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Validation of the Empowering Leadership Style Scale in a Large Sample of Healthcare Professionals

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Abstract

Background

The growing complexity of healthcare systems underscores the need for leadership approaches that promote autonomy, participation, and team development. Empowering leadership has been identified as a promising model for enhancing staff well-being, engagement, and performance, yet its assessment requires psychometrically robust instruments validated in clinical settings.

Purpose

This study evaluated the factorial validity, reliability, and external correlates of the Empowering Leadership Style Scale in a large sample of healthcare professionals.

Methods

A cross-sectional survey was administered to 924 healthcare workers. Item distributions and floor/ceiling effects were examined. Confirmatory factor analysis (CFA) using WLSMV estimated the fit of the original five-factor model and a second-order hierarchical model. Internal consistency was assessed via ordinal McDonald's omega. Associations with sociodemographic variables were examined using Spearman's correlations.

Results

Responses showed generally favorable perceptions of empowering leadership, with limited floor effects and moderate ceiling effects. The five-factor CFA model demonstrated good fit (RMSEA = 0.076; CFI = 0.986; TLI = 0.985; SRMR = 0.026), with strong and significant loadings for all items except item 26. Internal cross-validation using random split samples confirmed the robustness and stability of the measurement structure, yielding highly comparable fit indices and parameter estimates across subsamples. Omega coefficients indicated satisfactory reliability for all subscales and the total scale ($\omega \geq 0.70$). Small but significant associations emerged with manager gender, whereas participant gender, age, and experience showed weak or inconsistent relationships.

Conclusion

The Empowering Leadership Style Scale demonstrates strong psychometric performance among healthcare professionals. The validated factorial structure supports the use of subscale scores offering a reliable tool for leadership assessment, organizational diagnosis, and leadership development initiatives in healthcare settings.

INTRODUCTION

Healthcare systems are increasingly challenged by organizational complexity, workforce shortages, and sustained psychosocial strain. In this context, leadership approaches that distribute authority, foster participation, and invest in staff development have gained renewed relevance (Gottlieb, Gottlieb, & Bitzas, 2021). Empowering leadership—characterized by leading by example, involving staff in decision-making, coaching and developing team members,

sharing information, and showing concern in everyday interactions—has been widely proposed as a pragmatic lever to support staff well-being, collaboration, and care quality within interprofessional healthcare teams. Recent syntheses emphasize that contemporary healthcare leadership should promote trust, psychological safety, and collective competence in order to navigate complexity and sustain performance, innovation, and resilience (Spanos et al., 2024; Välimäki et al., 2024).

The theoretical foundations of empowering leadership are closely aligned with the psychological empowerment framework, which conceptualizes empowerment as a multidimensional motivational state encompassing meaning, competence, self-determination, and impact functions as proximal drivers of positive attitudes and performance. Meta-analytic evidence consistently demonstrates robust associations between psychological empowerment and outcomes such as job satisfaction organizational commitment, and reduced turnover intentions, underscoring the relevance of empowerment-oriented leadership for workforce sustainability. In clinical environments, leadership styles that emphasizing empowerment and participation have been associated with lower burnout, higher engagement and improved patient-related outcomes, further reinforcing their practical value in healthcare organizations (L. Z. Li et al., 2024; Ystaas et al., 2023)

Despite this growing body of evidence, advancing research and practice in empowering leadership critically depends on the availability of psychometrically sound measurement instruments. Valid measurement is essential not only to examine empowering leadership at scale, but also to diagnose organizational climates, and evaluate leadership development initiatives. Importantly, instruments developed in non-clinical contexts or validated in earlier periods cannot be assumed to function equivalently across sectors, professions, and healthcare systems. The hierarchical structures, high task interdependence, and strong normative expectations surrounding authority in healthcare may shape how empowering behaviors are perceived, interpreted, and reported by professionals (Spanos et al., 2024). Furthermore, specific measurement design features—such as the inclusion of reverse-keyed items—have been shown to introduce method effects that can compromise factorial clarity, inflate measurement error, and weaken item–total coherence. These issues warrant explicit examination when validating leadership scales, particularly in large, applied samples where subtle sources of construct-irrelevant variance may have substantial implications for interpretation and use (García-Fernández et al., 2022).

