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Perceived Teacher Informal Relationship Scale: A scale development and measurement invariance study

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Abstract

This work is intended to develop a measuring tool for determining teacher perception of informal relationships. The pool of items created by researchers through a literature review has been presented with expert assessment of the validity of the content, face, and meaning, and a draft scale has been created by making necessary revisions to the feedback. The draft form was applied to 214 teachers working in the central districts of Diyarbakır, exploratory factor analysis was made on the obtained data set, and a six-dimensional scale structure consisting of 20 items was determined. In order to verify this structure, data were collected from 306 teachers working in the central districts of Diyarbakir, and the six-factor scale structure was confirmed based on the goodness of fit values estimated by confirmatory factor analysis. In addition, AVE (Average Variance Extracted), the root of AVE, composite reliability, and correlation among factors were checked, and it was seen that the scale provided the convergent and discriminant validity conditions as a result of the values reached. For reliability analysis, Cronbach's Alpha coefficients and composite reliability values were checked together, and it was seen that the scale had sufficient reliability values. The measurement invariance of the scale was tested according to the categories of gender (female-male), marital status (married-single), level of employment (primary school, secondary school, and high school), and seniority (1-10 years, 11-20 years, 21 and above), and the formality of the scale, metric, scalar, and strict invariance conditions were found to satisfy. Consequently, it was concluded that the scale in question is a valid and reliable scale that can be used to measure teacher perception of informal relationships.

Keywords: Formal relationship, Informal relationship, Scale development, Factorization, Measurement invariance

Introduction

The quality of their intra-organizational relations (Xue et al., 2020). Inter-organizational relations, which have a critical importance, can be classified as formal and informal relations. While formal relationships are based on laws, written contracts, and formally codified legislation (Prell et al., 2010), informal relationships depend on trust, intimacy, or close relationships within the organization, organizational culture (Monge & Contractor, 2001; Tichy et al., 1979) and organizational climate (Tschan et al., 2004). Fay (2011) states that hierarchical control occurs at a lower level in informal relationships compared to formal relationships. This type of relationship, taking place outside the formal format, is more a reflection of the social aspects of organizations. For example, the connections established outside the formal production relations between employees who make friends or sympathize with each other in an organization are defined as informal relationships (Dymitrowski et al., 2019).
When the nature of informal relations is examined, it will be seen that they emerge as a result of requirements that are not provided by formal relations (Aydın, 1994). This type of relationship has the capacity to predict positive results, such as ensuring social control in the organizational sense, resolving relationships with different techniques (Bursalıoğlu, 1994) and providing satisfaction in the work environment (Katz & Kahn, 1971). In addition to these, Ergen (2011) states that an informal relationship is an organizational phenomenon where psycho-social needs are met at the same time. Rath (2006), on the other hand, goes beyond these determinations and states that healthy informal relations will be universally good in an organizational sense.

In this sense, it can be said that informal relations are an intangible and powerful source of connection between employees in organizational life (Zou et al., 2010). This type of relationship, which is outside of production relations, is not framed by legislation, but it may have the feature of strengthening the quality of employee

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performance (Yang & Shen, 2014). In cases where formal channels become dysfunctional, organizational costs can be avoided if informal relationships are used (Dyer & Singh, 1998). With its flexibility, strictarity, and capacity to provide practical knowledge exchange, this type of relationship also has the potential to provide a strict culture of cooperation among employees (Poppo & Zenger, 2002).

The capacity to meet the psycho-social needs of the person and the ability to predict positive organizational results may bring an optimistic perspective towards informal relations. However, when evaluated from a wider perspective, it will be easily understood that the event is not so simple and plain. As a matter of fact, besides the relationship of informal relationships with positive results (e.g., organizational commitment, job engagement, employee satisfaction; Shellenbarger, 2000; Sias et al., 2004), negative effects such as the intention to leave, stress, nepotism, and conflict of interest (Berman et al., 2002) were revealed. In this sense, the correct management of informal relationships with a sensitive nature (due to their potential to predict positive or negative results) is of vital importance for organizations. Administrators, being aware of the value of informal relations for the organization, can reveal the potential in the organization and turn it into energy and therefore efficiency; otherwise, managers who are insensitive to this relationship and ignore it in administrative processes will not be able to display an effective management approach. Informal relationships, which can be the source of organizational conflicts (Crabtree, 2004), are an organizational phenomenon that requires good management in this regard. Administrators who can control and care about this informal relationship can achieve a positive school environment and healthy functioning in organizational life (Mosley et al., 1996).

