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RESEARCH ARTICLE

Assessing Cyber-Emotional Skills in the Digital Age: The Turkish Adaptation and Measure Invariance of the E-Motions Scale

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What is already known on this topic?

- *The central role of cyber-emotions in psychosocial adjustment and interpersonal relationships in the digital realm has been recognized, particularly in the context of online interactions and relationships.*
- *Zych et al. (2017) developed and validated the "E-motions Questionnaire," a scale to assess emotional content in cyberspace, including the expression, perception, and regulation of emotions in the digital domain.*

What this study adds on this topic?

- *This study adapted and validated the E-motions scale for the Turkish context, ensuring linguistic and cultural compatibility through a rigorous validation process.*
- *The findings confirm that the four-factor structure of the original scale is applicable in Turkish culture, providing a reliable tool for assessing cyber-emotional skills among high school students.*

Abstract

In an era dominated by digital connectivity, online platforms have emerged as critical arenas where digital natives' behavioral patterns, emotional expressions, and social interactions converge and crystallize. While extensive research has examined various aspects of digital relationships, there is a compelling imperative to prioritize the investigation of emotional dimensions, as these components offer crucial insights into psychological well-being and interpersonal dynamics in virtual spaces. This study addresses a significant methodological gap by validating and evaluating the psychometric properties of the E-motions questionnaire in the Turkish context. Employing stratified sampling, data were collected from 332 high school students. Confirmatory factor analysis results indicate a robust fit of the adapted scale to a four-dimensional 21-item scale. The scale demonstrates high internal consistency, with a Cronbach's α coefficient of 0.933 and a McDonald's ω coefficient of 0.947. Measurement invariance assessments show strict invariance across gender, school type, social media use, and social media platforms. These findings not only validate the instrument's psychometric integrity but also substantiate its utility for conducting meaningful cross-group comparisons in cyber-emotional research, contributing significantly to the growing body of literature on emotional competencies in online spaces.

Keywords: Cyber-emotional skills, high school students, online emotional competency scale adaptation

Introduction

For over a century, linguists, psychologists, and philosophers have debated the meaning and context of emotions (Hebb, 1946; DeCatanzaro, 1999; Ekman, 2003; Goleman, 1996; Plutchik, 2003). For example, William James, commenting on the paradox "We don't laugh because we're happy—we're happy because we laugh", pointed out that emotions occur when we notice bodily changes following a stimulus and emphasized the direct link between these changes and our interpretation of them as emotions (James, 1884, p. 189). Cannon and Bard furthered that emotions and bodily responses occur simultaneously (Morris, 1996). However, in cognitive theory, emotions are not just reactions to external stimuli but are deeply intertwined with cognitive processes, like perception and interpretation (Scherer, 2003). Our subjective understanding and evaluation of a situation significantly influence the emotions we experience in that situation. Regardless of the theoretical framework used to elucidate emotions, several studies demonstrate their role in supporting decision making (Lerner et al., 2015), preparing for action (Fridja, 1987), directing attention (Öhman et al., 2001), influencing the recollection of events during retrieval (Kensinger & Ford, 2020), activating personal values (Cooper & Sawaf, 1997), and guiding interpersonal interactions (Lazarus, 2006).

Emotions are dynamic processes that both create and are affected by social relationships (Halberstadt et al., 2001). Since emotions are a "social matter", they are given meaning, controlled, and managed in our daily relationship life (Williams & Bendelow, 2005). They contribute to overcoming difficulties regarding mind and body, nature and culture, structure and action to facilitate interaction. They therefore play an essential key role in understanding social processes and extend the boundaries of sociological research (Williams & Bendelow, 2005).

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Achieving a high-quality standard of living and fostering healthy communication necessitate the accurate expression of emotions at the right time and place. This entails individuals being aware of their own emotions, being able to regulate them, understanding the emotions of others, mobilizing themselves based on their emotions, and possessing social skills, all of which contribute to a fulfilling life and effective interpersonal relationships (Alemdar & Anılan, 2020). Extensive research has highlighted the significance of emotional competence in traditional face-to-face interactions (Reich, 2017; Steiner, 2003; Mayer & Salovey, 1993).

