

The Stress and Adversity Inventory for Adults (Adult STRAIN) in Turkish: An initial validation and associations with mental and physical health

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Abstract

The Stress and Adversity Inventory for Adults (Adult STRAIN) has been developed to comprehensively assess lifetime stressor exposure. In the present study, we investigated the psychometric properties of the Adult STRAIN in Turkish in 270 participants. Concurrent validity was demonstrated through significant correlations with childhood trauma and perceived stress. Discriminant validity was established as lifetime stressor count and severity showed no significant association with social desirability and only weak associations with personality traits. Its predictive validity was supported by significant correlations linking lifetime stressor count and severity with executive function deficits, sleep disturbances, mental and physical health complaints, and doctor-diagnosed general health problems. Additionally, the Turkish Adult STRAIN produced reliable measurements over time, with good test-retest reliability. These findings indicate that the Turkish Adult STRAIN is a reliable and cross-culturally valid tool for assessing lifetime stressor exposure and its impact on health.

Keywords

Stress and Adversity Inventory, stress, adversity, validation, mental health, physical health

Introduction

Individuals face many psychosocial stressors in their daily lives, and stress is a normal and adaptive psychological and physiological response to these stressors (Chrousos, 2009; Koolhaas et al., 2011). Although stress is crucial for adapting to unprecedented situations (Koolhaas et al., 2011), exposure to prolonged or excessive amounts of acute stressors (e.g. traumatic events) or chronic stressors can pose a health risk (Marin et al., 2011; Weber et al.,

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Data Availability Statement included at the end of the article

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2022). Indeed, research has consistently documented that both acute and chronic stress are related to a variety of mental health issues (e.g. depression, anxiety; Juruena et al., 2020; Slavich and Irwin, 2014) and physical health problems (e.g. cancer, cardiovascular diseases, metabolic syndrome, immune system disorders; Chrousos, 2009; Cohen et al., 2007; Slavich, 2016; Slavich et al., 2010).

Life stressors encompass a wide variety of experiences that differ along several critical dimensions, including stressor type, severity, frequency, exposure timing, and duration (Dorsey et al., 2022; Epel et al., 2018). Moreover, stress and health models emphasize that stressful experiences, including daily, acute, and chronic stressors, can have a cumulative impact that increases the risk of developing various mental and physical health problems (Lupien et al., 2009; Mayer et al., 2019; Slavich et al., 2023). Therefore, assessing and addressing stressor exposure from a life course perspective is of critical importance for implementing preventive measures and improving long-term health outcomes across the lifespan.

To date, various self-report scales have been developed to measure different dimensions or characteristics of life stressors (Crosswell and Lockwood, 2020; Dorsey et al., 2022; Epel et al., 2018) such as the Perceived Stress Scale (PSS; Cohen et al., 1983), the Impact of Event Scale (IES; Horowitz et al., 1979), and Child Trauma Questionnaire (CTQ; Bernstein et al., 1994). Nearly all of the existing stress measures, including those described above, focus on the severity and duration of the psychological response to these stressors in certain developmental life stages and different periods of time and do not allow for inferences about the cumulative impact of stressors occurring *over the entire life course* on health. This critical gap highlights a pressing need for developing a comprehensive instrument that systematically captures the cumulative impact of stressors occurring over the entire lifespan (i.e. lifetime stressor exposure).

To this end, Slavich developed the Stress and Adversity Inventory (STRAIN) for both

adolescents (Adolescent STRAIN) and adults (Adult STRAIN) (Slavich et al., 2019; Slavich and Shields, 2018). This inventory is an online, user-friendly system that measures lifetime stressor exposure using a structured, interview-based approach that is highly scalable (see <http://www.strainsetup.com>). Specifically, the STRAIN is a comprehensive interview that thoroughly assesses the severity, frequency, exposure timing, and duration of a broad range of life stressors, including 26 acute life events and 29 chronic difficulties, that span 12 major life domains and 5 different social-psychological characteristics (see Table 1). The STRAIN thus allows for the generation of extensive data based on the type of exposure outcomes (i.e. lifetime stressor count and severity) with various types of stressors (e.g. acute life events, chronic difficulties), life periods (e.g. early life, adulthood), primary life domains (e.g. housing, finances), and core social-psychological characteristics (e.g. interpersonal loss, physical danger; Slavich and Shields, 2018).