When evaluated as a whole (without concentrating on positive or negative consequences), informal relationships have a quality that can predict important organizational results (Ackermann & Eden, 2011). Especially informal relations having a wide-ranging effect on understanding, making sense, and directing organizational behaviors, are discussed in a broad sense in the field of management (Rank, 2008; Song et al., 2015). Some studies suggest that the type of informal relationship that is not encoded in organizational structure designs is more likely to occur in comparison to the formal relationship. While Mintzberg (2015) states that informal relationships and channels constitute around 45% of organizational life; Van Hoye and Lievens (2009) calculated this rate as 75%. Informal relations, which are an important organizational reality, are expected to be experienced more in schools, which are an open social system, due to the fact that the human element is more effective compared to other organizations (Bursalıoğlu, 1994; Hoy & Miskel, 2010). When the informal relationship between teachers, administrators, and students, which does not depend on official rules, is managed and constructed in a healthy way, it can have an impact on reaching educational goals as a potential power in educational institutions (Yang & Shen, 2014; Zheng et al., 2008).

In general, informal relations that start within the institution have the quality to continue outside the institution (Kuipers, 2009). However, as in every social phenomenon, informal relations can also be affected by structural, cultural, and technological changes. Indeed, the proliferation of mass media, social networks, and Web 2 tools in educational institutions globally and nationally, and the realization of COVID-19 pandemic interactions through these tools have naturally changed the structure (Luykx et al., 2020) and quantity (Hazar & Saylık, 2021) of informal relationships. The measurement tools (Memduhoğlu & Saylık 2012; Uğurlu, 2014; Toytok & Doğan 2019) used in the literature to obtain meaningful data on informal relationships were developed before these changes occurred in the global and national sense. Therefore, these measurement tools ignore some indicators of informal relationships. In this study, it is intended to develop a measurement tool to measure teachers' perceptions of informal relationships, taking into account these changes in social life and organizational conditions.

Method

With this study, it was aimed to develop a valid, reliable, and useful scale to measure Teachers' Perception of Informal Relationships (P-TIRS). The study was designed within the framework of a screening design as part of the quantitative research paradigm. Screening design is a research design conducted to determine the attitudes and thoughts of participants regarding a phenomenon under investigation (Fraenkel & Wallen, 1996). Additionally, the steps that DeVellis (2003) stated should be followed in the scale development process were adhered to. According to the author, the steps to be followed in the scale development process are: i) determining the purpose, ii) identifying the qualities to be measured, iii) creating the item pool, iv) examining the item pool and conducting the application, v) determining the psychometric properties.

Working Group

In order to develop the P-TRI scale, two different participant groups in Diyarbakır were studied. Data obtained from 214 teachers was used for exploratory factor analysis, and data from 306 teachers was used for confirmatory factor analysis. The demographic information of the participants is shown in Table 1.

Table 1. Demographic Information of Participants

		Group 1. (N=214)		Group 2.(N=306)	
Categories		***f***	***%***	***f***	***%***
Gender	Woman	86	40.2	151	49.3
	Male	128	59.8	155	50.7
Marital status	Married	154	72.0	180	58.8
	Single	60	28.0	126	41.2
Age	21-30	27	12.6	64	20.9
	31-40	63	29.4	67	21.9
	41-50	44	20.6	65	21.2
	51 and above	80	37.4	110	35.9
Seniority	1-10 years	73	34.1	91	29.7
	11-20 years	94	43.9	96	31.4
	Over 21 years	47	22.0	119	38.9
Level of employment	Primary school	69	32.2	100	32.7
	Secondary school	63	29.4	119	38.9
	High school	82	38.3	87	28.4