These days, technology and the internet have a significant impact on human behavior and undoubtedly on an individual's emotional state (Valkenburg et al., 2017) and emotional well-being (Bottaro & Farraci, 2022). Lower social competence has been found to correlate with the perception of online interpersonal relationships as more effective, safe, and convenient than traditional face-to-face interactions (Caplan, 2003). This belief can lead to compulsive use of the Internet and adverse outcomes and trigger new forms of cyber behavior. Previous research has highlighted that deficits in emotional intelligence (EI) or its components are positively correlated with cyber victimization (Baroncelli & Ciucci, 2014). Conversely, EI has been found to protect against excessive internet use (Casale et al., 2013). Furthermore, individuals with higher socio-emotional competencies, such as self-awareness, social awareness, and altruism, are less likely to misuse technology (Cebollero-Salinas et al., 2022) and to experience cyber victimization and aggression (Marín-López et al., 2020). Therefore, fostering emotional e-skills, which encompass the emotional skills and competencies needed to effectively identify, regulate, and express one's emotions in online environments, can effectively mitigate cyber-related risks.

Emotions in Cyberspace

Cyberspace is just another human space and it is inevitable that it would have an emotional context (Holyst, 2017). Emotions are often expressed online, especially negative emotions, more often online than in person (Derks et al., 2008). Whether triggered by real-life dangers or digital content, emotional experiences share similarities, being shaped by psychological mechanisms influenced by social, cultural, and biological factors (Kappas, 2016). Highlighting how emotions spread across digital networks, the term "cyber-emotions" sheds light on the dynamics of emotional experiences on the Internet and their consequent impact on interpersonal interactions. Cyber-emotions refer to affective processes in social networks involving mediated communication influenced by individuals' emotional states, which in turn can lead to the elicitation or modulation of individuals' emotional states in networks (Kappas, 2016). Cyber-emotions not only influence the intensity of personal relationships but may also provide the fuel for the existence of the online group, and the diminution of this emotional investment may well mean the demise of the group (Holyst, 2017). Therefore, understanding cyber-emotions is critical to navigating the digital realm effectively, fostering empathy, collaboration, positive relationship building, conflict resolution, and ethical behavior in virtual communities.

The pervasive influence of cyber-emotions on psychosocial adjustment and interpersonal dynamics has become increasingly evident, particularly in the contemporary digital ecosystem where relationships are increasingly initiated, cultivated, and maintained. This phenomenon calls for a comprehensive understanding of how emotions are expressed, perceived, used, and regulated in online environments. In addition, as digital interactions become a significant part of everyday life, the need for tools to assess emotional competencies in online settings has grown.

The Need for a Tool to Assess Cyber-Emotional Skills

Instruments for assessing emotional competencies in face-to-face interactions are well established (Alemdar & Anılan, 2020), but few studies have investigated their applicability in virtual environments. Several tools have been developed to address this gap. For example, González-Cabrera et al. (2016) introduced the Internet EI scale, based on the Trait Meta-Mood Scale-24, which measures three dimensions of EI in online contexts: attention, clarity, and emotional repair. Similarly, the mobile EI test developed by Sanchez-Gomez and Breso (2019), which is based on Mayer and Salovey's four-branch model, assesses EI through nine tasks and demonstrates a reliable three-factor structure. In addition, Cebollero-Salinas et al. (2022) adapted Bisquerra and Pérez's (2007) framework to develop a scale to measure socio-emotional competencies in digital environments, identifying five dimensions, such as emotional e-conscience and social e-competence.

Despite their contributions, the number of tools specifically focused on measuring emotional content in online communication remains limited. The E-motions questionnaire, developed by Zych et al. (2017), fills this gap by assessing how emotions are expressed, perceived, and managed online under the conceptual framework of "E-motions". Its robust design assesses four key factors—perceiving, expressing, using, and managing emotions—and has demonstrated strong psychometric properties. Recognizing the lack of validated instruments tailored to the Turkish cultural context, this study took a rigorous methodological approach to adapting and validating the E-motions Questionnaire for use in Türkiye. By building on existing scientific work while avoiding redundancy, this adaptation enhances the cross-cultural validity of cyber-emotional assessment and contributes to advancing research on emotional competencies in cyberspace within a broader socio-cultural framework.

Method

This is a scale adaptation study. This section includes details of the original scale, the participants, and the process used to adapt the scale.

