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Adaptation of Teacher Immunity Scale to Turkish Culture: Validity and Reliability Study

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Abstract

The literature on teacher identity has yet to fully succeed to address the relationship between personal and contextual factors of teacher identity. Therefore, researchers are attempting to come up with constructs that better account for teacher identity. Accordingly, teacher immunity is a new concept that is a construct teachers develop either productively or maladaptively to protect themselves from the ever-increasing stress and challenges in instructional environments. This study aims to adapt the Language Teacher Immunity Questionnaire (Hiver, 2017) to Turkish culture. Research data were collected from a sample of teachers from various branches working in public and private schools (n=357). The scale adaptation process consists of 20 consecutive steps offered by the researchers based on a comprehensive literature review. When linguistic equivalency was ensured, confirmatory factor analysis was performed for construct validity, and internal consistency was tested through McDonald's Omega coefficients. After some modifications, the fit indices were above acceptable levels. Also, convergent and divergent validity were examined. According to the results, the Teacher Immunity Scale (TIS) in a 6-point Likert-type format consisting of 32 items gathered under seven factors preserved the original factor structure. This study offers a valid and reliable Turkish adapted form of TIS that can be used with teachers from all branches. Teacher immunity is an emerging concept in teacher identity research, and this adapted instrument allows researchers to research the construct in Turkish.

Keywords

Teacher immunity, teacher identity, resilience, coping, burnout.

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INTRODUCTION

Research on both exploration and development of teacher qualities, one of the most crucial and leverageable variables of student achievement, and developing these qualities have increasingly gained significance lately (Churchward & Willis, 2019; Darling-Hammond, 1997; Harris & Sass, 2011). Accordingly, teacher identity research which is regarded as one of the emerging components of studies on teacher qualities has catapulted recently (Beauchamp & Thomas, 2009; Beijaard et al., 2004), and new concepts are addressed to account for teacher identity. These concepts include teacher motivation (Dörnyei & Ushioda, 2009), teacher agency (Erdem, 2020a; Priestley et al., 2015), teachers' possible selves (Hamman et al., 2013; Tatlı Dalioğlu & Adıgüzel, 2017), teacher vision (Ergünay & Adıgüzel, 2020; Parsons et al., 2017), and teacher self-efficacy (Friedman & Kass, 2002). Teacher immunity, which refers to an analogy with biological immunity and its results, is a recent concept in explaining teacher identity (Hiver, 2017; Hiver & Dörnyei, 2017).

Hiver and Dörnyei (2017), who offered the concept of teacher immunity, argue that the need for this notion recently emerged because teachers experience very high-level stress in instructional environments, the level of this stress is ever-increasing, and the teacher identity research could not adequately address the relationship between personal and contextual factors of teacher identity. They maintain that teacher immunity is indeed a protective armor that develops through the interaction between teachers' personal and contextual factors to cope with the stress they experience in their teaching career; however, teachers may grow resistance to change when their teacher immunity develops into a maladaptive form.

Though a recent concept in teacher psychology research, a considerable amount of research has accumulated on teacher immunity (Ahmadi et al., 2020; Atefi Boroujeni et al., 2021; Beyranvand & Mohamadi Zenouzagh, 2021; Gooran et al., 2022; Jafari & Ameri, 2020; Li, 2021; Sampson, 2022). However, teacher immunity is under-researched in the Turkish context (Saydam, 2019), and the limited studies (Ordem, 2017; Sarıçoban & Kırmızı, 2021) address only English language teachers because Hiver's (2017) scale is not available in Turkish. In this regard, adapting Language Teacher Immunity Questionnaire (LTIQ) (Hiver, 2017) to the Turkish language may spark interest among academics. This study, therefore, aims to adapt the LTIQ to Turkish culture and report the psychometric properties of the adapted version of the scale. Though the scale name refers to language teachers, the items in the scale are not specific to language teachers, and we adapt this scale for all teachers, with Hiver's consent. Utilizing this instrument in studies involving not only language teachers but also teachers working in all other branches may enable us to understand the nature of teacher immunity development as a part of teachers' professional identity and hence contribute to the international literature.

Teacher Immunity

The 21st century presents a complex and complicated life for all people. Teachers are not an exception in this case. Given the peculiarities of the new century, teachers work in very stressful environments, and they have to cope with numerous problems. Pressures from educational authorities, parents, school managers, or other stakeholders can undermine teachers' immunity which should be fostered (Beyranvand & Mohamadi Zenouzagh, 2021). Teachers are not innately immune to this stressful environment, and they need to employ some psychological mechanisms to deal with the everchanging problems of the profession. Although there are some practices to increase teaching service quality, there are not adequate opportunities built in schools for supporting beginning teachers, mentorship,

or cooperation programs. In addition, attempts to address complex issues, such as why teachers do what they do or how they accommodate themselves to new settings, from a psychological perspective, do not go back a long way (Hiver, 2017). Understanding why some teachers preserve their vision and thrive in their careers while others suffer a lot and hardly survive in the profession was the starting point for studying teacher immunity (Saydam, 2019).

Hiver and Dörnyei (2017) proposed a theoretical framework for teacher immunity. They developed the concept of teacher immunity to reveal how psychological factors affect the instructional processes in the context of language teachers. Teacher identity is defined as "a robust armoring system that emerges in response to high-intensity threats and allows teachers to maintain professional equilibrium and instructional effectiveness" (Hiver, 2017). Given the definition, teacher immunity is not limited to language teachers. It is related to all teachers. He maintained that teacher immunity functions as a tool to understand teachers' lives and teaching practices considering issues including the commitment to the profession, adaptivity and openness to change, well-being, and effort in student learning.