Creating the Scale

A pool of 70 items was created to determine informal relationships by scanning the literature by the researchers (e.g., Dymitrowski et al., 2019; Ergen, 2011; Hazar & Saylık, 2021; Kuipers, 2009; Memduhoğlu & Saylık 2012; Uğurlu, 2014; Toytok & Doğan 2019). These items were first examined by five experts in the field of educational administration, and in line with the evaluations of these experts, five items were excluded from the item pool on the grounds that they were out of content, and 13 items measured the same characteristics as the other items In line with the recommendations of the experts, two items were added to the pool regarding informal relations. The resulting pool of 54 items was examined by two assessment and evaluation experts in order to get their evaluations in terms of scientific research logic. The two items were corrected on the grounds that they measured more than one thing at the same time and included words that did not have a five-item function. Then, it was examined by two Turkish language experts to check the suitability of the items in terms of meaning and spelling rules. As 11 items were not clear and intelligible within the framework of the opinions of language experts, they were corrected, and the items were given their final form. Considering the style of writing the items, the scale was prepared in a five-point Likert type as "I strongly disagree (1)", "I do not agree (2)", "I am undecided (3)", "I agree (4)" and "I strongly agree (5)".

Analysis of Data

The scale was examined by education administration experts for content validity, assessment and evaluation experts for face validity, and Turkish language experts for semantic validity, and necessary revisions were made according to feedback. Afterwards, the factorization of 54 items was started. For the factorization process, Exploratory Factor Analysis (EFA) was performed using the SPSS 22 package program. Kaiser-Meyer-Olkin (KMO) coefficient for the adequacy of the sample number to which the scale items were applied, and Bartlett's Test of Sphericity analyses were performed for the compliance of the items with EFA. A value of over .60 for the KMO coefficient is considered an indication of the adequacy of the sample size, and the significance of the Bartlett's Sphericity Test is accepted as an indicator of the scale's suitability for factor analysis (Tabachnick & Fidell, 2007). Although there are different factorization techniques, the principal components technique was preferred because it was psychometrically powerful, statistically simple, and effective in dealing with uncertainties (Stevens, 1996; as cited in Akbulut, 2010). In EFA, rotation was performed to have more information about the factors. Based on the assumption that the factors were not known in advance and therefore unrelated,

the Varimax vertical rotation technique (Çokluk et al., 2010) was applied. For the evaluation of the indicators, item factor loads and common variance values were taken into account. Since further analyses will be made regarding the scale items, the cut-off point for item factor loads was taken as .50 (Hair et al., 1998). The cut-off point of the common variance value was again taken as .50 (Thompson, 2004), and it was decided to exclude items with lower values from the scale (Kalaycı, 2010).

Confirmatory Factor Analysis (CFA) was performed to confirm the scale structure formed after the factorization process. The χ 2 test, which is the spherical type omnibus test, is usually used to evaluate the fit of the measurement model in DFA. However, since the χ2 test is sensitive to the sample size, the normed χ2 (*χ2/sd) value* obtained by dividing the *χ2 value by the degree of freedom (df*) is used (Şen, 2020). A value less than 2 is considered a perfect fit (Tabachnick & Fidell, 2007), while a value below 3 is considered a good fit (Hu & Bentler, 1999). In addition to the normed *χ2* statistic, it is recommended to use TLI (Tucker–Lewis Index), CFI (Comparative Fit Index), SRMR (Standardized Root Mean Square Residual) and RMSEA (Root Mean Square Error of Approximation) values to assess model fit (Xu & Tracey, 2017). Hu and Bentler (1999) CFI and TLI values greater than .95; A RMSEA value of less than .06 and an SRMR value of less than .05 indicate a perfect fit. On the other hand, CFI and TLI values were between .90 and .95; The RMSEA value is between .06 and .10; An SRMR value between .05 - .10 indicates an acceptable fit (Hu & Bentler, 1999).