Against this backdrop, the present study aimed to evaluate the psychometric properties of the Empowering Leadership Style Scale in a large sample of healthcare professionals. Specifically, we tested the factorial validity of the original five-dimensional structure using confirmatory factor analysis and evaluated a second-order model representing an overarching empowering leadership construct to support the use of both domain-specific and total scores. In addition, we examined item-level response distributions, including floor and ceiling effects, and assessed internal consistency using McDonald’s omega. Finally, evidence for validity based on relations with external variables was explored by examining associations between empowering leadership dimensions and selected sociodemographic characteristics.

METHODS

Study Design and Participants

A cross-sectional observational study was conducted among healthcare professionals working in public healthcare services. Participants were recruited through an online self-administered survey distributed via institutional communication channels. A total of 924 healthcare workers participated, including nurses (74.7%)

and healthcare assistants (25.3%). Most respondents were female (66.5%), and 40.6% reported more than 20 years of work experience. Participation was voluntary, anonymous, and no identifying information was collected (Table 1).

Sampling and Sample Size Considerations

The final sample of 924 participants provided an adequate basis for conducting a comprehensive psychometric validation of the Empowering Leadership Style Scale. Methodological recommendations for confirmatory factor analysis typically propose a minimum ratio of 10 participants per item or an absolute minimum of 300–500 cases for stable parameter estimation, particularly when using categorical indicators and the WLSMV estimator (Wolf, Harrington, Clark, & Miller, 2013). Given the scale has 38 items, the achieved sample corresponds to approximately 24 respondents per item, far exceeding conventional thresholds and ensuring robust estimation of first-order models (Kline, 2010).

Instruments

Empowering leadership was measured using the Empowering Leadership Style Scale, consisting of 38 items grouped into five theoretically grounded dimensions: (i) Leading by Example; (ii) Participative Decision-Making; (iii) Coaching; (iv) Informing, and (v) Showing Concern / Interacting with the Team. Items are rated on a five-point Likert scale from 1 *("never"*) to 5 (*"always"*). The scale includes both positively worded items and one reverse-coded item (i.e., i26). Higher scores reflect more frequent empowering leadership behaviors.

In addition to the study instrument, demographic and professional characteristics were collected to describe the sample and allow for subgroup analyses. These included gender, age, highest educational attainment, professional role, years of clinical experience, and manager's gender. All variables were self-reported(Lupo et al., 2023).

Data Collection Procedures

Data were collected through an electronic self-administered survey distributed via a secure online platform. Participation was voluntary, and respondents completed the questionnaire independently without supervision. Prior to accessing the survey, participants were provided with detailed information about the study aims, procedures, data handling, and confidentiality safeguards. Informed consent was obtained electronically before questionnaire initiation. The survey platform was configured to prevent multiple submissions from the same device and to minimize missing data by prompting respondents to review incomplete responses before submission, while preserving the voluntary nature of participation. No personally identifying information was collected. Data were stored on password-protected institutional servers accessible only to the research team and were handled in accordance with applicable data protection regulations and institutional privacy standards.

Statistical Analysis

Statistical analyses were conducted using IBM SPSS Statistics (version 29) for descriptive analyses and Mplus (version 8.9) for confirmatory factor analyses (CFA). Sample characteristics were summarized using means and standard deviations for continuous variables and frequencies and percentages for categorical variables. These

analyses were conducted to describe the demographic and professional profile of the participants. Item-level descriptive statistics were examined to evaluate the distributional properties of the items. For each item, frequencies, percentages, means, standard deviations, and response distributions across the five Likert categories were calculated. Floor and ceiling effects were assessed by calculating the proportion of respondents endorsing the lowest ("never") and highest ("always") response categories. Consistent with established psychometric criteria, floor or ceiling effects were considered present if more than 15% of responses were concentrated at the lowest or highest category, respectively (Terwee et al., 2007).