The initial validation study of the Adult STRAIN revealed that it demonstrates good usability and acceptability, along with excellent test-retest reliability over a 2-week period (Slavich and Shields, 2018). Additionally, the study demonstrated that the inventory has strong concurrent and discriminant validity, as well as excellent predictive validity for physical health (including self-reported complaints and doctor-diagnosed physical and autoimmune disorders), mental health, sleep problems, and executive function deficits (Slavich and Shields, 2018). Like the original Adult STRAIN, adaptation and validation studies have been conducted across different countries and languages, including German (Sturmbauer et al., 2019), Brazilian Portuguese (Cazassa et al., 2020), Dutch (Engels et al., 2023), and Korean (Kim et al., 2025), and each has demonstrated very good psychometric characteristics. Besides these validation studies, a large body of research has now accumulated showing that the STRAIN predicts a wide variety of health-related outcomes, including prenatal health behaviors (Smith et al., 2020), physical and mental health

Table 1. Dimensions of the adult STRAIN.

Exposure indices	Stressor count
	Stressor severity
Exposure timing	Early life stressors
	Adulthood stressors
	Continuous age across the life course
Stressor types	Acute life events
	Chronic difficulties
Primary life domains	Housing
	Education
	Work
	Treatment/health
	Marital/partner
	Reproduction
	Financial
	Legal/crime
	Other relationships
	Death
	Life-threatening situations
	Possessions
	Interpersonal loss
	Physical danger
Core social-psychological characteristics	Humiliation
	Entrapment
	Role change/disruption

problems (McLoughlin et al., 2021; Olvera Alvarez et al., 2019; Shields et al., 2017b; Toussaint et al., 2016), sleep problems and fatigue (Bower et al., 2014; Cuneo et al., 2017), biological and neural reactivity including differentiation in hypothalamic–pituitary–adrenal (HPA) axis responses (Lam et al., 2019), memory performance (Goldfarb et al., 2017; Shields et al., 2017a), executive function (Slavich and Shields, 2018), and working memory capacity (Shields et al., 2019), among others.

Present study

In the present study, we translated the STRAIN into Turkish and subsequently investigated the psychometric properties of the Adult STRAIN in Turkish. Based on prior research that examined the psychometric properties of the Adult STRAIN across different cultures (Cazassa

et al., 2020; Engels et al., 2023; Slavich and Shields, 2018; Sturmbauer et al., 2019), we hypothesized that the Turkish Adult STRAIN would demonstrate good usability, acceptability, and be a valid and reliable measure of lifetime stressor exposure. Consistent with the aim of the study, we employed the validation protocol used for the original English version of the Adult STRAIN (Slavich and Shields, 2018). First, we examined the usability and acceptability of the Turkish Adult STRAIN. Second, we investigated concurrent validity by calculating correlation coefficients between the Turkish Adult STRAIN (lifetime stressor count and severity) and other measures of life stress, including childhood trauma and perceived stress. Third, to test predictive validity, we examined associations between the Turkish Adult STRAIN and health and cognitive outcomes—namely, self-reported mental and physical health complaints, sleep quality, executive function, doctor-diagnosed general health problems, and doctor-diagnosed autoimmune disorders. Fourth, we investigated discriminant validity through correlation coefficients between the Turkish Adult STRAIN and personality traits and social desirability. Fifth, we documented the test-retest reliability of the Turkish Adult STRAIN over 1 month. Finally, we examined whether various dimensions of lifetime stressor exposure assessed by the Adult STRAIN were predictive of the likelihood of being diagnosed with general health and autoimmune disorders. The results of these analyses thus provide evidence of the validity and reliability of the Turkish STRAIN, a comprehensive and unique tool for measuring lifetime stressor exposure in the Turkish culture.