Teacher immunity protects teachers in complicated learning environments; however, just like biological immunity, it may evolve into a maladaptive form and lead to threats such as resistance to change, apathy, and cynicism (Hiver, 2017). Hiver argued that when teachers feel vulnerable in protecting their professional identity and self-perception, their maladaptive behaviors may include conservative pedagogy, defensive teaching, and not being engaged and committed to the profession. Positive or negative, teacher immunity influences teachers' all practices in their teaching career (Atefi Boroujeni et al., 2021). This dual nature of teacher immunity posits two main global types of immunity: productive immunity and maladaptive immunity (Hiver & Dörnyei, 2017). Accordingly, productive immunity involves adapting to the demands of the profession. Despite heavy workloads, challenging relationships, or other specific adversities such as dealing with substance abuse, productive immunity acts as a robust system, including the characteristics of specificity, memory, adaptability, and durability. On the other hand, maladaptive immunity involves skewed defense mechanisms such as risk avoidance and exerting mechanical routines in the classroom as opposed to investing in new methodologies accompanied by apathy and fossilization. Though these mechanisms may solve the immediate problem temporarily, they are not adequate in the long term and may cause depletion (Hiver & Dörnyei, 2017). Hiver (2017) then added the immunocompromised and partially immunized to the immunity types. Accordingly, partially immunized teachers are those who have half-way characteristics of teacher immunity, while immunocompromised teachers are the ones who have not developed a coherent teacher immunity form.

Hiver (2017) and Hiver and Dörnyei (2017) argued that the self-organization component of complexity theory is helpful in understanding how teacher immunity evolves and materializes in teachers. Complexity theory posits that an organism and its environment dynamically change each other, and self-organization enables the organism to realize the external environment and accommodate to the environment to survive (Saydam, 2019). Correspondingly, teachers follow the stages of triggering, linking, realignment, and stabilization in following a self-organized sequence (For a detailed explanation, see Hiver & Dörnyei, 2017). Based on further research, Hiver (2017) identified teacher archetypes as their immunization characteristics aligned with the global immunization types. These archetypes include the spark plug, the visionary (productively immunized), the sell-out, the fossilized teacher (maladaptively immunized), the overcompensator, the bleeding heart (immunocompromised), the defeated teacher, the poseur, and the striver (partially immunized) (see Hiver, 2017 for detailed information).

Based on the interview data on the teacher archetypes and literature review, Hiver (2017) identified seven absolute factors of the teacher archetypes. He developed a scale to identify teachers' teacher immunity characteristics on the basis of these factors. The factors named self-efficacy, burnout, resilience, attitudes toward teaching, openness to change, classroom affectivity, and coping shape teachers' immunity features. Teaching self-efficacy is teachers' belief regarding their capabilities to perform their profession, and teachers with a high level of self-efficacy employ effective teaching strategies, commit themselves to their profession, and are less inclined to burnout (Morris et al., 2017). A common problem in schools, teacher burnout refers to a syndrome of depersonalization, emotional exhaustion and a decrease in personal capabilities and achievement, and it debilitates teachers' idealism, and intrinsic motivation enthusiasm, so it leads them to indifference (Shen et al., 2015). Resilience is one's capacity to adapt to the environment despite challenges and adversities (Howard & Johnson, 2000). Resilient teachers can maintain their commitment to the profession despite serious challenges, bounce back in risky situations, and maintain their well-being (Brunetti, 2006; Oswald et al., 2003). The contrary form of conservatism, openness to change, is manifested in cases of a choice. In these cases, teachers open to change choose the new, for example, unknown curricula or methods (Tal & Yinon, 2002). Classroom affectivity is related to emotions teachers experience in instructional environments. Finally, coping refers to the strategies teachers use in handling challenges and conflicts in the classroom or school.

Purpose

Teacher immunity is a significant concept related to teacher psychology that helps in understanding the nature of teacher identity formation; however, teacher immunity is under-researched in the Turkish context because there is not a reliable and valid instrument to use in Turkish. Hiver (2017), who coined the concept, also offers a teacher immunity scale. Therefore, the current study aims to adapt the language teacher immunity questionnaire (Hiver, 2017) into the Turkish context as a general teacher immunity scale. This study sought to answer the research question: "Are the scores in the adapted form of the Teacher Immunity Scale valid and reliable?".

METHOD

Participants

The research participants were chosen through the convenience sampling technique, and the sample size was determined based on the guidelines regarding the requirements highlighted in the literature. Although various recommendations have been provided in the context of the ideal sample size calculation for confirmatory factor analysis, it is still a matter of debate and controversy. While some scholars (e.g., Bollen, 1989; Schreiber et al., 2006; Tinsley & Tinsley, 1987) suggest that 5 to 10 participants per item in the instrument is regarded as fair enough, others point out a minimum of 100 to 200 cases are needed for CFA (e.g., Chou & Bentler, 2000; Hoe, 2008; Kline, 2016). In another perspective, a sample group consisting of 300 participants equals the ideal sample size (e.g., Comrey & Lee, 1992; Tabachnick & Fidell, 2013). Thus, researchers decided to adopt a holistic and comprehensive approach in this process, and a total of 390 teachers working in public and private schools affiliated with the Ministry of National Education in Türkiye were invited to the research. The researchers informed the teachers about the purpose and method of the study and the data processing. 357 of the invited teachers voluntarily wanted to participate in the study, which met the ideal requirements according to the literature.

While the mean age of the sample group is 39,13 (SD=8,44), the youngest teacher is 22 years old, and the oldest one is 65. Likewise, the average year of teaching experience is 15,67 (SD=8,67), and teachers' years of experience range from one to 46 years. Thus, when the distribution of the participants in terms of gender, age, and department is examined, it can be stated that the sample group has a high representation power of the differences in the research group studied. Table 1 shows the demographic information of the sample group.