The factorial validity of the instrument was evaluated via CFA of a five-factor correlated structure, in which each item was specified in accordance with the original theoretical framework of the instrument, including the following dimensions: Leading by Example, Participative Decision Making, Coaching, Informing, and Showing Concern/Interacting with the Team (Arnold, Arad, Rhoades, & Drasgow, 2000). Each item was allowed to load only on its hypothesized latent factor, and correlations among the five factors were freely estimated.

Given the ordinal nature of the items (five-point Likert scale), models were estimated using the Weighted Least Squares Mean and Variance adjusted (WLSMV) estimator (C.-H. Li, 2014), which is appropriate for categorical ordinal data (Table 2).

Model fit was evaluated using multiple goodness-of-fit indices, including the chi-square statistic (χ^2), the Root Mean Square Error of Approximation (RMSEA) with 90% confidence interval, the Comparative Fit Index (CFI), the Tucker–Lewis Index (TLI), and the Standardized Root Mean Square Residual (SRMR). Following commonly accepted guidelines, CFI and TLI values ≥ 0.90–0.95, RMSEA values ≤ 0.08, and SRMR values ≤ 0.08 were considered indicative of acceptable model fit (Hu & Bentler, 1999). To examine the stability of the measurement solution, an internal cross-validation was performed through a random split of the dataset into two independent subsamples (Split A and Split B). The same CFA specification and estimation settings were applied in each split, and results were compared qualitatively and quantitatively in terms of global fit, magnitude and direction of standardized loadings (STDYX), and the pattern of interfactor correlations.

Internal consistency reliability was evaluated using ordinal McDonald's omega (ω). This approach was preferred over Cronbach's alpha, as omega provides a more accurate estimate of reliability under conditions of multidimensionality and unequal factor loadings. Omega values ≥ 0.70 were considered indicative of acceptable internal consistency (MCDonalds & Mahwah, 1999)(Table 3).

Evidence for validity based on relations with external variables was examined by testing a set of a priori hypotheses regarding the associations between empowering leadership dimensions and selected sociodemographic variables. Specifically, weak or negligible correlations were hypothesized between empowering leadership scores and professionals' individual characteristics (i.e., age, working experience, and gender of the professional), as empowering leadership is conceptualized as a relational and behavioral construct rather than as a function of followers' demographic attributes (Knevelsrud et al., 2025; Rahman, Zhang, Rahman, & Hyder Sherazi, 2025). Conversely, small but potentially meaningful associations were hypothesized with the gender of the manager, given prior evidence suggesting that leadership perceptions may be influenced by contextual and social factors (Llorente-Alonso, García-Ael, & Topa, 2024), including gender-related expectations and stereotypes (Salin, 2020). Associations were examined using Spearman's rank correlation coefficients, given the ordinal nature of the variables. Measurement invariance across manager gender was tested using multi-group CFA with ordinal indicators and the ULSMV estimator (Meredith, 1993). Configural, metric, and scalar (threshold) invariance

models were sequentially evaluated. Metric invariance was tested by constraining factor loadings to equality across groups while fixing latent factor variances to unity. Scalar invariance additionally constrained item thresholds to equality. Changes in model fit were evaluated using ΔCFI and ΔRMSEA (Chen, 2007). Statistical significance was set at $p < 0.05$.

Ethical considerations

The study protocol was submitted to the relevant Institutional Review Board for evaluation. Formal ethical approval was waived because the study did not involve patients, clinical interventions, or sensitive health data and was considered minimal risk. Nevertheless, authorization to conduct the study was formally obtained from hospital leadership, including nursing directors and unit managers of the participating hospital departments. All procedures were conducted in accordance with institutional policies and applicable data protection regulations.

RESULTS

Sample characteristics

The sample comprised 924 healthcare professionals, mainly nurses (74.7%), with healthcare workers accounting for 25.3%. Most participants were female (66.5%), and 38.9% were older than 50 years. Nearly half of the sample reported upper secondary education (46.6%) or a bachelor's degree (47.1%), while 6.3% held a master's degree. Professional experience was generally high, with 40.6% reporting more than 20 years of work experience. In most cases, the direct manager was female (61.4%).