Method

Participants and procedures

University students from various Turkish universities were recruited between August 2019 and June 2021. Of the 551 initial participants, 15 did not complete the survey, 55 took it multiple times, and 211 failed attention checks,

leaving a final sample of 270 (227 female, 43 male; $Mage = 20.69$ years old, $SD = 2.04$, range: 18–30). Among them, 26.3% ($n = 71$) reported low income, 38% ($n = 101$) middle income, 16.3% ($n = 44$) high income, and 20% ($n = 54$) did not disclose their income.

Participants were first invited to complete a 45-minute online survey via social media platforms and email groups and were informed about the study. They responded to the items from several measures, including stress levels, childhood trauma, personality, social desirability, and mental and physical health. For test-retest reliability, 100 randomly selected participants were invited to retake the survey after 1 month.

All procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2013, and all procedures were approved by Koç University Committee on Human Research (Approval Number: 2020.052. IRB3.024; Date: 02.05.2020). Written informed consent was obtained from all participants.

Measures

Life stress measures

Stress and adversity inventory for adults. The Adult STRAIN is an online instrument for comprehensively assessing exposure to stressors over participants' entire lives (Slavich and Shields, 2018). It focuses on various life stressor dimensions (see Table 1) and provides detailed information on the severity, frequency, exposure timing, and duration of a wide range of acute and chronic stressors. The Adult STRAIN can yield 115 different lifetime stressor exposure scores. More details about the inventory can be found in the original study (Slavich and Shields, 2018) and on the STRAIN website (<http://www.strainsetup.com>).

The Turkish Adult STRAIN: The Adult STRAIN in Turkish was created using the validation protocol for the original version

(Slavich and Shields, 2018). A formal translation of the Adult STRAIN into Turkish was first implemented by the two native-speaking Turkish authors of this study (MG and IY); subsequently, a third independent, Turkish-speaking subject expert combined these two translations into one, which was subsequently reviewed by two subject-expert reviewers. Finally, to refine and improve item wording, we administered the Adult STRAIN in Turkish to several individuals and, based on their feedback, finalized the inventory. Similar to its original version, the Turkish version includes a comprehensive set of questions covering different domains of stress and adversity (see Table 1). In this study, we focused on lifetime stressor count, lifetime stressor severity, several domains of lifetime stressor exposure by stressor count, and several domains of lifetime stressor exposure by core social-psychological characteristics.

Childhood trauma questionnaire-short form (CTQ-SF). Experiences of childhood abuse and neglect were assessed with the CTQ-SF comprising 28 items focusing on 5 types of maltreatment: emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect (Bernstein et al., 2003). Each item is rated on a five-point Likert scale ranging from "never true" to "very often true." The Turkish version of the CTQ-SF has been shown to be valid and reliable across different populations (Rezan and Eroglu, 2012; Şar et al., 2012). In this study, an overall CTQ-SF score was calculated by taking the mean of 25 items, with higher scores indicating greater childhood trauma. In this study, Cronbach's alpha for the entire scale was 0.89.

Perceived stress scale (PSS). Perceived stress was assessed using the 10-item PSS (Cohen et al., 1983; Roberti et al., 2006). Items were rated on a five-point Likert type scale ranging from 0 (*never*) to 4 (*very often*). Prior research has suggested that the Turkish PSS showed good internal reliability and validity (Örücü and

Demir, 2009). An overall perceived stress score was calculated by taking the mean of 10 items, with higher scores indicating higher perceived stress levels. In the present study, Cronbach's alpha for the whole scale was 0.85.