Composite reliability (CR), average variance extracted (AVE) and correlation values between factors were used to test the convergent and discriminant validity of the scale whose structure was verified. If the CR values of the scale are greater than .70 and the AVE value, and the AVE value is greater than .50, the convergent validity of the scale is; the fact that the square roots of the AVE values are higher than the correlation values between the factors is accepted as a sign of discriminant validity (Hair et al., 2014). In order to test the reliability of the scale, whose construct, convergent, and discriminant validity were tested, Cronbach Alpha (α) values as well as CR statistics were checked. Since the Cronbach Alpha coefficient is based on the assumption that factor loads and error variances are equal, and this situation is not statistically correct (Raykov, 1998), CR values are used together with Alpha values.

Measurement invariance tests were applied to determine whether the scale, whose validity and reliability analyses were performed, measured the same structure in different groups. In the studies where the scale will be applied, it is a very important issue in the comparisons between the groups whether the difference really arises from the group or the measurement tool. In studies where the difference is caused by the measurement tool, comparisons between groups may cause erroneous results (Byrne, 2008). In order not to encounter such a problem, measurement invariance tests are needed (Vandenberg & Lance, 2000).

Measurement invariance is first initiated by the formal invariance test. If the fit values of the formal invariance tests are good or at an acceptable level, the scale is considered to provide the formal invariance condition (Gürbüz, 2019). After the formal invariance condition is provided, metric, scalar, and strict invariance tests are applied, respectively. Significance of χ^2 difference tests ($\Delta\chi^2$) in these nested models, respectively checked, and a non-significant difference is accepted as evidence that these types of invariances are achieved. However, since χ^2 tests are sensitive to sample size, alternative difference fit values are checked. Chen (2007) states that $-0.010 \leq \Delta CFI$ and $\Delta RMSEA \leq 0.015$ values in samples larger than 300 are good cut-off points for the invariance decision.

Results

In this section, first of all, EFA was performed for factorization. Then, the factorization results were validated by CFA. Construct validity, convergent validity, and discriminant validity were tested on the data obtained by CFA. After the validity analyses, reliability analyses were made, and at the last stage, the necessary tests for measurement invariance were applied.

Exploratory Factor Analysis (EFA)

As a result of the exploratory factor analysis, the KMO value was .82 and the Barlett sphericity test (χ2 = 6090.06; df = 1431; p = 0.00) was found to be statistically significant. Therefore, it was determined that the sampling was sufficient and the data set was suitable for EFA. As a result of factor analysis, it was seen that 20 factors with an eigenvalue greater than 1 emerged from the data set. Afterwards, considering the item contents, six dimensions were determined, and the data set was tested again as six factors. As a result, it was decided to exclude 19 items from the analysis, respectively, because the values they loaded under the two factors were below .10 (Hair et al., 1998). Then, item analyses were made, and items with item load values and common variance values below .50 were excluded from the analysis, starting with the lowest one. As a result of this process, 16 items were excluded from the dataset. A six-factor structure consisting of 19 items was estimated as a result of the analysis. The results of the EFA are given in Table 2.

Table 2. EFA results for the scale

Factor Loads and Common Variance Values							
Substances	factor 1	factor 2	factor 3	factor 4	factor 5	factor 6	h^2
m62	0.81						0.67
m63	0.78						0.67
m60	0.78						0.72
m61	0.77						0.64
m31		0.83					0.58
m34		0.79					0.72
m30		0.72					0.55
m37			0.86				0.83
m36			0.86				0.80
m40			0.80				0.66
m26				0.87			0.70
m25				0.81			0.76
m24				0.78			0.80
m14					0.79		0.70
m12					0.79		0.65
m13					0.76		0.67
m3						0.80	0.68
m10						0.76	0.73
m8						0.72	0.67
Eigenvalue	4.56	2.88	1.99	1.56	1.31	1.17	
Total Explained Var. %	24.01	15.18	10.49	8.25	6.91	6.16	

Note: P-TIRPS= percieved teacher informal relationship

When Table 2 is examined, it will be seen that a scale structure with an eigenvalue greater than 1 and consisting of six factors has been revealed. The eigenvalues and variances of the factors are, respectively, 4.56 (24.01), 2.88 (15.18), 1.99 (10.49), 1.56 (8.25), 1.31 (6.91) and 1.17 (6.16). Six factors have explained 70.99% of the total variance.