Item descriptive analysis

Overall, responses showed a clear tendency toward the upper end of the scale across most items, with the categories "often" and "always" being the most frequently endorsed. Floor effects were limited, as the lowest response category ("never") was generally endorsed by a small proportion of participants across items. Several items exhibited moderate ceiling effects, reflecting a high perceived presence of empowering leadership behaviors. The two most endorsed items were *"Works as hard as possible"* (i6, Leading by Example) and *"Helps all members of the group"* (i23, Coaching). For Item 6, 44.5% of participants selected the *"always"* option and 26.5% selected *"often"*, resulting in a combined endorsement of 71.0% in the upper response categories. Similarly, for Item 23, 43.0% of respondents selected *"always"* and 25.6% selected *"often"*, corresponding to 68.6% of responses in the highest categories. The least endorsed items were *"Makes decisions based solely on his/her own ideas"* (Item 26, Participative Decision-Making; reverse-coded) and *"Takes into account group members' ideas even when disagreeing with them"* (i22, Participative Decision-Making). For i26, 22.9% of respondents selected *"never"* and 26.8% selected *"rarely"*, yielding 49.7% of responses in the two lowest categories. For i22, 14.3% of participants selected *"never"* and 11.8% selected *"rarely"*, corresponding to 26.1% of responses in the lowest categories.

Confirmatory factor analysis

Full sample

In the full sample, the five-factor correlated CFA model converged normally and demonstrated acceptable to good overall fit: $\chi^2(655) = 4172.619$, RMSEA = 0.076 (90% CI 0.074–0.078), CFI = 0.986, TLI = 0.985, and SRMR = 0.026. Standardized factor loadings were generally strong and statistically significant across domains, indicating that items were robust indicators of their intended latent constructs. Interfactor correlations were high, suggesting

substantial shared variance among dimensions while still supporting their conceptual distinctiveness within a correlated factor framework. One notable exception concerned item i26, which showed a comparatively weak association with the Participative Decision-Making factor relative to other indicators (STDYX = 0.196, SE = 0.029, p < .001).

Split-sample cross-validation

In Split A (n = 461), model fit remained acceptable ($\chi^2(655) = 2409.552$, RMSEA = 0.076 [0.073–0.079], CFI = 0.983, TLI = 0.982, SRMR = 0.030). Similarly, Split B (n = 463) demonstrated highly comparable fit indices ($\chi^2(655) = 2394.464$, RMSEA = 0.076 [0.073–0.079], CFI = 0.987, TLI = 0.986, SRMR = 0.024), supporting strong internal replication of the overall model structure. Across both splits, standardized factor loadings were consistently high for nearly all items, typically exceeding 0.88 within each domain, and the overall pattern of interfactor correlations was stable. However, i26 displayed consistent instability across subsamples. While the remaining Participative Decision-Making indicators showed strong positive loadings, i26 exhibited small and negative standardized loadings in both subsamples (Split A: STDYX = − 0.231, SE = 0.041, p < .001; Split B: STDYX = − 0.163, SE = 0.042, p < .001). Threshold estimates for this item also suggested limited informativeness of certain response categories.

Validity based on external variables

Manager's gender showed small but statistically significant associations with all empowering leadership domains. Specifically, being supervised by a female manager was associated with slightly lower perceived scores in Leading by Example ($\rho = -0.067$, $p = 0.042$), Participative Decision-Making ($\rho = -0.105$, $p = 0.001$), Coaching ($\rho = -0.067$, $p = 0.043$), Informing ($\rho = -0.090$, $p = 0.006$), and Showing Concern/Interacting with the Team ($\rho = -0.067$, $p = 0.042$). Participants' gender showed weak and inconsistent associations with empowering leadership domains, reaching statistical significance only for Participative Decision-Making ($\rho = -0.069$, $p = 0.035$) and Showing Concern/Interacting with the Team ($\rho = -0.073$, $p = 0.026$). No consistent associations were observed with age, gender, or working experience of the healthcare professional. As expected, strong correlations were observed among the five domains (ρ range = 0.84–0.97, all $p < 0.001$).