Table 1

Demographics of the participants

		N	%
Gender	Female	222	62,2
	Male	135	37,8
	Total	357	100,0
Age	20-29	42	11,8
	30-39	156	43,7
	40-49	110	30,8
	50-59	43	12
	60 and more	6	1,7
	Total	357	100
Experience	1-9 years	93	26,1
	10-19 years	145	40,6
	20-29 years	89	24,9
	30 and more	30	8,4
	Total	357	100,0
Department	Primary School Teaching	71	19,9
	English Language Teaching	46	12,9
	Preschool Teaching	45	12,6
	Turkish Language Teaching	35	9,8

	Mathematics Teaching	24	6,7
	Social Sciences Teaching	14	3,9
	Science Teaching	11	3,1
	Arabic Language Teaching	11	3,1
	Others (29 Departments)	100	28
	Total	357	100

Procedure

At the beginning of the adaptation study, an extensive literature review covering the theoretical research explaining the scale development and adaptation processes in educational studies (e.g., Cohen, Swerdlik, 2018; DeVellis, 2017; Polat & Arslan, 2022) was carried out. Also, previous scale adaptation research on teacher qualifications in Turkish literature was analyzed to compare the stages in the process. In this direction, requirements and steps in the adaptation process were evaluated through a holistic perspective, and a detailed research and application plan was developed to clarify the steps to be followed in this research by the researchers. In this context, the scale adaptation process consists of 20 consecutive steps:

1- Conducting an extensive literature review to check whether the instrument has a Turkish adaptation

2- Getting permission for the adaptation from the scholar/s who developed the original scale.

3- Obtaining ethics approval from the social and human sciences ethics committee

4- Translation of the items into Turkish by the researchers and the first expert group

5- Cross-checking of the draft translations by the researchers through a panel study

6- Formation of Turkish draft form

7- Backward translation of the draft into English by the second expert group

8- Comparative analysis of Turkish draft form and back-translated English form

9- Finalizing the translation process and updating of Turkish draft form

10- Sending the assessment form to the third expert group for consultation

11- Updating the Turkish draft form in line with the feedback and corrections from the third expert group

12- Sending Turkish form to Turkish language expert group for consultation

13- Updating the Turkish draft form in line with the feedback and corrections from the fourth expert group

14- Focus group discussion with teachers

15- Pilot study

16- Linguistic equivalence analysis

17- Administration of the translated scale on the sample group

18- Construct Validity

18.1. Preliminary analysis for CFA

18.2. CFA

19- Reliability analysis

20- Finalizing the draft scale

The researchers, focusing on the context of "teacher immunity", which was put forward as one of the concepts aiming to explain teachers' professional identity, realized that the adaptation of the measurement tool developed by Hiver (2017) into Turkish culture would make a major contribution for the studies to be conducted in this field in Turkey. In this context, the first step taken by the authors was to perform a detailed literature search on educational databases such as Web of Science, Scopus, ERIC and TR Index to ensure whether the instrument has a Turkish adaptation. In this process, only one study using the original scale was found in the Turkish literature (Sarıçoban & Kırmızı, 2021). However, the instrument has not been adapted to the Turkish context in the literature yet.

As the second step, the researchers contacted Hiver, who developed the instrument, through an e-mail to get permission to adapt the scale into Turkish. In this process, Hiver was informed about the plan to carry out an adaptation study of the scale so that it can be used not only for foreign language teachers but also for all teachers. He was also asked to evaluate the potential threats that could be regarded as barriers to using this instrument tool for all teachers from different departments. As a result of the communication between the researchers and Hiver, he supported the idea that enables researchers to use the instrument for all teachers, allowed the scale to be adapted into Turkish, and stated that the results could be pretty meaningful for him as well.

Next, one of the researchers applied to his university's social and human sciences ethics committee to get ethics approval. The researcher added the original form of the scale and the permission document from Phil Hiver to the online application form and gave information about the purpose, methodology, and the sample group expected to participate in their research. One month later, the institution sent the ethics approval report to the researchers.

After obtaining the necessary permissions, the researchers started the translation process of the scale items into Turkish. At first, researchers decided to create independent expert groups to consult in the adaptation process. The criteria considered when determining the language experts during the translation step in the adaptation process of the instrument can be summarized as follows:

1-high level of proficiency in the source language and the target language;

2-sufficient experience in the field of translation;

3-expertise in the subject area of the instrument to be adapted;

4-familiarity with the cultural context.

The necessity of translators to be experts in their field and to have sufficient experience is stated as the factors underlined in the literature that affect both the validity and reliability and the equivalence

of cultural and grammatical harmony (Bracken & Barona, 1991; Hambleton & Kanjee, 1995). As presented in Table 2, four different expert groups, consisting of a total of 10 scholars, were formed to consult at different steps in the adaptation process. Except for the experts in the fourth group, all field experts are academics who have a good command of Turkish and English and have worked in educational sciences at the higher education level for at least 10 years.

In the next step, the authors sent the original form of the scale to the first expert group and asked them to translate the items into Turkish. Also, the authors independently translated the scale items. As the first expert group and the authors completed the translation of the items into Turkish, the authors cross-checked all of them and discussed each item in an online panel study until they reached a consensus. The authors formed the Turkish draft form at the end of this step. Then, they sent the draft to the second expert group and asked them to translate the items back into English. When the experts in the second group completed the backward translation process, the authors compared the items in the original version of the scale with the version translated back into English by the experts in the second group in terms of linguistic equivalency. The findings showed no crucial differences between the forms, and they looked almost identical. Only a limited number of words were changed on the Turkish version to avoid possible ambiguities, and the Turkish draft form was finalized.

Table 2

Detailed information about the expert groups

Expert Groups	*Focus*	*Experts*	*Qualifications*	*Experience*
1st expert group	Turkish Translation	E1	English Language Teaching & Teacher Qualities	15 years
		E2	English Language Teaching & Teacher Education	11 years
		E3	English Language Teaching & Curriculum and Instruction	11 years
2nd expert group	Backward Translation	E1	English Language Teaching & Applied English and Translation	14 years
		E2	English Language Teaching & Turkish as Foreign Language	12 years
3rd expert group	Cross Check	E1	English Language Teaching & Teacher Education	10 years
		E2	English Language Teaching & Educational Psychology	15 years
4th expert group	Turkish Language	E1	Turkish Language Teaching & Turkish as Foreign Language	10 years
		E2	Turkish Language Teaching & Teacher Education	13 years

The authors prepared an assessment form for the third expert group in the following step. The form includes a chart composed of both the items in the updated Turkish form and the original form side by side. There were two options next to each item: accept or revision. The gaps in the next column of the form were for experts' opinions about the items. They could write feedback or offer revised translations for any items with their reasons.