The first factor consists of four items with loads ranging from .77 to .81; The second factor consists of four items with a loading value between .71 and .83; the third factor consists of three items with load values between .80 and .85; the fourth factor was loaded between .78 and .87; the fifth factor consisted of three items loaded between .76 and .79 and the sixth factor consisted of three items with a factor loading value between .72 and .80. The common variance values (h^2) of all items were found over .50. This situation can be shown as important evidence for the homogeneity of the scale items (Çokluk et al., 2010).

The six factors created were named "World View", "Social Media", "Motivation", "Syndicate ", "Sincerity," and "Outside the Institution," respectively, by the researchers, taking into account the item contents and related variables.

Confirmatory Factor Analysis (CFA)

CFA was performed to confirm the structure of the scale, which consists of 19 items and six factors as a result of EFA. Single factor, six-factor, and second-order six factor CFA model fit values for the P-TIRs are shown in Table 3.

Table 3. P-TIRS Fit Values of Models Related to Factor Structure of the Scale

Models	χ^2	**df**	χ^2/**df**	***p***	**RMSEA**	**CFI**	**TLI**	**SRMR**
Single factor model	2049.516	152	13.48	.000	.202	.338	.255	.162

Six-factor model	208.655	137	1.52	.000	.041	.975	.969	.045
Second order six-factor model	239.086	146	1.64	.000	.046	.968	.962	.066

Note: P-TIRS= percieved teacher informal relationship scale

When Table 3 is examined, it will be seen that all goodness-of-fit indices for the single-factor model are outside the acceptable limits. However, all fit indices of the six-factor model estimated by EFA indicate excellent fit values. In addition, we tested the second-order six-factor model and observed that the results were worse than the fit values of the single-factor model, so we decided to use the single-factor model. In this sense, it is seen that the six-factor P-TIR scale provides the valid conditions for construct validity. The results of the modified measurement model are shown in Figure 1.

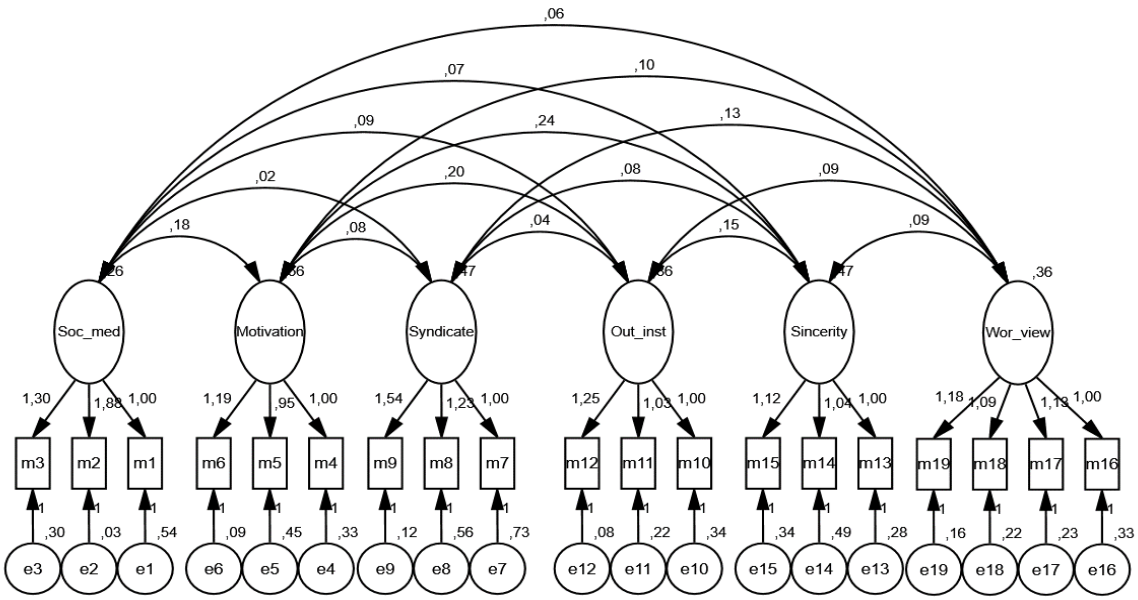

Figure 1. Confirmatory factor analysis of P-TIRS

CR, AVE, square root of AVE, correlation between factors, and Cronbach Alpha values were calculated for the convergent validity, discriminant validity, and reliability of the six-factor P-TIR scale. The results obtained are shown in Table 4.