Potential confounding factors

The ten-item personality inventory (TIPI). Big Five personality traits were measured using the TIPI (Gosling et al., 2003). It consists of 10 items, with 2 items per trait (i.e. openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism), and items are rated on a seven-point Likert scale ranging from 1 (*disagree strongly*) to 7 (*agree strongly*). The TIPI has been shown to provide a quick, valid, and reliable measure of personality traits (Atak, 2013; Gosling et al., 2003). Cronbach's alphas were 0.43 for openness to experience, 0.46 for conscientiousness, 0.75 for extraversion, 0.15 for agreeableness, and 0.34 for neuroticism. Because the TIPI is relatively brief and focuses on high content validity, the instrument's authors have described low reliability coefficients as normal (Gosling et al., 2003).

Social desirability scale (SDS-17). The tendency of individuals to present themselves in a socially desirable manner was measured using the SDS-17 (Stöber, 2001), comprising 17 items with 1 (*true*) and 0 (*false*) response options. Prior research has shown that the SDS-17 exhibits good to excellent levels of both validity and reliability across different cultures (Stöber, 2001; Tran et al., 2012). At the time we began the adaptation work, there were no studies utilizing the SDS-17 with the Turkish population. Therefore, after obtaining necessary permissions from the authors who developed the SDS-17, we first translated the scale into Turkish, which was subsequently back-translated by a bilingual researcher. The back-translated version of the scale was then reviewed by a native English speaker, and refinements were made as needed, thus finalizing the Turkish version of the SDS-17. A total score for social desirability was the sum of these items, with higher scores indicating a greater tendency toward socially

desirable responding. In this study, Cronbach's alpha for the whole scale was 0.65.

Positive and negative affect (PANAS). Negative and positive affect were measured using the PANAS (Watson et al., 1988). It has 20 items (10 items for negative affect and 10 items for positive affect) in which participants rate the extent to which they have experienced each emotion over a specified time period using a five-point Likert scale ranging from 1 (*very slightly or not at all*) to 5 (*extremely*). The Turkish version of the PANAS has been suggested to be a valid and reliable measure (Gençöz, 2000). In this study, an overall negative affect score was used by taking the mean of the 10 items, with higher scores indicating greater negative affect. Cronbach's alpha for negative affect was calculated as 0.88.

Cognitive measures

The Barkley deficits in executive functioning scale (BDEFS). The BDEFS (Barkley, 2011) was used to assess multiple domains of executive functioning, including time management, organization and problem solving, self-discipline, self-motivation, and self-regulation of emotion. It consists of 88 items rated on a four-point scale ranging from rarely or not at all to very often. No prior studies have used the BDEFS in Turkey. Therefore, following the same procedure used for the SDS-17, the BDEFS was first translated into Turkish, then back-translated, and finalized. A total executive function score was used, with higher scores indicating higher executive functioning deficits. In the present study, Cronbach's alpha for the whole scale was 0.97.

Health measures

The Pittsburgh sleep quality index (PSQI). Sleep quality and disturbance were measured using the Turkish version of the PSQI (Ağargün et al., 1996), originally developed by Buysse et al. (1989), with self-administered questions (e.g. "During the last month, how long [in minutes] has it taken you to fall asleep each night?"). A total self-administered sleep quality score was used in this study, with higher scores indicating

higher sleep disturbances. Cronbach's alpha was calculated as 0.74.

Kessler psychological distress scale (K6). General mental health complaints were measured using the Turkish translation of the K6 (Kessler et al., 2003). It has six items rated on a five-point Likert scale ranging from *none of the time* to *all of the time*, with higher scores indicating greater mental health complaints.

The physical health questionnaire (PHQ). General physical and somatic symptoms over the past month were assessed using the PHQ (Schat et al., 2005). It consists of 14 items rated on a seven-point Likert scale ranging from *not at all* to *all of the time*. An overall physical health problem score was created by taking the mean of the items, with higher scores indicating greater physical health complaints. Following the same procedure used for previously introduced scales (e.g. the BDEFS), we translated the PHQ into Turkish and finalized it after implementing the suggested adjustments.