After finalizing the translation process and updating the Turkish draft, the authors sent the assessment form to the third expert group to cross-check the items' conceptual meanings. In this step, experts gave valuable feedback on the linguistic, lexical, and cultural equivalence of the items in a comparative context. The authors updated the Turkish draft form in line with the suggestions and corrections from the third expert group. The exact process was repeated with Turkish language experts to check syntax, grammar, spelling, and punctuation to ensure readability and comprehensibility. After that, the authors made final corrections based on the suggestions from Turkish language experts.

Next, a focus group discussion was held with ten teachers working at different levels of education. Firstly, they were asked to analyze the finalized Turkish version of the scale and underline the items which were not clear or ambiguous. Secondly, they shared their ideas on the factors, instructions, response anchors, font, font size, and layout. At the end of this step, the Turkish form of the scale was ready for the pilot study.

The pilot study consisting of two stages was conducted with 54 teachers, determined by criterion-based sampling method. The main criterion was being proficient in both languages. English teachers were regarded as the best group because of their similar characteristics to the target sample group for the adapted instrument and their linguistic capability in both languages. In this context, the teachers first responded to the original English form of the scale and then to the Turkish form after six weeks.

In the next stage, the researchers administered the Turkish draft form of which linguistic equivalence was proven through expert opinions and statistical analyses, to a total of 357 teachers. These analyses have three substages. The first one, called preliminary analyses for CFA, included the analyses of the normality assumptions through checking the descriptive statistics (Kirk, 2008), visual methods (Field, 2013), normality tests (Krzanowski, 2007) and multivariate normality test through calculating relative multivariate kurtosis (RMK). After that, the differences between mean scores of upper 27% and lower 27% were calculated through an independent sample t-test, corrected item-total correlation values were analyzed. According to the results presented in the findings part, the dataset was acceptable for the CFA analysis. Also, multicollinearity was checked by analyzing the Variance Inflation Factor (VIF). In the second substage, CFA was conducted through LISREL 8.51. Fit indices such as χ^2/df rate, RMSEA, SRMR, NNFI/TLI, PNFI, PGFI etc., were calculated, modification index values of the model were checked, and necessary modifications were performed based on the suggestions from the analysis software. Thirdly, internal consistency was tested through McDonald's Omega values. At the end of these successive steps, researchers finalized the valid and reliable Turkish form of the scale.

Research instrument

Language Teacher Immunity Questionnaire (LTIQ) was developed by Hiver (2017) with 293 South Korean language teachers from various school levels. Based on items from interview data and other established instruments, the questionnaire included 39 items. The factors of the instrument are teaching self-efficacy, burnout, resilience, attitudes toward teaching, openness to change, classroom affectivity, and coping. The Cronbach's alpha values for the factors were .82, .80, .82, .85, .74, .81, and

.78, respectively. The scale is in English and in 6-point Likert type format (from strongly disagree to strongly agree).

Ethical Principles

Ethics committee permission for this study was obtained from Karabük University Social and Human Sciences Research Ethics Committee with the decision dated 18.01.2022 and numbered 2022/01-38.

FINDINGS

This section includes the results of the pilot study for the linguistic equivalence, preliminary analyses, which consist of holistic analyses of normal distribution, independent sample t-test, item-total correlation, CFA in terms of validity, and reliability.

Pilot Study

The data obtained from 54 teachers in the context of the pilot study were analyzed through SPSS 24, and correlation coefficients were examined on the basis of items, factors, and the total scale in order to check the existence of equivalence between the original English form and adapted Turkish form. According to the results, while the correlation levels in the context of the items varied between .74 and .88, the values in the context of the factors were between .82 and .87 ($p<.01$). In addition, the correlation value between the total of the scales was 0.83 ($p<.01$), which points to linguistic equivalence.

Preliminary analyses

As detailed in the method section, a number of preliminary analyzes were conducted to test the normal distribution of the data and its suitability for the validity and reliability of the instrument. First of all, descriptive statistics, including mean, median, mode, skewness and kurtosis values, were examined. Results showed that mean, median and mode values were close (Table 3), which was an indicator of normal distribution. Likewise, skewness and kurtosis values that were between +1 and -1 also strengthen the normality assumption (Bryne, 2010; Hair et al., 2010). After that, a test was conducted to check the normality of the dataset in a comparably. Shapiro-Wilk displayed that the data were normally distributed (Table 3).

Table 3

Descriptive statistics for normal distribution

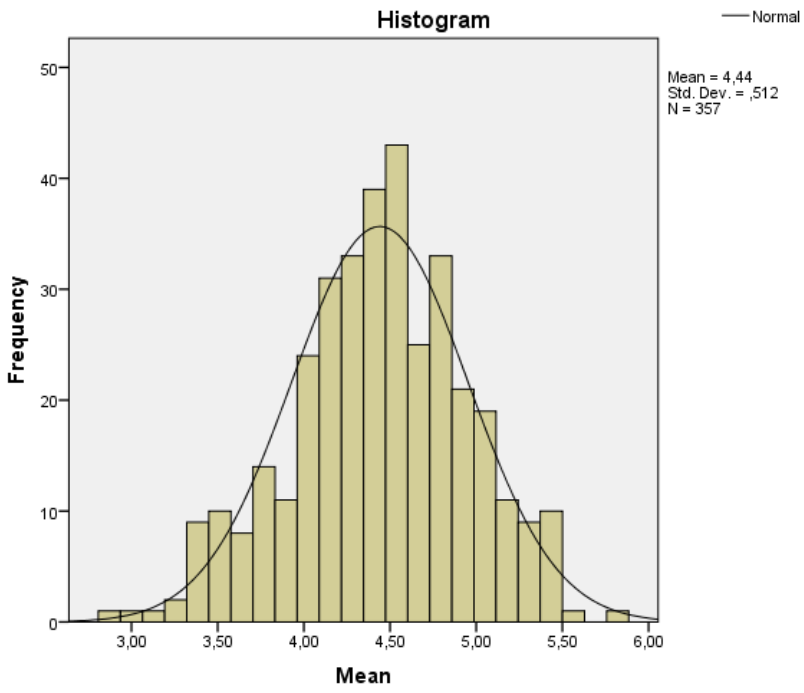
N	Valid	357
	Missing	0
Mean		4,44
Median		4,46
Mode		4,54