Table 4. Validity and Reliability Statistics of the P-TIR Scale

Factor	**α**	**AVE**	**CR**	**√AVE**	**1**	**2**	**3**	**4**	**5**	**6**
1. World view	.88	.65	.88	.80	1					
2. Motivation	.86	.69	.76	.83	.17**	1				
3. Syndicate	.82	.62	.72	.79	.27**	.12*	1			
4. Sincerity	.80	.59	.70	.76	.17**	.42**	.13*	1		
5. Outside the institution	.86	.68	.76	.82	.24**	.33**	.12*	.28**	1	
6. Social media	.82	.62	.82	.79	.22**	.38**	.14*	.18**	.20**	1

Note(s): α= Cronbach Alpha; AVE= Avarage Variance Extracted; CR= Composite Reliability; √AVE= The square root of AVE, ** *p<.01*

When Table 4 is examined, it will be seen that the AVE values of all factors were estimated higher than .50 and the CR values higher than .70. In addition, the AVE value for each factor was estimated lower than the CR value. By looking at these statistics, it can be said that the scale provides convergent validity conditions and measures conceptually similar structures.

When the values for each factor are checked, the fact that the CR value is greater than the AVE value and .70 and the square root of the AVE value is higher than the correlation values between the factors can be shown as evidence

that the scale provides the discriminant validity conditions. Based on this evaluation, it can be said that although the scale measures conceptually the same structures, the measurements are different from each other. However, when both Alpha and CR values are controlled, high values are predicted for all factors. Therefore, reaching high reliability values for all factors can be shown as evidence that the scale provides the reliability requirements.

Measurement Invariance

In order to estimate whether the scale measures the same structure according to the categories of gender (female-male), marital status (married-single), level of employment (primary school, secondary school, and high school), and seniority (1-10 years, 11-20 years, 21 and above). Measurement invariance analyses were performed. The statistics obtained are given in Table 5.

Table 5. Measurement Invariance Statistics of the P-TIR Scale (N=306)

Models	χ^2	**df**	**SRMR**	**TLI**	**CFI**	**RMSEA**	$\Delta\chi^2$	**Δdf**	***p***	**ΔCFI**	**ΔRMSEA**
Female (N=151) *Male (155)*											
Configural model	409.549	274	.047	.943	.954	.040					
Metric model	453.702	312	.049	.947	.952	.039	44.153	38	.227	-.002	-.001
Scalar model	472.461	327	.059	.948	.950	.038	18.759	15	.224	-.002	-.001
Strict model	490.817	346	.059	.951	.951	.037	18.356	19	.472	.001	-.001
Married (N=180) *Single (126)*											
Configural model	523.784	276	.066	.924	.939	.046					
Metric model	543.089	313	.064	.938	.943	.042	19.305	37	.992	.004	-.004
Scalar model	556.045	328	.067	.941	.943	.041	12.956	15	.605	.000	-.001
Strict model	579.181	347	.068	.943	.942	.040	23.136	19	.231	-.001	-.001
Primary School (N=100) *Secondary School (119)* *High School (87)*											
Configural model	554.515	411	.065	.940	.952	.034					
Metric model	654.319	487	.072	.941	.944	.034	99.804	76	.034	-.008	.000
Scalar model	707.947	517	.097	.937	.936	.035	53.628	30	.005	-.008	.001
Strict model	771.531	555	100	.933	.928	.036	63.584	38	.005	-.008	.001
1-10 Years (N=91) *11-20 years (96)* *21 + (119)*											
Configural model	523.354	411	.063	.952	.962	.030					
Metric model	618.356	487	.066	.953	.955	.030	95.002	76	.069	-.007	.000
Scalar model	646.126	517	.073	.957	.956	.029	27.770	30	.582	.001	-.001
Strict model	715.724	555	.078	.950	.946	.031	69.598	38	.001	-.010	.002

