisfaction, wellbeing and performance in the digital era. Lessons learned during COVID-19 lockdown in Spain. *Curr. Psychol.* **41**(5), 2507–2520. <https://doi.org/10.1007/s12144-022-02873-x> (2022).
- Petcu, M. A. et al. Multidimensional assessment of job satisfaction in telework conditions. Case study: Romania in the COVID-19 pandemic. *Sustainability.* **13**(16), 8965. <https://doi.org/10.3390/su13168965> (2021).
- Becerra-Astudillo, L., Vargas-Díaz, B., Molina, C., Serrano-Malebrán, J. & Garzón-Lasso, F. Teleworking in times of a pandemic: An applied study of industrial companies. *Front. Psychol.* **13**, 1061529. <https://doi.org/10.3389/fpsyg.2022.1061529> (2022).
- Beckel, J. L. O. & Fisher, G. G. Telework and worker health and well-being: A review and recommendations for research and practice. *Int. J. Environ. Res. Public Health* **19**(7), 3879. <https://doi.org/10.3390/ijerph19073879> (2022).
- Federici, S. et al. Approaches adopted by researchers to measure the quality of the experience of people working from home: A scoping review. *J. Technol. Behav. Sci.* **7**(4), 451–467. <https://doi.org/10.1007/s41347-022-00264-4> (2022).
- Grant, C. A., Wallace, L. M. & Spurgeon, P. C. An exploration of the psychological factors affecting remote e-worker's job effectiveness, well-being and work-life balance. *Empl. Relat.* **35**(5), 527–546. <https://doi.org/10.1108/ER-08-2012-0059> (2013).
- Staples, D. S., Hulland, J. S. & Higgins, C. A. A self-efficacy theory explanation for the management of remote workers in virtual organizations. *J. Comput. Med. Commun.* <https://doi.org/10.1111/j.1083-6101.1998.tb00085.x> (1998).
- Fisher-McAuley G, Stanton JM, Jolton JA, Gavin J. Modeling the Relationship between Work/Life Balance and Organizational Outcomes. In: *Annual Conference of the Society for Industrial-Organizational Psychology*. Orlando, Florida; 2003. [https://www.researchgate.net/profile/Jeffrey-Stanton-2/publication/260516221\\_Modeling\\_the\\_Relationship\\_between\\_WorkLife\\_Balance\\_and\\_Organizational\\_Outcomes/links/02e7e53177cbe062aa000000/Modeling-the-Relationship-between-Work-Life-Balance-and-Organizational-Outcomes.pdf](https://www.researchgate.net/profile/Jeffrey-Stanton-2/publication/260516221_Modeling_the_Relationship_between_WorkLife_Balance_and_Organizational_Outcomes/links/02e7e53177cbe062aa000000/Modeling-the-Relationship-between-Work-Life-Balance-and-Organizational-Outcomes.pdf).