Std. Deviation	,512
Skewness	-,192
Std. Error of Skewness	,129
Kurtosis	-,060
Std. Error of Kurtosis	,257
Shapiro-Wilk Statistic	.994
df	357
Sig.	.184

Next, researchers created a histogram with normal curve overlay (Figure 1) to check the distribution of the data in another way to ensure the assumption. As clearly seen from Figure 1, a bell-shaped curve and approximately symmetrical distribution confirmed the previous findings on the normality (Field, 2013; Thode, 2002).

Figure 1

Histogram before CFA



Finally, the data was examined to see multivariate normal distribution. For multivariate normality, relative multivariate kurtosis (RMK) was calculated. As a result, the RMK value was calculated as 1.574.

A value less than 3 is an acceptable level for multivariate normality (Pellegrini & Scandura, 2005). Moreover, Beyazıt and Bütün Ayhan (2018) also highlighted that when RMK value is closer to 1, it shows a multivariate normal distribution. Thus, the assumption of multivariate normal distribution was confirmed. Then, before conducting CFA, multicollinearity among the variables were also checked. It was seen that the VIF values for the variables varied between 1,29 and 3,08 indicating no problems in terms of multicollinearity since they were below 10 (Field, 2013).

In the following step, independent samples t-tests were performed to check the differences between the mean scores of the upper below 27% (n=96) and the lower below 27% (n=96) in the context of individual items and total scale. The results showed significant differences between the means of each item in the upper and lower group. Likewise, the difference between the scale total score is also significant in terms of the upper (M= 5,05 SD=0,23) and the lower group (M= 3,80 SD=0,29) which confirms the success of the items in terms of distinguishing the difference between the two groups [t (190) =33,021, p<.01]. Afterwards, corrected item-total correlation coefficients, which show the correlation between the association of an item with the total score on the other items (Zijlmans et al., 2019), were examined to evaluate the item discrimination. Field (2013) underlines that the discrimination of items in an instrument should be above 0.30 to be acceptable. As presented in Table 5, findings demonstrated that any of the observed values in the scale were not below the cutoff value.

CFA

CFA based on Pearson correlation matrices was conducted to examine the construct validity of the Turkish version of the instrument consisting of 39 items grouped under seven factors. Maximum likelihood was used to estimate parameters. The observed model fit indices for the model reported in the first attempt are presented in Table 4. According to the results obtained from the CFA, it was found that the t-values of three items (Item 3, 28 and 36) were below 1.96, which indicated the requirement for item removal. Composite reliability (CR) values for all factors are above .70 and average variance extracted (AVE) values are above .50. CR > AVE revealed that combining validity was achieved (Hair et al., 1998).

Researchers decided to remove them one by one and repeated the CFA three times. After removing these items, the results showed that t-values of all of the items were above 2.56 and significant (p<.01), which was regarded as acceptable in the literature. After that, the items' factor loadings revealed that four items (Item 20, 24, 27 and 35) were below the .30 acceptance value (e.g. Costello & Osborne, 2005). These items were discarded from the model one at a time, the CFA was reconducted at every turn, and the structure of the scale was checked recursively. After excluding four items, it was revealed that 32 items in the adapted version of the instrument were gathered under seven dimensions, just like in the original scale (see Fig. 2 & Table 5).

The factor loads ranged between the lowest 0.46 and the highest 0.72 for the first dimension; between the lowest 0.52 and the highest 0.80 for the second dimension; between the lowest 0.44 and the highest 0.70 for the third dimension; between the lowest 0.70 and the highest 0.83 for the fourth dimension; between the lowest 0.48 and the highest 0.71 for the fifth dimension; between the lowest 0.40 and the highest 0.69 for the sixth dimension and between the lowest 0.42 and the highest 0.69 for the final factor (see Figure 2). All of the factor loads were acceptable and statistically significant (Comrey & Lee, 1992; Hair et al., 1998; Stevens, 1992; Tabachnick and Fidell, 2013), which points to convergent validity.

In addition to convergent validity, the correlation coefficients between the factors were also examined to test the scale's divergent validity. As presented in Table 6, the correlation coefficients between the factors are not high, which means the relationships between the factors are low and they display a discriminant structure. As Kline (2011) and Hubley (2014) stress, correlations between the factors in the instrument should not be very high for divergent validity. Table 6 displayed that the divergent validity of the scale was ensured.