Data Collection Tool

The *E-motions questionnaire*, formulated by Zych et al. (2017), is an important tool for assessing these competences in such contexts, aiming to measure the emotional content of online space and to explore the expression, perception, use, and regulation of emotions online. The questionnaire consists of a total of 21 items divided into four subscales: E-motional expression, E-motional perception, facilitating the use of E-motions, and understanding and managing E-motions. The items in the questionnaire are based on the experiences on some popular social networking sites like Facebook, Twitter, and Instagram, as those serve as platforms for sharing experiences and fostering communication within social relationships (Ross & Myers, 2017). The items, which are presented in a FIVE-point Likert format, are answered from "1—strongly disagree" to "5—strongly agree." The validity of the E-motions questionnaire was reinforced by a confirmatory factor analysis (CFA) conducted by the authors, which showed that the goodness of fit indicators of the scale were within acceptable parameters ($\chi^2 = 316.23$, $df = 183$, $p < .05$; $\chi^2/df = 1.728$; comparative fit index (CFI) = 0.98, normed fit index (NFI) = 0.95, non-normed fit index (NNFI) = 0.98, the root mean square errorof approximation (RMSEA) = 0.07). For the tool, the Cronbach's α reliability coefficient was calculated as 0.84 for the emotional expression dimension (four items, e.g. "I express my emotions through social media platforms such as Facebook or Instagram"); 0.75 for the emotional perception dimension (three items, e.g, "People tell me whether they are happy or sad through Facebook or Instagram"); 0.91 for the emotional facilitation dimension (six items, $\alpha = 0.91$; e.g., "I express my emotions through Facebook or Instagram to overcome challenges"); and 0.87 for the emotional understanding and management dimension (eight items, $\alpha = 0.87$; e.g., "I understand what kind of emotions people feel when I look at their profiles"). It has proven a valuable tool for both researchers and practitioners, providing a deeper insight into the complex dynamics of emotions in virtual environments.

Participants and Sampling

We selected our participants from four different high schools in Eskişehir, Türkiye, using stratified sampling, a probability-based sampling approach. The schools in this study were stratified according to their type: science high schools and vocational high schools. Science high schools in Türkiye are selective academic institutions that focus on advanced science and mathematics education and prepare students for university education, primarily in STEM fields. Vocational high schools in Türkiye, on the other hand, provide technical and vocational education and prepare students for direct entry into the labor market or vocational higher education programs. This stratification reflects the academic tracking approach of the Turkish education system, which channels students into different educational pathways based on their academic performance and career aspirations. From four different schools, 332 students volunteered to take part in the study (Table 1).

Of the participating students, 41.3% were male, while 58.7% were female. Additionally, 58.4% of the participants were studying at a science high school, and 41.4% at a vocational high school. Regarding the time spent on social media, 19.3% of participants used it for less than 1 hour, 48.8% for 1–2 hours, and 31.9% for 3 hours or more. In terms of the number of social media accounts, 6.3% had one, 23.8% had two, 28.3% had three, 19.6% had four, and 22% had five social media accounts.

The Procedure

The process of adapting the scale involved several key stages. Firstly, permission for the adaptation process was obtained from the authors of the scale. Approval was obtained from the University Ethics Committee (2023/271) to administer the scale to high school students, ensuring that ethical guidelines were followed.

The adaptation process was systematic. The original items of the scale were translated into Turkish by three academics specializing in educational sciences who were undertaking post-doctoral studies abroad. This resulted in a preliminary Turkish version of the scale. The translated items were then reviewed by four English language experts to ensure consistency between the English and Turkish versions. To validate language and meaning, four Turkish language experts from the Book Writing Commissions of the Turkish NMoE reviewed the items for grammatical accuracy and semantic alignment with the Turkish language and made necessary revisions. To further ensure the fidelity of the translation, a back-translation of the Turkish form into English was carried out by an English language expert, followed by a careful comparison with the original English items to assess equivalence. To establish linguistic equivalence, 21 university students majoring in English Language Education were given both Turkish and English versions of the E-motions scale, administered one week apart. Correlation values between two forms (0.94) showed the items retained the same meaning in both versions. In parallel, the Turkish version was reviewed for content validity by three experts with a Ph.D. in education. With the latest form, we created a Google form which included the demographic section and the scale items, and had help from the teachers working in sampled schools. Teachers made sure students attended the study on a voluntary basis. We had 332 forms at the end of 2 weeks. The items were analyzed using Pearson's product–moment correlation analysis, and the correlation coefficient between the items and the total score was used to calculate item discrimination. The construct validity of the E-motions scale was tested in a CFA, and the internal consistency of the scale was examined using Cronbach's α and McDonald's ω coefficients. "lavaan," "semPlot," and "psych" packages in the R Studio program were used for the validity and reliability analyses of the scale.