Measurement invariance

(Table 4) shows the results for the measurement invariance testing across the managers' gender. Briefly, the configural model showed excellent fit, supporting the same factorial structure across groups. Constraining factor loadings to equality (metric invariance) did not result in any deterioration of model fit (ΔCFI = 0; ΔRMSEA = 0.006), indicating equivalent factor loadings across genders. The scalar model, additionally constraining item thresholds to equality, also demonstrated excellent fit, with negligible changes in fit indices compared to the metric model (ΔCFI = 0; ΔRMSEA = 0.001).

DISCUSSIONS

This study provides updated evidence on the psychometric performance of the Empowering Leadership Style Scale in a large sample of healthcare professionals. The psychometric evaluation was conducted in accordance with COSMIN recommendations, focusing on structural validity, internal consistency, and validity based on relations with external variables (Mokkink et al., 2010). Overall, the findings support the robustness of the scale's factorial structure, its high internal consistency, and its applicability in contemporary clinical settings. Both the five-factor first-order model and the hierarchical second-order model demonstrated good and comparable fit, confirming the theoretical multidimensionality of empowering leadership while also supporting the presence of a

strong overarching construct. This structure is relevant for applied research and organizational practice, as it justifies the use of both domain-specific scores and a total empowering leadership score.

Compared with earlier validation studies conducted outside healthcare or in earlier organizational contexts (Arnold et al., 2000; Zhang & Bartol, 2010), the findings suggest that the dimensions of empowering leadership—leading by example, participative decision-making, coaching, informing, and showing concern—remain empirically distinct yet interrelated in healthcare settings characterized by high task interdependence and hierarchical complexity. The strong correlations among the domains, together with their high loadings on the second-order factor, suggest that empowering leadership is perceived as a coherent pattern of leadership behaviors rather than as a set of loosely related dimensions. To our knowledge, previous validation studies have not explicitly tested a hierarchical second-order factor model; thus, the present study is the first to provide empirical support for the use of a valid and reliable total empowering leadership score, which can be used as a parsimonious indicator of overall empowering leadership, useful for organizational diagnostics, benchmarking, and leadership development initiatives. At the same time, the retention of well-defined first-order factors preserves the conceptual richness of the scale and allows for more nuanced analyses when specific leadership behaviors are of interest.

Although the overall factorial structure was robust, item-level analyses highlighted a noteworthy exception. Item 26 (“Makes decisions based solely on his/her own ideas”), belonging to the Participative Decision-Making domain and reverse-coded, showed weaker psychometric performance compared with other items.

Several explanations may account for this pattern. First, the negative wording of the item may have introduced method effects, as reverse-keyed items are known to increase cognitive load and reduce response consistency, particularly in long Likert-type scales (Barnette, 2000). Second, the semantic content of the item may be ambiguous in healthcare contexts. The phrase “based solely on his/her own ideas” can be interpreted not only as an exclusionary or authoritarian leadership style (the intended construct), but also as legitimate autonomous decision-making driven by professional expertise, clinical urgency, or organizational constraints (Martinko, Harvey, & Douglas, 2007). In such cases, respondents may endorse the item for reasons unrelated to participative leadership per se, introducing construct-irrelevant variance (Podsakoff, MacKenzie, & Podsakoff, 2012). Third, situational attribution bias may further weaken the item’s coherence with the latent construct. Healthcare professionals may perceive individual decision-making as unavoidable in contexts characterized by time pressure, rigid protocols, or medico-legal accountability, thereby responding to the item based on contextual necessity rather than leadership style (West et al., 2015). Taken together, these factors likely explain why Item 26 behaved differently from the remaining items within the same domain. Rather than representing a purely psychometric flaw, Item 26 highlights a conceptual tension between participative leadership and context-driven autonomous decision-making in healthcare. Importantly, despite these limitations, the item was retained in the model. Its removal would have altered the original content balance of the Participative Decision-Making domain and compromised comparability with prior applications of the scale. From a pragmatic perspective, retaining the item while explicitly acknowledging its limitations appears preferable at this stage. Future research should consider reformulating this item using positive wording or more context-sensitive phrasing to better capture participative decision-making without introducing ambiguity.