Doctor-diagnosed general health problems. General health problems diagnosed by a doctor were measured using the Turkish translation of the single question, "Have you ever been diagnosed by a doctor with any of the following conditions?" These health problems included arthritis, asthma, cancer, chronic pain, heart disease, depression, anxiety, gastroesophageal reflux disease, heart attack, high blood pressure, insomnia, kidney stones, migraine, overweight, posttraumatic stress disorder, stomach ulcer, and stroke. An overall general health problem score was created by summing the responses (No=0, Yes=1), with higher scores indicating a greater number of doctor-diagnosed general health problems.

Doctor-diagnosed autoimmune disorders. Autoimmune disorders diagnosed by a doctor were measured using the Turkish translation of the single question, "Have you ever been diagnosed by a doctor with any of the following conditions?" These autoimmune disorders included

Addison's disease, celiac disease, dermatomyositis, Grave's disease, Hashimoto's thyroiditis, inflammatory bowel disease, multiple sclerosis, myasthenia gravis, pernicious anemia, psoriasis, rheumatoid arthritis, Sjögren's syndrome, lupus, and other autoimmune disorders. An overall autoimmune disorder score was created by summing the responses (No=0, Yes=1), with higher scores indicating more doctor-diagnosed autoimmune disorders.

Data analyses

First, to assess usability and acceptability, we calculated descriptive statistics, including interquartile range of time spent taking the STRAIN. We also calculated descriptive statistics for the Adult STRAIN scores. Second, Pearson's correlation analysis was performed to examine the concurrent validity of the Adult STRAIN with childhood maltreatment (CTQ-SF) and perceived stress (PSS). Third, Pearson's correlation and linear regression coefficients were computed to examine the predictive validity of the Adult STRAIN with executive functioning deficits, sleep disturbance, general mental health complaints, and general physical health complaints, whereas Poisson generalized linear models were conducted to predict doctor-diagnosed general health problems and doctor-diagnosed autoimmune disorders.

Fourth, to examine the discriminant validity of the Adult STRAIN with personality traits and social desirability, we used Pearson's correlation analyses and linear regression analyses, adjusting for age, sex, and negative affect. Fifth, the test-retest reliability of the Adult STRAIN over 4 weeks was evaluated by computing intraclass correlation coefficients (ICC) between the two assessments of the STRAIN (i.e. baseline, follow-up). Sixth, independent samples *t*-tests were conducted to examine domains of lifetime stressor exposure (12 primary life domains and 5 core social-psychological characteristics) for males versus females, with effect sizes (Cohen's *d*) calculated. Finally, we performed Poisson generalized linear regression analyses to examine whether primary life domains and core

social-psychological characteristics, as well as early life stressors, adulthood stressors, acute life events, and chronic difficulties, were associated with the risk of being diagnosed with general health problems or autoimmune disorders. Data were analyzed using SPSS (Version 29).

Results

Usability and acceptability of the STRAIN

Of the 270 participants who completed the STRAIN, none reported any issues or problems with the overall instrument or individual items. Among these participants, the average completion time for the STRAIN was 19 minutes.

Descriptive statistics

The average lifetime stressor count was 13.12 ($SD=8.89$, range=0–56; possible range=0–166), with an average lifetime stressor severity of 32.37 ($SD=21.13$, range=0–120; possible range=0–265). The correlation between lifetime stressor count and lifetime stressor severity was significant and strong ($r=0.91$, $p<0.01$), as expected, given that lifetime stressor severity is based in part on lifetime stressor count. Results of independent samples t -tests revealed no significant differences in either lifetime stressor count, $t(268)=-0.85$, $p=0.398$, or lifetime stressor severity, $t(268)=-1.55$, $p=0.122$, for males versus females. As expected, age was significantly related to both lifetime stressor count ($r=0.14$, $p=0.025$) and severity ($r=0.17$, $p=0.006$).