Table 1.
Participants' Demographic Information

Variable		*n*	%
Gender	Man	137	41.27
	Woman	195	58.73
	Not declared	0	0.00
School type	Science high school	194	58.43
	Vocational high school	138	41.57
Time spent on social media	Less than 1 hour	64	19.28
	2–3 hours	162	48.80
	3+ hours	106	31.93
Number of social media accounts	1	21	6.33
	2	79	23.80
	3	94	28.31
	4	65	19.58
	5+	73	21.99

Before data analysis, Tabachnick and Fidell's (2013) recommended assumptions were followed to assess missing data, sample size, outlier detection, normality, and multicollinearity. There were no missing data in the dataset. With a sample size of more than 200, it was a large sample according to Kline (2011), thus ensuring a sufficient sample size for the analyses. We checked whether the standardized *z*-score fell within the range [−3, +3] (Kaliyaperumal et al., 2015). As none of the observations had a *z*-score outside this range, none of them were classified as outliers. To assess the normality assumption, we checked skewness and kurtosis values; skewness values ranged from −0.45 to 0.14 and kurtosis values ranged from −0.62 to −0.29. Being within the range of −1.5 to 1.5, the normality assumption was met (Tabachnick & Fidell, 2013). Multicollinearity was assessed using variance inflation factor (VIF) values. The highest VIF value was 3.42, which was observed in item "emot20" of the E-motions scale. Since no item in the scale had a VIF greater than 5, it was concluded that multicollinearity was not a concern (Kline, 2011). We ran the main tests after all these checks.

Factor analysis provides important evidence of construct validity in adaptation studies to determine whether the original factor structure of a scale is appropriate for the adapted culture (Koyuncu & Kılıç, 2019; Uyumaz & Sirganci, 2020). We conducted a CFA to examine the construct validity and factor structure of the scale. The results are evaluated based on the chi-squared value (χ^2), the chi-squared to degrees of freedom ratio (χ^2/df), RMSEA, standardized root mean square residual (SRMR), goodness of fit index (GFI), adjusted GFI (AGFI), NFI, CFI, and Tucker–Lewis Index (TLI) (Byrne, 2012). For the reliability analysis, we calculated the coefficient of internal consistency (Cronbach's α) and the McDonald's omega coefficient (ω).

Measurement invariance across demographic variables was assessed using multi-group CFA (MG-CFA). Measurement invariance was examined by testing four hierarchical models in sequence, namely, configural invariance, metric invariance, scalar invariance, and strict invariance (Vandenberg and Lance, 2000). To assess model-data fit between these stages, χ^2, χ^2/df, RMSEA (RMSEA < 0.08), SRMR (SRMR < 0.08), TLI (TLI > 0.95), CFI (CFI > 0.95), and ΔCFI values were used (Hu & Bentler, 1999). When it was determined that model fit was adequate at the first stage, we proceeded to the next stage of analysis. Some studies suggest that the significance of $\Delta\chi^2$ can be tested to determine whether configural, metric, scalar, and strict invariance have been achieved (Schmitt & Kuljanin, 2008). However, the chi-square difference test is influenced by sample size and often tends to reject the null hypothesis with large samples. As an alternative to $\Delta\chi^2$, Cheung and Rensvold (2002) recommended examining changes in the ΔCFI. In this study, a criterion of ΔCFI less than or equal to 0.01 is used to determine whether invariance has been achieved between stages (Cheung & Rensvold, 2002).

Table 2.
CFA Model Fit Indices

Scale	Reference Value	Model I	Model II
χ^2		480.24	498.09
p		.000	.000
df		183	185
χ^2/df	<5	2.624	2.692
RMSEA	<0.07	0.058	0.060
SRMR	<0.07	0.065	0.067
GFI	>0.90	0.984	0.982
AGFI	>0.90	0.980	0.978
NFI	>0.90	0.974	0.972
CFI	>0.92	0.991	0.989
TLI	>0.90	0.990	0.988

Findings

This section presents findings related to the adaptation of the E-motions scale.