Table 4

CFA Results

	Before Modifications		*After Modifications*
	χ^2 = 1835,49; df = 681 (p <0.0001)		χ^2 = 1034,36; df = 441 (p <0.0001)
Fit Indices	*Observed Values*	*Acceptable Values*	*Observed Values*
χ^2/df	2.69	Excellent Fit χ^2/df ≤ 2.5	2.34
RMSEA	0.069	Good Fit 0.05 < RMSEA ≤ 0.08	0.061
SRMR	0.075	Good Fit 0.05 < S RMR ≤ 0.08	0.064
PGFI	0.69	Acceptable fit .50 ≤ PGFI ≤ 0.95	0.71
PNFI	0.80	Acceptable fit .50 ≤ PNFI ≤ 0.95	0.82
CFI	0.92	Acceptable Fit .95 ≤ CFI < 0.97	0.95
NFI	0.87	Acceptable Fit NFI ≥ 0.85	0.92
NNFI/TLI	0.91	Good Fit NNFI/TLI ≥ 0.90	0.95
IFI	0.92	Good Fit NNFI ≥ 0.90	0.95

Source: Schumacher & Lomax (2004); Jöreskog & Sörbon (1993); Kline (2011); Meyers, Gamst, & Guarino, 2006; Schermelleh-Engel, Moosbrugger & Müller (2003)

In the following step, fit indices and modification indexes were examined. The model consisting of 32 items displayed good fit according to model chi-square and degrees of freedom ratio; good fit according to RMSEA, SRMR and NNFI/TLI values; acceptable fit according to CFI, NFI, NNFI /TLI and IFI values. Next, the modification index values of the model were analyzed thoroughly, and notable relationships between the error covariances of especially two pairs of items (I29-I30 & I31-I32) were found under the same latent variable named Classroom Affectivity. The analysis software recommended two modifications that would trigger a meaningful decrease in chi-square value and improvement in fit indices if pairs of items (I29-I30 & I31-I32) were covaried. Consequently, these items

were covaried as recommended by the software one by one. When the fit indices after the modifications were analyzed, noteworthy advances were observed in the degree of χ^2/df and fit indices (See Table 4).

Table 5

Statistics after CFA

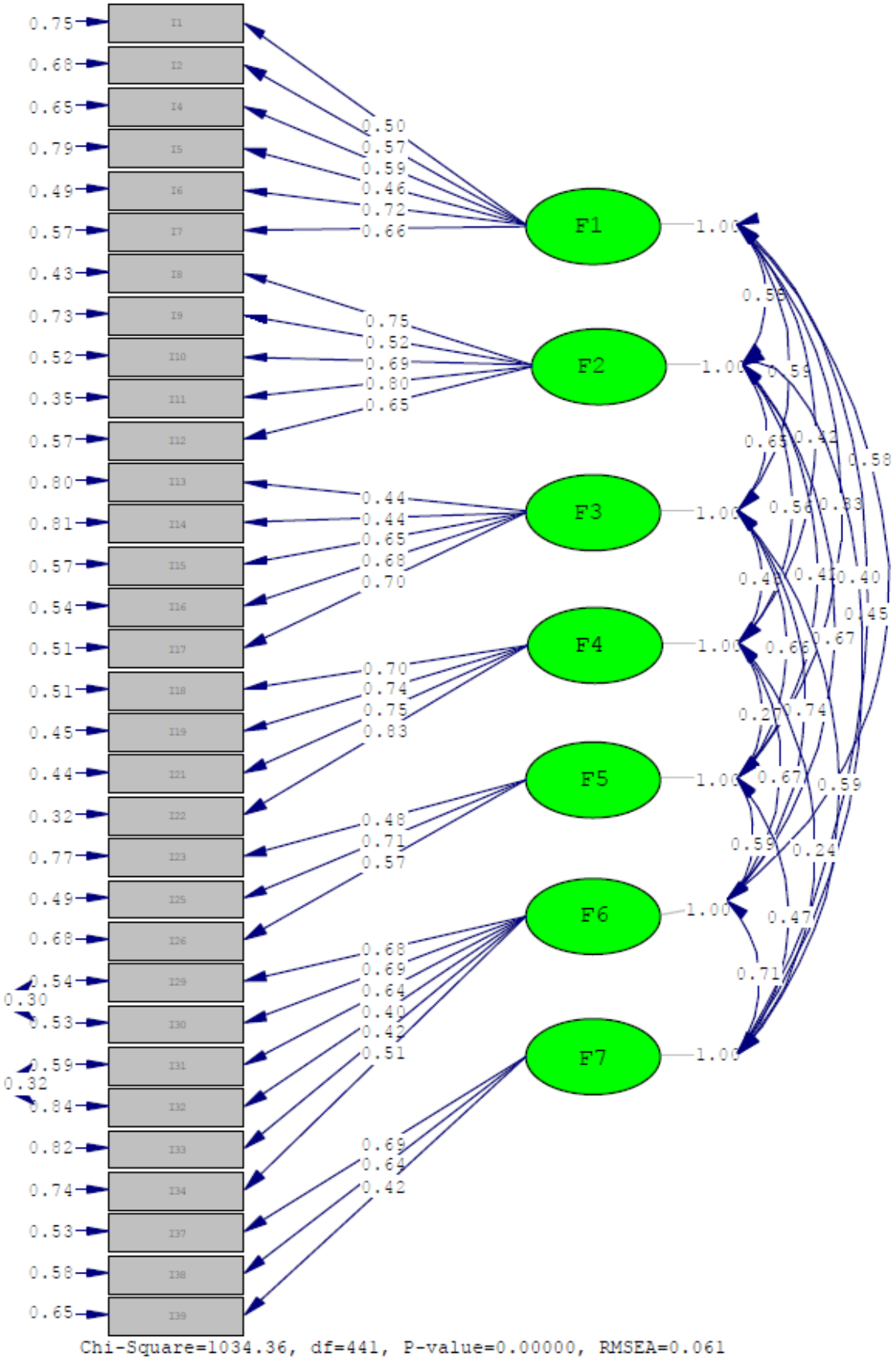
Factors & Items	Mean	SD	Item total r	Error Variances	t	AVE	CR
1st Factor: Teaching Self efficacy (ω= 0.725)						*0.53*	*0.82*
1	5,06	,910	,425	0.75	9.09		
2	5,01	,795	,495	0.68	10.45		
4	4,73	1,059	,460	0.65	11.06		
5*	4,62	1,316	,382	0.79	8.18		
6	4,97	,805	,572	0.49	13.90		
7	5,23	,740	,552	0.57	12.48		
2nd Factor: Burnout (ω= 0.823)						*0.59*	*0.82*
8*	3,98	1,491	,679	0.43	15.63		
9*	4,93	1,257	,436	0.73	9.82		
10*	3,38	1,459	,623	0.52	14.01		
11*	4,00	1,501	,696	0.35	17.15		
12*	4,28	1,453	,581	0.57	12.97		
3rd Factor: Resilience (ω = 0.724)						*0.59*	*0.72*
13	5,01	,904	,359	0.80	7.99		
14	4,16	1,258	,371	0.81	7.96		
15*	4,10	1,214	,507	0.57	12.60		