When Table 5 values are examined; c fit values of the configural model according to gender category χ 2 (274) = 409,549; RMSEA = .040; CFI = .954; TLI = .943; and SRMR = .047. These values, which are evidence of the overall perfect fit of the model, show that formal invariance is achieved. Then, the fact that the p value of all $\Delta\chi2$ values calculated by gradually comparing each model with the previous model is insignificant and that the ΔCFI and ΔRMSEA values are within the limits of -0.010 and 0.015 reveals that metric, scalar, and strict invariance conditions are provided. Therefore, the insignificance of the $\chi2$ difference tests and the variation of ΔCFI and ΔRMSEA values within the predicted limits indicate that all stages of measurement invariance are fully provided for the gender category.

Marital status categories were $\chi2$ (276) = 523.784; RMSEA = .046; CFI = .939; TLI = .924; and SRMR = .066. Based on these values, it can be said that the condition of formal invariance is provided. The fact that the p value of all $\Delta\chi2$ values calculated by gradually comparing each model with the previous model is insignificant and the change values in CFI and RMSEA are in the range of -0.010 to 0.015 reveals that metric, scalar, and strict invariance conditions are provided. In this sense, both the insignificance of the $\chi2$ difference tests and the fact that the ΔCFI and ΔRMSEA values do not exceed the predicted limits indicate that all measurement invariance stages are fully provided for the marital status variable.

Fit values of the formal invariance model in terms of the level of employment were $\chi2$ (411) = 554.515; RMSEA = .034; CFI = .952; TLI = .940; and SRMR = .065. These values, indicating a good fit, show that the formal constancy condition is met. The significance of the p value of all $\Delta\chi2$ values for which each model is calculated incrementally by comparing it with the previous model is a situation that should be suspected for the metric, scalar, and strict invariance stages. However, the fact that all changes in CFI and RMSEA values are in the range of -.010 to .015 can be shown as evidence of metric, scalar, and strict invariance. In this sense, it can be said that all measurement invariance stages are provided in terms of the level of employment based on ΔCFI and ΔRMSEA values.

For the seniority variable, the fit values of the formal invariance model were $\chi2$ (411) = 523.354; RMSEA = .030; CFI = .962; TLI = .952; and SRMR = .063. These values show that the necessary conditions for configural invariance are met. Then the fact that the p values of the $\Delta\chi2$ values of the metric and scalar model, which are calculated by gradually comparing each model with the previous model, are insignificant and the ΔCFI and ΔRMSEA values are within the limits of -.010 and .015 show that the metric and scalar invariance is fully achieved. On the other hand, if the p value of the $\Delta\chi2$ value of the strict invariance model is significant, it is a situation that requires suspicion that strict invariance is achieved. However, the change in CFI and RMSEA values in the range of -.010 to .015 can be shown as evidence that the necessary condition for strict invariance is fulfilled. Based on all these data, it can be concluded that formal, metric, and scalar invariance are fully provided and strict invariance is partially provided in terms of seniority category.

Discussion and Conclusion

Informal relationships, which are shaped outside the formal format in organizational life and can have a sensitive nature in terms of the positive and negative outcomes that they can predict, are an important organizational reality. Structural, cultural, and technological developments in the global and national context have caused systematic changes in both the sociological structure and working conditions, and this has also changed the structure and quantity of informal relations. In this study, it was aimed to develop an informal relationship perception scale (P-TIR) for teachers, who are seen as one of the most important stakeholders of the education system, where these changes occur violently.

Although there are measurement tools available in the literature to assess teachers' informal relationships (e.g., Memduhoğlu & Saylık 2012; Uğurlu, 2014; Toytok & Doğan 2019), significant changes have occurred in informal relationships in the education context at the national and global level in recent years. The widespread use of mass media, social networks, and Web 2.0 tools in educational institutions, the intensification of interactions through these tools during the COVID-19 pandemic, and their effects on the structure and quantity of informal relationships (Hazar & Saylık, 2021; Luykx et al., 2020) highlight the importance of considering these changes in the development of such tools. Additionally, measurement invariance tests were applied to the P-TIR scale to demonstrate that the variance stems from the informal relationship itself rather than various variables (gender, marital status, rank, seniority), contributing to the literature.