Factor Structure of the E-Motions Scale

In the adaptation of a measure across different cultural contexts, where the factor structure has been established, the use of CFA is essential to assess the factor configuration of the scale in the new cultural setting (Orcan, 2018; Kılıç & Doğan, 2021). To examine the structure of the Turkish version of the E-motions scale, we present the CFAs conducted for the original four-factor model (Model I) and the second-order four-factor model (Model II), see in Table 2).

The eigenvalue plot of the scale shows that there is a dominant factor, and the high level of correlations between the factors (>0.70) indicates that there is a single-factor structure. Confirmatory factor analysis results indicate that this scale meets criteria and is of good quality for both Turkish adaption (χ^2 = 501.0, *df*=152, χ^2/df=3.2; CFI=0.98, NFI=0.98, RMSEA=0.06) and the original form (χ^2=316.2, *df*=183, χ^2/df=1.7; CFI=0.98, NFI=0.95, RMSEA=0.07).

The results of the single-factor CFA in Model I (χ^2/df=2.6, RMSEA=0.06, SRMR=0.07, GFI=0.98, AGFI=0.98, CFI=0.99, TLI=0.99) and Model II (χ^2/df=2.7, RMSEA=0.06, SRMR=0.07, GFI=0.98, AGFI=0.98, CFI=0.99, TLI=0.99) demonstrate a high level of goodness-of-fit and meet all criteria (Kline, 2011; Schumacker & Lomax, 2004). The path diagram and standardized coefficients of the CFA models are presented in Figure 1.

The *t*-values for each item exceeding the critical value of 1.96 at 0.05 indicate that the items are significantly related to the specified structures, demonstrating strong construct validity (Jöreskog & Sörbom, 1993). In our study, the standardized coefficients of each item were found significant in CFA analysis, with *t*-values examined and confirmed significant at $p < .01$ for all items.

Correlations Between Dimensions of the E-Motions Scale

The relationships between the sub-dimensions of the E-motions scale were analyzed by Pearson correlation analysis. The descriptive and correlational analyses are presented in Table 3.