16	4,73	1,022	,593	0.54	13.31		
17*	4,17	1,300	,542	0.51	13.76		
4th Factor: Attitude toward teaching (ω = 0.842)						*0.57*	*0.84*
18	5,28	,902	,618	0.51	14.25		
19	4,56	1,384	,669	0.45	15.26		
21*	4,32	1,584	,662	0.44	15.51		
22*	4,77	1,310	,739	0.32	17.86		
5th Factor: Openness to change (ω = 0.795)						*0.53*	*0.76*
23*	3,75	1,364	,346	0.77	8.01		
25*	4,30	1,232	,494	0.49	11.80		
26*	4,40	1,249	,379	0.68	9.52		
6th Factor: Classroom affectivity (ω = 0.769)						*0.50*	*0.74*
29*	4,99	1,004	,588	0.54	13.09		
30*	5,14	,898	,639	0.53	13.32		
31	4,72	,937	,614	0.59	12.30		
32	4,87	,935	,467	0.84	7.13		
33*	4,86	,950	,355	0.82	7.64		
34	4,85	,898	,428	0.74	9.47		
7th Factor: Coping (ω = 0.739)						*0.53*	*0.76*
37	4,98	,768	,372	0.53	11.39		
38	4,75	,937	,319	0.58	10.81		
39	4,75	1,391	,372	0.65	3.50		

* These items will be reverse coded.

Figure 2

CFA Results



Reliability

The internal consistency analysis of the scale, consisting of 32 items gathered under seven factors in the structure that formed after CFA, was carried out through the calculation of McDonald's Omega coefficients in the context of both the factors and the scale total. While the internal consistency of the factors ranged from .724 to .842, McDonald's Omega value was calculated as .905 in terms of the scale total (see Table 6). Thus, it can be said that the adapted version of the scale is reliable.

Table 6

Internal consistency coefficients and correlations between factors

Factors	McDonald's Omega	Correlations between the factors						
		F1	F2	F3	F4	F5	F6	F7
Teaching Self-efficacy(F1)	,725	1	,449	,470	,340	,249	,448	,306
Burnout(F2)	,823		1	,508	,496	,299	,499	,358
Resilience(F3)	,724			1	,325	,455	,527	,408
Attitudes Toward Teaching(F4)	,842				1	,213	,496	,214
Openness to Change(F5)	,795					1	,394	,344
Classroom Affectivity(F6)	,769						1	,480
Coping(F7)	,739							1
Total	,905							

RESULTS, DISCUSSIONS, AND SUGGESTIONS

Teacher immunity is a significant construct that teachers should possess to survive in the everchanging and increasingly intense and stressful instructional environments. Hiver (2017), who coined the concept based on extensive research, developed an instrument to measure the factors that contribute to the formation of teacher immunity. This study aimed to adapt this instrument to the Turkish context so that researchers can employ this scale in their research on teacher immunity. Therefore, the researchers followed a meticulous and extensive adaptation process to procure a valid and reliable instrument in this research.

After a scrupulous process for translating the items in the scale and ensuring proper use of Turkish, the linguistic equivalence study, involving English teachers proficient in both English and Turkish, revealed a high-level correlation between the original scale and the adapted version. Following this stage, the validity of the scale was reported using CFA after an iterative analysis process. After some

modifications, the fit indices were above acceptable levels. The results of convergent and divergent validity analysis and item analysis were also reported in the findings section. The reliability analysis also proved a reliable instrument. The analyses performed for the adaptation of the scale culminated in an adapted form of 32 items gathered under seven factors in a six-point Likert-type format. Seven items were removed from the scale in the analysis process; however, the original factor structure of the scale (Hiver, 2017) was preserved. The theoretical framework of the scale was also not affected negatively in this process, because the discarded items were the ones represented in the same factors by the items that are very close in meaning.

The factors of the scale in the final adapted form include teaching self-efficacy (6 items), burnout (5 items), resilience (5 items), attitudes toward teaching (4 items), openness to change (3 items), classroom affectivity (6 items), and coping (3 items). Saydam (2019) based her study on Hiver's (2017) teacher immunity concept but devised a new language teacher immunity questionnaire with data from language instructors working at universities in Turkey. Her questionnaire includes 22 items gathered under the factors of attitudes toward students/profession, positive affect, resilience, coping, self-efficacy, and hardiness. These factors are similar to the factor structure offered by Hiver (2017). However, there are minor differences. Her sample included tertiary-level English instructors; however, this adaptation study involved teachers working at the Ministry of National Education in Turkey from various branches.

Hiver (2017) does not offer a grading scheme for categorizing teachers' levels of teacher immunity since he performed a cluster analysis to match the clusters with his pre-determined teacher archetypes based on a series of interviews. In the current study, higher mean scores refer to higher levels of teacher immunity. Besides, Saydam (2019, p. 85) graded the language instructors' levels as high immunity (means between 5-6), close to high immunity (means between 4-5), halfway immunity (means between 3-4), and low immunity (means between 1-2). Researchers can use this categorization for interpreting the results of the current scale scores.