Internal consistency estimates were excellent across all domains and for the total scale, with McDonald’s omega coefficients well above conventional thresholds. These findings indicate that the scale provides highly reliable scores when used with healthcare professionals and further support its suitability for both research and applied purposes. The use of ordinal omega, rather than Cronbach’s alpha, strengthens confidence in these results, as it

appropriately accounts for the ordinal nature of the items and the unequal contribution of individual items to their respective factors (Dunn, Baguley, & Brunsden, 2014).

Evidence for validity based on relations with external variables was modest but interpretable. Small yet statistically significant associations emerged between empowering leadership perceptions and the gender of the manager, with slightly lower leadership scores reported when the manager was female. Although effect sizes were small, the consistency of this pattern across all five domains suggests a systematic phenomenon rather than a spurious finding. These results should be interpreted cautiously and do not imply differences in actual leadership behaviors; rather, they may reflect gendered expectations, stereotypes, or differential evaluative standards applied to leaders in healthcare settings (Salin, 2020).

Associations with participants' gender were weak and inconsistent, and no meaningful relationships were observed with age or working experience. These findings can be interpreted as evidence of divergent validity, and are broadly consistent with prior leadership research showing that empowering leadership perceptions are not strongly driven by individual demographic characteristics of the professionals, but rather by relational and organizational factors(Wang, Oh, Courtright, & Colbert, 2011).

Finally, the demonstration of scalar invariance supports the use of the Empowering Leadership scale in gender-comparative research and organizational settings, allowing valid comparisons of leadership dimensions across male and female managers. To the best of our knowledge, this evidence represents an original methodological contribution, as it is the first to formally examine measurement invariance of the Empowering Leadership Scale across manager gender using a multi-group CFA framework. The findings suggest that the scale measures the same latent constructs in both groups and that observed or latent score comparisons across gender are meaningful and unbiased. This is particularly relevant for research on leadership styles and equity in managerial roles, where gender-based comparisons are common (Shen & Joseph, 2021).

Strengths and limitations

This study has several strengths, including the large sample size, the exclusive focus on healthcare professionals, and the use of analytic methods appropriate for ordinal data. The comprehensive psychometric evaluation, encompassing factorial validity, reliability, item-level analysis, and external correlates, provides a solid foundation for the use of the Empowering Leadership Style Scale in healthcare research.

Nevertheless, some limitations should be acknowledged. The cross-sectional design precludes causal inference, and the exclusive reliance on self-reported perceptions may be influenced by common method variance. In addition, the external variables available for validity testing were limited and mostly categorical, constraining the evaluation of convergent, discriminant, and predictive validity. Future studies should examine associations with theoretically proximal outcomes, such as job satisfaction, burnout, work engagement, or turnover intentions, and test longitudinal predictive validity.

CONCLUSION

Overall, the Empowering Leadership Style Scale demonstrates strong psychometric properties in a large healthcare sample, supporting its use as a reliable and valid instrument for assessing empowering leadership behaviors. The confirmed hierarchical structure justifies the use of both subscale and total scores, enhancing the scale's flexibility and practical relevance. While one reverse-coded item showed suboptimal performance, its

limitations are theoretically interpretable and highlight important directions for future refinement. Overall, the scale represents a valuable tool for advancing leadership research and practice in healthcare settings.

Declarations

Ethics approval and consent to participate

This study did not require formal ethics approval, as it did not involve the collection of patient data, sensitive information, or any information allowing the identification of individuals. In accordance with Italian data protection legislation (Legislative Decree No. 196/2003, "Data Protection Code," as amended by Legislative Decree No. 101/2018), research of this nature does not require submission to or approval by an ethics committee or institutional review board. No formal written informed consent was required, as all data were collected anonymously and voluntarily. Nonetheless, all procedures were conducted in accordance with the ethical principles of the Declaration of Helsinki.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available but are available from the corresponding author Grazia Dicuonzo (grazia.dicuonzo@uniba.it)

Competing Interests

The authors declare that they have no competing interests.

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Authors' contributions

FR contributed to the conceptualization, investigation, writing of the original draft, and review & editing. PI contributed to the formal analysis, writing of the original draft, and review & editing. GD contributed to the methodology, writing of the original draft, and supervision. AN contributed to the methodology, writing of the original draft, and supervision. All authors read and approved the final manuscript.