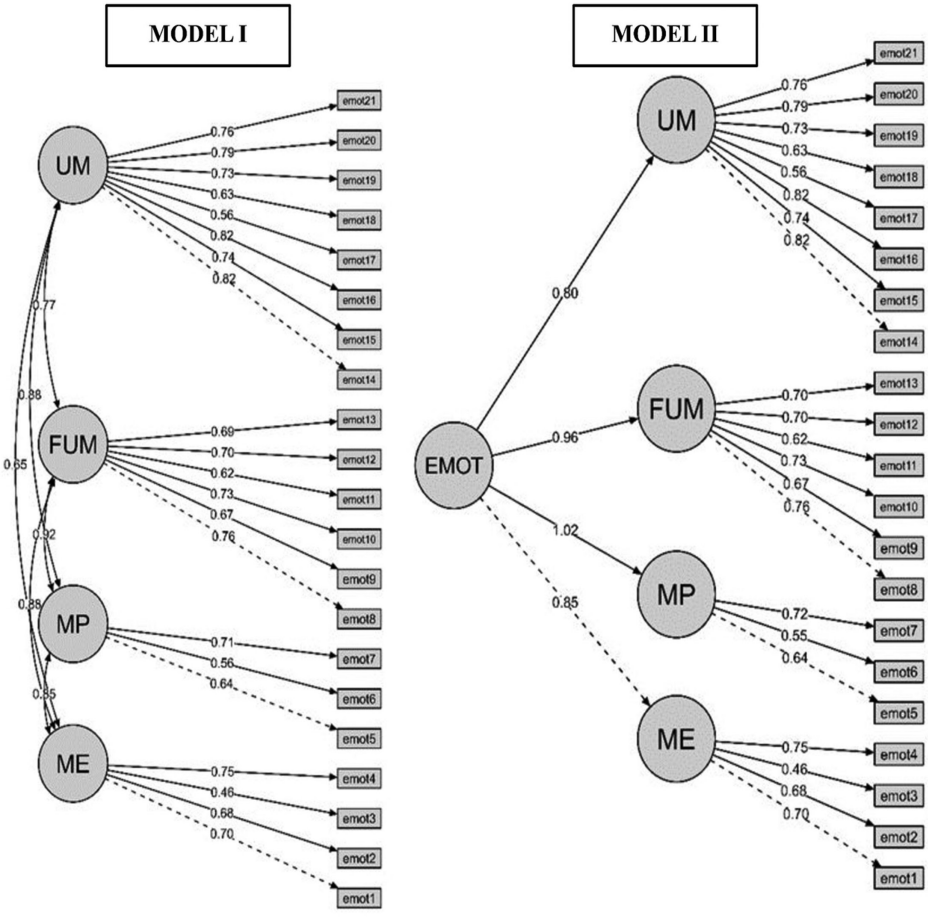

Figure 1.
CFA Path Diagram for Model I and Model II.

Table 3.
Correlations Among Dimensions of the Turkish Version of the E-Motions Scale

	M	SD	1	2	3	4	5
ME	10.08	3.68	1				
MP	8.06	2.69	0.588	1			
FUM	14.95	5.26	0.691	0.691	1		
UM	23.85	7.74	0.516	0.686	0.660	1	
E-motions Total	56.95	16.68	0.773	0.828	0.886	0.897	1

**Note*: FUM = facilitating use of E-motions; ME = E-motional expression; MP = E-motional perception; UM = understanding and managing E-motions.

All correlations between the total score and the sub-dimensions of the E-motions scale are positively significant ($p < .01$) at the moderate level (Büyüköztürk, 2014), with values ranging from 0.516 to 0.691.

Reliability Analysis and Convergent Validity

For the entire E-motions scale, the Cronbach's α reliability coefficient is 0.93, accompanied by a McDonald's ω (omega) coefficient of 0.94. Table 4 also shows the item–total correlations calculated for each item, the average variance extracted (AVE) value calculated for each factor, and the Cronbach's α and ω coefficients.

The psychometric evaluation revealed robust reliability metrics, with both Cronbach's α and McDonald's ω coefficients substantially exceeding the conventional threshold (>0.60) established in social sciences research (Hair et al., 2010). In examining convergent validity, we applied the established criteria wherein AVE values should be higher than composite reliability (CR) values, while maintaining individual AVE values above 0.5 (Fornell & Larcker, 1981). It is noteworthy that even in cases where AVE falls marginally below 0.5, convergent validity remains adequate when CR exceeds 0.6, as per Fornell and Larcker's (1981) guidelines. Analysis of the data presented in Table 4 demonstrates that all sub-dimensions of the scale satisfy these convergent validity parameters. Further validation was established through item–total correlations, where coefficients of 0.30 or higher serve as empirical evidence of item validity (Nunnally & Bernstein, 1994). The E-emotions scale exhibited robust item-total correlations ranging from 0.44 to 0.77, with all items meeting or exceeding the prescribed criteria, thus substantiating the scale's internal consistency and construct validity.

Table 4.
Reliability and Convergent Validity Values

Factors	Item	Item–Total Correlation	AVE	CR	Cronbach α	Mc Donald's Omega (ω)
E-motional expression	M1	0.754	0.418	0.733	0.738	0.738
	M2	0.777				
	M3	0.708				
	M4	0.767				
E-motional perception	M5	0.783	0.408	0.677	0.662	0.672
	M6	0.723				
	M7	0.811				
Facilitating use of E-motions	M8	0.765	0.486	0.847	0.848	0.849
	M9	0.774				
	M10	0.790				
	M11	0.733				
	M12	0.715				
	M13	0.753				
Understanding and managing E-motions	M14	0.766	0.535	0.886	0.904	0.901
	M15	0.776				
	M16	0.819				
	M17	0.720				
	M18	0.776				
	M19	0.803				
	M20	0.758				
	M21	0.780				
Total					0.933	0.947

Measurement Invariance

We tested measurement invariance based on the hierarchical order of structural (configural) invariance, metric (metric) invariance, scalar (scalar) invariance, and strict (strict) invariance (Table 5). To determine whether invariance was achieved between the two hierarchical stages, we used the ΔCFI value. The result ΔCFI < 0.01 in between the stages indicates that measurement invariance is established (Cheung & Rensvold, 2002).