Since Hiver and Dörnyei (2015) worked with EFL teachers and named the concept as language teacher immunity, various scholars across the world have studied teacher immunity in the context of language teachers (Ahmadi et al., 2020; Atefi Boroujeni et al., 2021; Beyranvand & Mohamadi Zenouzagh, 2021; Ellerton, 2022; Jafari & Ameri, 2020; Li, 2021; Maghsoudi, 2021; Noughabi et al., 2020; Rahimpour et al., 2020; Sarıçoban & Kırmızı, 2021). However, the items in the scale are not specific to language teachers, and the concept of teacher immunity addresses all teachers. Therefore, this critical aspect of teacher identity should be studied with teachers from all branches. With the consent of Hiver, this study employed teachers from various disciplines. This is the first study to include all teachers in teacher immunity research. As well as providing a teacher immunity instrument in Turkish for the use of Turkish scholars, this study may also spark an academic interest in expanding the samples of teacher immunity research across the world. Teacher immunity is not an inborn characteristic, but a situational and instruction-specific construct based on experienced clashes in the classroom (Hiver & Dörnyei, 2015). Hence, teachers' experiences from various fields may enrich teacher immunity research.

Further research may address identifying teachers' levels of teacher immunity in various contexts, and hence the validity and reliability of the scale can be tested. Studies involving advanced analysis techniques such as structural equation modeling or path analysis may portray the relationship of teacher immunity with other constructs in the formation of teacher identity. Mixed-method research studies in which data from this instrument is supported with the qualitative data from interviews,

observations or narrations may help to understand the nature of teacher immunity better. Since teacher identity formation is not limited to the in-service period of teaching career (Erdem, 2020b) and identity shifts are plausible in pre-service teacher education and the period of beginning to teach (Beauchamp & Thomas, 2009), further research may also be conducted with pre-service and/or beginning teachers to reveal how their experiences shape their teacher immunity.

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Appendix

	ÖĞRETMEN BAĞIŞIKLIĞI ÖLÇEĞİ	**Kesinlikle Katılmıyorum**	**Katılmıyorum**	**Kısmen Katılmıyorum**	**Kısmen Katılıyorum**	**Katılıyorum**	**Kesinlikle Katılıyorum**
Öğretim öz-yeterliliği							
1	Eğer gerçekten çabalarsam, motivasyonsuz ya da en zor öğrenciyle bile iletişim kurabilirim.						
2	Bütün faktörler göz önünde bulundurulduğunda öğrencilerimin sınıftaki başarısı üzerinde güçlü bir etkiye sahibim.						
3	Sınıftaki neredeyse tüm öğrenme sorunları ile başa çıkmak için yeterli eğitim ve tecrübeye sahibim.						
4	Öğrencilerimin hayatlarında bir fark yarattığımdan emin değilim.*						
5	Öğrencilerimin sorunları ile etkili bir şekilde başa çıkabilirim.						
6	Yaptığım öğretmenlik sayesinde öğrencilerimin hayatlarını olumlu yönde etkilediğimi hissediyorum.						
Tükenmişlik							
7	Okulda işimden dolayı kendimi tükenmiş hissediyorum.*						
8	Öğretmenliğin beni duygusuzlaştırdığını hissediyorum.*						
9	Okulda kendimi güçsüz hissettiğim günler oluyor.*						
10	Öğretmenlik beni duygusal olarak bitkinleştiriyor.*						
11	Okulda kendimi güvensiz hissettiğim günler oluyor.*						
Dayanıklılık							
12	Daha önce zorluklar ile karşılaştığım için zor zamanları atlatabilirim.						

13	Başarısızlıklar bir öğretmen olarak başarma motivasyonumu ikiye katlar.						
14	Stresli olayların üstesinden gelmekte zorlanıyorum.*						
15	Zor zamanlardan sonra hızlıca kendimi toparlama eğilimindeyimdir.						
16	Kötü bir şey olduğunda kendime gelmek benim için zordur.*						
Öğretmenliğe yönelik tutumlar							
17	Öğretmen olarak çalışmaktan keyif alırım çünkü öğretmenlik bana haz verir.						
18	Öğretmenlik benim hayatımdır ve onu bırakmayı hayal bile edemem.						
19	Eğer bugün meslek seçiyor olsaydım, öğretmen olmayı tercih etmezdim.*						
20	Öğretmenlik mesleğini bırakmaya meyilliyim.*						
Değişime açıklık							
21	Bir öğretmen olarak, bilmediğim şeylerdense aşina olduğum şeyleri tercih ederim.*						
22	Bir öğretmen olarak yaptığım iş konfor alanımın dışında ise ve aşina olmadığım bir şey ise hüsrana uğrarım.*						
23	Geçmiş öğretim sürecimde işime yaramış, ancak artık başarılı olmayan bir şeyi bırakmak benim için zordur.*						
Sınıf duygulanımı							
24	Okulda veya sınıfta kendimi çoğunlukla üzgün hissederim.*						
25	Öğretim sürecinde genellikle kendimi bunalımda hissederim.*						
26	Okulda ya da sınıfta devamlı olarak kendimi canlı hissederim.						
27	Genel olarak, sınıfta kötü şeylerden ziyade iyi şeylerin gerçekleşeceğini beklerim.						
28	Birisinin öğretim konusunda heyecan duyduğunu hayal etmek benim için zordur.*						

29	Öğretim sürecinde her zaman olaylara iyi tarafından bakarım.						
Sorunlarla başa çıkma							
30	İşler çok stresli hale geldiğinde, ne yapacağım konusunda bir strateji bulmaya çalışırım.						
31	Okulda kötü bir durumla karşılaştığımda yaşanan olaylarla ilgili iyi bir şey bulmaya çalışırım.						
32	Önüme çıkan sorunlarla başa çıkabileceğimi düşünmüyorum.*						

* These items will be reverse coded.

Author Contributions

First and second author both contributed equally to the design, implementation of the research, and the analysis of the results in the manuscript.

Conflict of Interest

No potential conflict of interest was declared by the author.

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Ethical Approval and Participant Consent

Ethics committee permission for this study was obtained from Karabük University Social and Human Sciences Research Ethics Committee with the decision dated 18.01.2022 and numbered 2022/01-38.

Plagiarism Statement

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Availability of Data and Materials

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