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Tables

Table 1. Sample characteristics (N = 924)

Characteristic	Category	n	%
Gender	Male	279	30.2
	Female	614	66.5
	Other / not specified	31	3.4
Age group (years)	< 30	104	11.3
	31–40	234	25.3
	41–50	227	24.6
	> 50	359	38.9
Professional role	Healthcare worker	234	25.3
	Nurse	690	74.7
Years of work experience	< 5 years	169	18.3
	5–10 years	192	20.8
	11–20 years	188	20.3
	> 20 years	375	40.6
Education level	Upper secondary school	431	46.6
	Bachelor’s degree	435	47.1
	Master’s degree	58	6.3
Sex of the manager	Male	357	38.6
	Female	567	61.4

Note. Percentages are calculated on valid responses.

Table 2. Item response distributions and item–total correlations of the Empowering Leadership Style Scale (N = 924).

Domain	Item	N	Never n (%)	Rarely n (%)	Sometimes n (%)	Often n (%)	Always n (%)	Item–total r
Leading by example	I1	924	48 (5.2)	116 (12.6)	154 (16.7)	305 (33.0)	301 (32.6)	0.89
	I6	924	64 (6.9)	92 (10.0)	112 (12.1)	245 (26.5)	411 (44.5)	0.98
	I11	924	72 (7.8)	90 (9.7)	115 (12.4)	265 (28.7)	382 (41.3)	>0.99
	I16	924	92 (10.0)	101 (10.9)	111 (12.0)	254 (27.5)	383 (41.5)	0.99
	I21	924	82 (8.9)	116 (12.6)	126 (13.6)	260 (28.1)	340 (36.8)	0.97
Participative Decision-Making	I2	924	79 (8.5)	121 (13.1)	169 (18.3)	244 (26.4)	311 (33.7)	0.91
	I7	924	73 (7.9)	79 (8.5)	172 (18.6)	286 (31.0)	314 (34.0)	0.96
	I12	924	87 (9.4)	109 (11.8)	161 (17.4)	287 (31.1)	280 (30.3)	0.93
	I17	924	57 (6.2)	103 (11.1)	124 (13.4)	257 (27.8)	383 (41.5)	0.95
	I22	924	132 (14.3)	109 (11.8)	171 (18.5)	246 (26.6)	266 (28.8)	0.88
	I26	924	212 (22.9)	248 (26.8)	216 (23.4)	126 (13.6)	122 (13.2)	-0.10
Coaching	I3	924	69 (7.5)	131 (14.2)	164 (17.7)	244 (26.4)	316 (34.2)	0.93
	I8	924	63 (6.8)	123 (13.3)	131 (14.2)	261 (28.2)	346 (37.4)	0.97
	I13	924	89 (9.6)	109 (11.8)	125 (13.5)	265 (28.7)	336 (36.4)	0.97
	I18	924	58 (6.3)	95 (10.3)	136 (14.7)	271 (29.3)	364 (39.4)	0.99
	I23	924	51 (5.5)	125 (13.5)	114 (12.3)	237 (25.6)	397 (43.0)	0.99
	I27	924	61 (6.6)	139 (15.0)	162 (17.5)	274 (29.7)	288 (31.2)	0.81
	I29	924	74 (8.0)	130 (14.1)	108 (11.7)	254 (27.5)	358 (38.7)	>0.99
	I31	924	75 (8.1)	103 (11.1)	113 (12.2)	268 (29.0)	365 (39.5)	0.98
	I34	924	64 (6.9)	121 (13.1)	113 (12.2)	275 (29.8)	351 (38.0)	>0.99