The ΔCFI value of the E-motions scale is less than 0.01 across all stages according to gender and school type (Table 5). Therefore, the scale provides configural, metric, scalar, and strict invariance for gender and school type. Considering the participants' daily social media use time, categorized into "less than 1 hour," "between 2 and 3 hours," and "more than 4 hours," the MG-CFA analysis revealed ΔCFI values between all levels consistently below 0.01. Additionally, regarding the variable of the number of social media platforms, participants indicated five categories: 1, 2, 3, 4, and 5+. Due to the limited number of observations in some groups, we recoded this variable into "few" ($n = 100$) and "a lot" ($n = 232$), then examined measurement invariance between these two groups. The findings of the MG-CFA analysis revealed that the ΔCFI value of the E-motions scale across all stages based on the social media platforms variable was smaller than 0.01. These suggest that the Emotions Scale exhibits configural, metric, scalar, and strict invariance based on social media use and the number of social media platforms used.

How to Score the Scale

The Turkish adaptation of the E-motions scale has 21 items: four in E-motional expression, three in e-motional perception, seven in facilitating the use of E-motions, and eight in understanding and managing E-motions. The scale does not have any reverse-coded items. The scale can be scored between 21 and 110.

Discussion

In the contemporary digital landscape, the proliferation of online platforms necessitates equipping "digital natives" with requisite competencies and knowledge. Recognizing the central role of cyber-emotions in psychosocial adjustment and interpersonal relationships, particularly in the dynamic landscape of cyberspace where relationships often emerge and flourish, our aim was to explore the emotions expressed, perceived, utilized, and regulated in the online realm. As there is a gap in the literature regarding a structured assessment tool tailored for assessing in the digital realm in the Turkish context, we wanted to develop a standardized and validated instrument designed to measure cyber-emotional skills. After reviewing the existing literature, we discovered that Zych et al. (2017) had already developed and validated a scale to assess emotional content in cyberspace, investigating the expression and management of emotions in the digital domain under the conceptual framework of the "E-motions Questionnaire." Based on that, our study aimed to expand the methodological toolkit available to researchers by rigorously validating the psychometric properties of the adapted E-motions scale, which measures cyber-emotional skills.

Following established cross-cultural adaptation guidelines (Geisinger, 1994), we implemented a comprehensive validation protocol. The initial phase involved establishing linguistic equivalence through a systematic translation–back-translation procedure conducted by bilingual educational science experts. The Turkish translation

Table 5.
Measurement Invariance by Demographic Variables

Demographic Variable	Stage	χ^2	SD	χ^2/SD	RMSEA	SRMR	GFI	AGFI	TLI	CFI	ΔCFI
Gender	Configural	614.8	366	1.680	0.060	0.072	0.993	0.991	1.000	1.000	–
	Metric	596.9	383	1.559	0.065	0.080	0.992	0.989	0.992	0.991	0.009
	Scalar	627.3	400	1.568	0.065	0.082	0.991	0.989	0.991	0.991	0.000
	Strict	646.4	421	1.536	0.065	0.084	0.991	0.989	0.991	0.991	0.000
School type	Configural	623.79	366	1.704	0.060	0.07	0.993	0.991	0.979	0.976	–
	Metric	569.15	383	1.486	0.060	0.076	0.992	0.99	0.978	0.976	0.000
	Scalar	586.68	400	1.467	0.058	0.077	0.992	0.99	0.978	0.977	0.001
	Strict	608.33	421	1.445	0.058	0.079	0.991	0.99	0.977	0.977	0.000
Social media use	Configural	757.40	549	1.380	0.057	0.073	0.992	0.99	0.981	0.978	–
	Metric	733.50	583	1.258	0.057	0.083	0.990	0.987	0.980	0.978	0.000
	Scalar	766.44	617	1.242	0.055	0.084	0.990	0.988	0.980	0.979	0.001
	Strict	805.68	659	1.223	0.054	0.086	0.989	0.988	0.979	0.980	0.001
Social media platforms	Configural	625.80	366	1.710	0.062	0.070	0.993	0.990	0.976	0.973	–
	Metric	584.22	383	1.525	0.065	0.078	0.991	0.988	0.973	0.970	0.003
	Scalar	596.56	400	1.491	0.063	0.078	0.991	0.988	0.973	0.971	0.001
	Strict	612.41	421	1.455	0.062	0.08	0.99	0.988	0.972	0.972	0.001

underwent iterative refinement based on expert feedback. To verify linguistic compatibility, both versions were administered to a pilot sample, yielding strong inter-version correlations. Subsequently, the Turkish adaptation, comprising 21 items across four factors, was administered to a sample of 322 high school students.