First, to develop the scale, a literature review was conducted by the researchers, and an item pool of 70 items was created. Five experts in the field of educational administration were consulted for content validity; It was examined

by two assessment and evaluation experts for face validity and two Turkish language experts for semantic validity. Necessary revisions were made according to the feedbacks, and a draft scale of 54 items was determined. Afterwards, EFA was applied to the draft scale. It was observed that 20 factors emerged with EFA, and then the data set was reanalyzed by determining six dimensions, taking into account the item contents. Due to factor loadings, common variance values, and loading under multiple factors, 35 items were excluded from the analysis, and a 20-item scale structure consisting of six dimensions was estimated. “Social media” and “World view” dimensions are four items each; the dimensions of "Motivation", " Syndicate", "Outside the Institution" and "Sincerity" consist of three items each. The scale explains 70.99% of the total variance in general, and it is accepted that this value is over 50% (Liau et al., 2011).

To confirm the scale structure determined as a result of the EFA analysis, a CFA was conducted testing for single-factor, six-factor, and second-order six-factor models. When the model fit values of the single-factor model were checked, it was found that they were outside the acceptable limit ($\chi 2/df=13.48$; RMSEA= .202; CFI=.338; TLI=.255; SRMR=.162). Therefore, the scale is not suitable for one-dimensional use. However, it was observed that the fit values of both the six-factor model ($\chi 2/df=1.52$; RMSEA= .041; CFI=.975; TLI=.769; SRMR=.045) and the second-order six-factor model ($\chi 2/df=1.64$; RMSEA= .046; CFI=.968; TLI=.962; SRMR=.066) were within acceptable limits. Therefore, the P-TIRS can be used as both a six-factor and a second-order six-factor scale.

Using the standardized item values and residual values obtained by DFA, the values of CR, AVE and AVE’s square root were obtained. These values were also evaluated together with the Pearson correlation values between the factors, and the convergent and discriminant validity of the scale were checked. After controlling these values, it was determined that the scale provided both convergent and discriminant validity conditions. Parallel to this, both Cronbach Alpha and CR values were controlled together, and it was observed that these values were above .70. Therefore, it has been estimated that the scale has a reliable structure.

At the last stage, measurement invariance analyses were conducted to determine whether the scale would measure the same construct in terms of different groups in comparative studies. Formal, metric, scalar, and strict invariance tests of the scale were performed according to the variables of gender, marital status, level of employment, and seniority. It was revealed that formal, metric, scalar, and strict invariance were fully achieved in terms of gender and marital status variables with these tests, due to both the insignificance of the $\chi 2$ difference test and the fact that the change in RMSEA and CFI values were within the threshold values. $\chi 2$ difference tests were found to be significant in terms of seniority, and level of employment and this revealed a questionable situation regarding measurement invariance in terms of these variables. However, the $\chi 2$ values, which are sensitive to sample size, as well as the change in CFI and RMSEA values, were controlled. Since the change in these values is within the threshold values, it has been observed that the scale meets the formal, metric, scalar, and strict invariance conditions in terms of seniority and level of employment. Based on these results regarding the measurement invariance of the scale, it can be used reliably in comparative studies as it measures the same structure in terms of gender, marital status, seniority, and level of employment.

In this sense, as a result of all these evaluations, it can be said that the P-TIR scale has structural, convergent, and discriminant validity, has good reliability values, meets measurement invariance criteria, and can therefore be used safely in order to determine teachers' perception of informal relations. All items of the P-TIR scale were coded positively. The scale has been prepared as a five-point Likert type. The highest score a participant could get from the scale was 95; the lowest score is 19. A high score indicates a high level of perception of informal relationships; low scores indicate low informal relationship perception level. Therefore, researchers who will apply the scale are expected to pay attention to this issue.

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Authors Contribution Rate

In general, the contribution rate of the first author to the research is 50%. The contribution rate of the second author to the research is 30%. The contribution rate of the third author is 20%.
Author 1: Designing the research, determining the method, counseling, validity and reliability studies.
Author 2: Designing the research, reporting.
Author 3: Data analysis and reporting

Conflicts of Interest
There is no conflict of interest in the research.

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