25. Hayman, J. Psychometric assessment of an instrument designed to measure work life balance. *Res. Pract. Human Resour. Manag.* **13**(1), 85–91 (2005).
26. Troup, C. & Rose, J. Working from home: do formal or informal telework arrangements provide better work–family outcomes?. *Community Work Fam.* **15**(4), 471–486. <https://doi.org/10.1080/13668803.2012.724220> (2012).
27. van der Lippe, T. & Lippényi, Z. Co-workers working from home and individual and team performance. *N. Technol. Work. Employ.* **35**(1), 60–79. <https://doi.org/10.1111/ntwe.12153> (2020).
28. Wang, H., Xiao, Y., Wang, H., Zhang, H. & Chen, X. ‘Who knows me understands my needs’: The effect of home-based telework on work engagement. *Psychol. Res. Behav. Manag.* **16**, 619–635. <https://doi.org/10.2147/PRBM.S402159> (2023).
29. Grant, C. A., Wallace, L. M., Spurgeon, P. C., Tramontano, C. & Charalampous, M. Construction and initial validation of the E-Work Life Scale to measure remote e-working. *Empl. Relat.* **41**(1), 16–33. <https://doi.org/10.1108/ER-09-2017-0229> (2019).
30. Buomprisco, G., Ricci, S., Perri, R. & Sio, S. D. Health and telework: New challenges after COVID-19 pandemic. *Eur. J. Environ. Public Health.* **5**(2), em0073. <https://doi.org/10.21601/ejeph/9705> (2021).
31. Obdržálková, E. & Moravcová, M. Pros and Cons of Home Office during the Covid-19 Pandemic. *SHS Web of Conferences.* **135**, 01023. <https://doi.org/10.1051/shsconf/202213501023> (2022).
32. Harpaz, I. Advantages and disadvantages of telecommuting for the individual, organization and society. *Work Study.* **51**(2), 74–80. <https://doi.org/10.1108/00438020210418791> (2002).
33. Chang, Y., Chien, C. & Shen, L. F. Telecommuting during the coronavirus pandemic: Future time orientation as a mediator between proactive coping and perceived work productivity in two cultural samples. *Pers. Individ. Differ.* **171**, 110508. <https://doi.org/10.1016/j.paid.2020.110508> (2021).
34. Tavares, A. I. Telework and health effects review. *Int. J. Healthc.* **3**(2), 30. <https://doi.org/10.5430/ijh.v3n2p30> (2017).
35. Hamadeh N, Van Rompaey C, Metreau E, Eapen SG. *New World Bank country classifications by income level: 2022–2023.* <https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2022-2023> [Accessed 25th March 2024].
36. Dagher, L. & Nehme, R. Can Lebanon’s economy be saved? A plan for revival. *Middle East Policy.* **28**(1), 123–134. <https://doi.org/10.1111/mepo.12538> (2021).
37. ESCWA. *Legal study on the possibility of implementing flexibility of labour in Lebanon - United Nations Economic and Social Commission for Western Asia.* ESCWA Resources. <https://www.unescwa.org/sites/default/files/inline-files/law-proposal-flexible-working-arrangements-lebanon-brochure-english.pdf> [Accessed 23rd August 2025].
38. Núñez-Sánchez, J. M., Molina-Gómez, J., Mercadé-Melé, P. & Fernández-Miguélez, S. Navigating remote work: the role of corporate social responsibility in boosting employee engagement. *Academia Revista Latinoamericana de Administracion.* **37**(4), 617–633. <https://doi.org/10.1108/ARLA-07-2024-0141> (2024).
39. Núñez-Sánchez, J. M., Molina-Gómez, J., Mercadé-Melé, P. & Fernández-Miguélez, S. M. Identifying employee engagement drivers using multilayer perceptron classifier and sensitivity analysis. *Eurasian Bus. Rev.* **14**(4), 1001–1022. <https://doi.org/10.1007/s40821-024-00283-6> (2024).
40. Ingusci, E. et al. Development and validation of the remote working benefits & disadvantages scale. *Qual. Quant.* **57**(2), 1159–1183. <https://doi.org/10.1007/s11135-022-01364-2> (2023).
41. Junça-Silva, A. & Caetano, A. How good is teleworking? Development and validation of the tele attitude scale. *Qual. Quant.* <https://doi.org/10.1007/s11135-024-01887-w> (2024).
42. Comrey, A. L. & Lee, H. B. *A First Course in Factor Analysis* (Psychology Press, 2013).
43. Zalat, M. & Bolbol, S. Telework benefits and associated health problems during the long COVID-19 era. *Work (Reading Mass.).* **71**(2), 371–378. <https://doi.org/10.3233/WOR-2106916> (2022).
44. Clark, L. A. & Watson, D. Constructing validity: New developments in creating objective measuring instruments. *Psychol. Assess.* **31**(12), 1412–1427. <https://doi.org/10.1037/pas0000626> (2019).
45. Ahmed, A. & Maruod, W. Comparative analysis of varimax and Promax rotation methods in exploratory factor analysis. *Edelweiss Appl. Sci. Technol.* **9**(5), 501–513. <https://doi.org/10.55214/25768484.v9i5.6929> (2025).
46. Brown TA, Moore MT. Confirmatory factor analysis. In: *Handbook of structural equation modeling.* New York, NY, US: The Guilford Press; 2012. p. 361–379.
47. Adamson, K. A. & Prion, S. Reliability: Measuring Internal Consistency Using Cronbach’s  $\alpha$ . *Clin. Simul. Nurs.* **9**(5), e179–e180. <https://doi.org/10.1016/j.ecns.2012.12.001> (2013).