The results of the analyses indicated good internal consistency and revealed that the original four-factor structure of the scale was also compatible with Turkish culture. The CFA results obtained from the original four-factor model of the scale (Model I) show that the scale meets the criteria and is of good quality for Turkish adaptation (Model I: $\chi^2 = 480.2$, $df = 183$, $\chi^2/df = 2.6$; CFI = 0.99, NFI = 0.97, RMSEA = 0.06 − Original form: $\chi^2 = 316.2$, $df = 183$, $\chi^2/df = 1.7$; CFI = 0.98, NFI = 0.95, RMSEA = 0.07). The factor loadings of the items in the scale vary between .56 and .82. Researchers state that factor loadings of .45 and above are good selection criteria (Büyüköztürk, 2014; Tabachnick & Fidell, 2013). In addition, the CFA findings of the second-level original four-factor model of the scale (Model II) also showed good model-data fit and proved that the scores obtained from the scale could be summed ($\chi^2 = 498.7$, $df = 185$, $\chi^2/df = 2.7$; CFI = 0.99, NFI = 0.97, RMSEA = 0.07).

The Turkish adaptation demonstrated exceptional internal consistency (Cronbach's $\alpha = 0.93$), surpassing both the original version ($\alpha = 0.92$; Zych et al., 2017) and subsequent adaptations ($\alpha = 0.88$; Cebollero-Salinas et al., 2022). Item–total correlations, ranging from 0.44 to 0.77, substantially exceeded the conventional threshold of 0.30, providing robust evidence of item discrimination. Notably, measurement invariance analyses established strict invariance across multiple demographic variables including gender, school type, social media usage patterns, and platform diversity. This comprehensive invariance supports the instrument's utility for meaningful cross-group comparisons (Cheung & Rensvold, 2002). These findings collectively establish the Turkish adaptation of the E-motions scale as a psychometrically sound instrument, demonstrating robust reliability, validity, and measurement invariance within the Turkish cultural context.

Limitations and Future Directions

While this study makes substantial contributions to the measurement of cyber-emotional competencies, several methodological limitations need consideration. Primary among these is the inherent challenge of response bias associated with self-report instruments, which may introduce systematic variance due to social desirability effects and subjective interpretation of scale items. This limitation underscores the potential value of incorporating multi-method assessment approaches in future research.

The study's sampling framework, while strategically designed, presents certain constraints regarding external validity. The participant pool, drawn from four educational institutions in Türkiye, while adequate for initial validation purposes, may not fully capture the demographic and socio-cultural diversity of the broader population. Future research would benefit from expanded sampling across different geographical regions, socioeconomic strata, and educational contexts to enhance generalizability.

The exclusively quantitative approach, while providing robust psychometric evidence, potentially overlooks nuanced aspects of cyber-emotional experiences that might be better captured through mixed-method designs. Integration of qualitative methodologies could provide valuable insights into the contextual factors and individual experiences that shape cyber-emotional competencies. Such approaches might illuminate how different digital environments, platform-specific features, and varying patterns of online interaction influence the expression and regulation of emotions in virtual spaces. Moreover, while the scale demonstrates excellent psychometric properties within the high school student population, its utility across different age groups and developmental stages remains to be established.

Despite these limitations, this study makes a significant contribution to the growing body of research on digital EI. The validated E-motions scale represents a versatile instrument that can be effectively deployed across various research designs: as a moderator in examining the relationship between digital behavior and psychological outcomes, as a mediator in understanding the mechanisms of online social interaction, or as a dependent variable in evaluating the effectiveness of digital literacy interventions. This flexibility positions the scale as a valuable tool for researchers investigating the increasingly complex landscape of online emotional experiences and competencies.

Data Availability Statement: The datasets generated by the survey research during and/or analyzed during the current study are available in the Dataverse repository.

Ethics Committee Approval: The ethics permission was obtained from the Ethics Commission of Necmettin Erbakan University (Approval no: 2023/271, Date: 09.06.2023).

Informed Consent: Informed consent for participation was secured from all participants for this anonymous quantitative study. The participants have been

made aware that the data will be utilized for the purpose of submitting the results as an article.

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