Domain	Item	N	Never n (%)	Rarely n (%)	Sometimes n (%)	Often n (%)	Always n (%)	Item–total r
	I35	924	80 (8.7)	116 (12.6)	117 (12.7)	283 (30.6)	328 (35.5)	>0.99
	I38	924	70 (7.6)	130 (14.1)	111 (12.0)	268 (29.0)	345 (37.3)	>0.99
Informing	I4	924	88 (9.5)	87 (9.4)	155 (16.8)	249 (26.9)	345 (37.3)	0.94
	I9	924	92 (10.0)	95 (10.3)	155 (16.8)	268 (29.0)	314 (34.0)	>0.99
	I14	924	74 (8.0)	122 (13.2)	118 (12.8)	310 (33.5)	300 (32.5)	0.95
	I19	924	86 (9.3)	113 (12.2)	134 (14.5)	250 (27.1)	341 (36.9)	>0.99
	I24	924	59 (6.4)	111 (12.0)	113 (12.2)	260 (28.1)	381 (41.2)	0.95
	I28	924	76 (8.2)	126 (13.6)	115 (12.4)	275 (29.8)	332 (35.9)	—
Showing Concern/Interacting with the Team	I5	924	75 (8.1)	121 (13.1)	132 (14.3)	248 (26.8)	348 (37.7)	0.91
	I10	924	70 (7.6)	112 (12.1)	136 (14.7)	238 (25.8)	368 (39.8)	>0.99
	I15	924	80 (8.7)	139 (15.0)	139 (15.0)	205 (22.2)	361 (39.1)	0.94
	I20	924	106 (11.5)	108 (11.7)	133 (14.4)	266 (28.8)	311 (33.7)	0.95
	I25	924	75 (8.1)	96 (10.4)	126 (13.6)	238 (25.8)	389 (42.1)	0.97
	I30	924	57 (6.2)	127 (13.7)	101 (10.9)	254 (27.5)	385 (41.7)	>0.99
	I32	924	39 (4.2)	122 (13.2)	130 (14.1)	231 (25.0)	402 (43.5)	>0.99
	I33	924	52 (5.6)	120 (13.0)	110 (11.9)	252 (27.3)	390 (42.2)	0.95
	I36	924	70 (7.6)	124 (13.4)	140 (15.2)	249 (26.9)	341 (36.9)	0.97
	I37	924	55 (6.0)	110 (11.9)	131 (14.2)	255 (27.6)	373 (40.4)	0.96

Note. Item–total correlations refer to corrected polychoric item–total correlations computed within the corresponding subscale.

Table 3. Internal consistency reliability of the Empowering Leadership Scale

Scale / Domain	Number of items	McDonald's ω
Leading by Example	5	0.96
Participative Decision-Making	6	0.99
Coaching	11	0.98
Informing	6	0.97
Showing Concern / Interacting with the Team	10	0.98
Total scale	38	0.99

Table 4. Measurement invariance of the five-factor Empowering Leadership model across manager gender (males = 357, females = 567).

Model	Invariance level	χ^2	df	CFI	TLI	RMSEA (90% CI)	SRMR	ΔCFI	ΔRMSEA
M0	Configural (same pattern of loadings)	2240.84	1452	1.00	1.00	0.034 (0.031-0.037)	0.029	—	—
M1	Metric / Weak (equal factor loadings)	1995.27	1457	1.00	1.00	0.028 (0.025-0.031)	0.031	0	0.006
M2	Scalar / Strong (equal loadings + thresholds/intercepts*)	1950.72	1462	1.00	1.00	0.027 (0.024-0.030)	0.035	0	0.001

Note. *M0* = configural invariance (same pattern of factor loadings across groups); *M1* = metric (weak) invariance, with factor loadings constrained to equality across groups and latent factor variances fixed to unity for identification; *M2* = scalar (strong) invariance, with both factor loadings and item thresholds constrained to equality across groups. Models were estimated using multi-group confirmatory factor analysis with ordinal indicators and the ULSMV estimator. Model fit was evaluated using the comparative fit index (CFI), Tucker–Lewis index (TLI), root mean square error of approximation (RMSEA) with 90% confidence intervals, and standardized root mean square residual (SRMR). Measurement invariance was assessed based on changes in CFI ($\Delta CFI \leq 0.010$) and RMSEA ($\Delta RMSEA \leq 0.015$), with smaller values indicating support for invariance. Differences in degrees of freedom reflect the effective number of constraints imposed under ordinal identification.