48. Schober, P., Boer, C. & Schwarte, L. A. Correlation Coefficients: Appropriate Use and Interpretation. *Anesth. Analg.* **126**(5), 1763. <https://doi.org/10.1213/ANE.0000000000002864> (2018).
49. Mamani-Benito, O. J. et al. Design and validation of the telework perception scale (Tele-Cov-19) in Peruvian primary schoolteachers. *Archivos De Prevencion De Riesgos Laborales.* **25**(3), 259–270. <https://doi.org/10.12961/apr.2022.25.03.03> (2022).
50. Filardi F, Castro RMPD, Zanini MTF. Advantages and disadvantages of teleworking in Brazilian public administration: analysis of SERPRO and Federal Revenue experiences. *Cadernos EBAPE.BR.* 2020; **18**: 28–46. <https://doi.org/10.1590/1679-395174605x>.
51. Sigmund, T. & Sladek, P. The perception of teleworking by university students before and during the COVID-19 crisis. *SHS Web of Conferences.* **92**, 04023. <https://doi.org/10.1051/shsconf/20219204023> (2021).
52. West Y. *Differences in Perceived Constraints of Telework Utilization among Teleworkers and Office Workers.* Walden Dissertations and Doctoral Studies. <https://scholarworks.waldenu.edu/dissertations/3267>
53. Brandão, S. & Ramos, M. Teleworking in the context of the COVID-19 pandemic: advantages, disadvantages and influencing factors – the workers’ perspective. *Revista Brasileira de Gestão de Negócios.* **25**, 253–268. <https://doi.org/10.7819/rbgn.v25i2.4221> (2023).
54. Ipsen, C., van Veldhoven, M., Kirchner, K. & Hansen, J. P. Six Key Advantages and Disadvantages of Working from Home in Europe during COVID-19. *Int. J. Environ. Res. Public Health* **18**(4), 1826. <https://doi.org/10.3390/ijerph18041826> (2021).
55. Nguyen, M. H. Factors influencing home-based telework in Hanoi (Vietnam) during and after the COVID-19 era. *Transportation* **48**(6), 3207–3238. <https://doi.org/10.1007/s11116-021-10169-5> (2021).
56. Verdeil É, Biberson M. Infrastructure collapse and network interdependence: lessons from Lebanon’s blackout. *Flux.* 2022;128(2): 66–74. <https://www.cairn-int.info/journal-flux-2022-2-page-66.htm>
57. Kaluza, A. J. & van Dick, R. Telework at times of a pandemic: The role of voluntariness in the perception of disadvantages of telework. *Curr. Psychol.* <https://doi.org/10.1007/s12144-022-03047-5> (2022).
58. OECD. *The surge of teleworking: a new tool for local development?.* OECD Publishing; 2023. [https://www.oecd.org/content/dam/oe.cd/en/publications/reports/2023/09/the-surge-of-teleworking-a-new-tool-for-local-development\\_6b88f7da/5eb3b9f2-en.pdf](https://www.oecd.org/content/dam/oe.cd/en/publications/reports/2023/09/the-surge-of-teleworking-a-new-tool-for-local-development_6b88f7da/5eb3b9f2-en.pdf)
59. Eurofound (EU body or agency), Vargas Llave O, Vacas Soriano C, Hurley J, Staffa E, Peruffo E, et al. *The rise in telework: impact on working conditions and regulations.* Luxembourg: Publications Office of the European Union; 2022. [https://doi.org/10.2806/069206](https://data.europa.eu/doi/https://doi.org/10.2806/069206) [Accessed 12th March 2024].
60. OECD. Productivity gains from teleworking in the post COVID-19 era: How can public policies make it happen? *OECD Policy Responses to Coronavirus (COVID-19).* 2020; <https://doi.org/10.1787/a5d52e99-en>.

## Acknowledgements

The authors would like to thank all those who participated in this study by filling up and spreading the web-based online survey

### Author contributions

PS designed the study; HS, CH, MZ, PS drafted the manuscript; PS, CH carried out the analysis and interpreted the results; JK, MA, SEK assisted in drafting and reviewing the manuscript; PS supervised the course of the article, HS revised and edited the article edited for English language. All authors reviewed and approved the final version of the manuscript.

### Funding

No funding was received for conducting this study.

### Declarations

#### Ethics approval and consent to participate

The Ethics Committee at the Modern University for Business and Science (MUBS) approved the study protocol (MU-20220628–35). All participants provided informed consent at the beginning of the survey before they could access the questionnaire. The study followed the principles delineated in the Helsinki Declaration and maintained anonymity throughout the data collection process.

#### Competing interests

The authors declare no competing interests.

#### Additional information

**Correspondence** and requests for materials should be addressed to C.H.

**Reprints and permissions information** is available at [www.nature.com/reprints](http://www.nature.com/reprints).

**Publisher's note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

**Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

© The Author(s) 2025