Concurrent validity

To examine the concurrent validity of the Turkish Adult STRAIN, we computed correlations of lifetime stressor count and severity with childhood maltreatment (i.e. CTQ-SF) and perceived stress (i.e. the PSS). Lifetime stressor count was significantly correlated with childhood maltreatment ($r=0.53$, $p<0.001$) and

perceived stress ($r=0.38$, $p<0.001$). Similarly, stressor severity was significantly correlated with child maltreatment ($r=0.48$, $p<0.001$) and perceived stress ($r=0.42$, $p<0.001$). These correlations provide evidence for the concurrent validity of the Turkish Adult STRAIN.

Predictive validity

The predictive validity of the Turkish Adult STRAIN was assessed by computing correlations between lifetime stressor count and severity and executive functioning deficits, sleep disturbance, general mental health complaints, and general physical health complaints. Incidence Rate Ratios (IRR) from Poisson generalized linear models were also computed to assess the relation between STRAIN scores and doctor-diagnosed general health problems or autoimmune disorders. Lifetime stressor count was significantly related to executive functioning deficits ($r=0.24$, $p<0.001$), sleep disturbance ($r=0.34$, $p<0.001$), general mental health complaints ($r=0.44$, $p<0.001$), general physical health complaints ($r=0.45$, $p<0.001$), and greater doctor-diagnosed general health problems (IRR=1.016, 95% CI (1.005, 1.027), $p<0.001$), but not to doctor-diagnosed autoimmune disorders (IRR=0.996, 95% CI (0.983, 1.010), $p=0.597$). Similarly, lifetime stressor severity was significantly correlated with executive functioning deficits ($r=0.31$, $p<0.001$), sleep disturbance ($r=0.36$, $p<0.001$), general mental health complaints ($r=0.49$, $p<0.001$), general physical health complaints ($r=0.45$, $p<0.001$), and greater doctor-diagnosed general health problems (IRR=1.006, 95% CI (1.002, 1.011), $p<0.001$), but not to doctor-diagnosed autoimmune disorders (IRR=0.999, 95% CI (0.993, 1.004), $p=0.614$).

All of these effects remained significant while controlling for age, sex, and negative affect. Specifically, lifetime stressor count remained significantly associated with executive functioning deficits ($\beta=0.22$, $p<0.001$), sleep disturbance ($\beta=0.31$, $p<0.001$), general mental health complaints ($\beta=0.41$, $p<0.001$),

general physical health complaints ($\beta=0.44$, $p<0.001$), and more doctor-diagnosed general health problems (IRR=1.016, 95% CI (1.004, 1.027), $p=0.006$). Similarly, lifetime stressor severity remained significantly associated with executive functioning deficits ($\beta=0.28$, $p<0.001$), sleep disturbance ($\beta=0.32$, $p<0.001$), general mental health complaints ($\beta=0.45$, $p<0.001$), general physical health complaints ($\beta=0.43$, $p<0.001$), and more doctor-diagnosed general health problems (IRR=1.006, 95% CI (1.001, 1.011), $p=0.014$). These results suggest that the Turkish Adult STRAIN shows excellent predictive validity, as evidenced by significant associations with nearly all of the health outcomes, even when adjusting for age, sex, and negative affect.

Discriminant validity

To examine the discriminant validity of the Turkish STRAIN, we computed correlations and linear regression coefficients between lifetime stressor count and severity and personality characteristics (i.e. TIPI) and social desirability (i.e. SDS-17). As expected, the STRAIN's indices of lifetime stressor count and lifetime stressor severity were not significantly correlated with social desirability ($r=0.01$, $p=0.946$; $r=0.06$, $p=0.460$, respectively). After adjusting for age, sex, and negative affect, these associations remained non-significant (lifetime stressor count: $\beta=0.00$, $p=0.946$; lifetime stressor severity: $\beta=0.06$, $p=0.462$). Both the CTQ-SF and the PSS were not significantly correlated with social desirability ($r=-0.05$, $p=0.507$; $r=0.04$, $p=0.592$, respectively). These associations remained non-significant after adjusting for age, sex, and negative affect (CTQ: $\beta=-0.05$, $p=0.512$; the PSS: $\beta=0.04$, $p=0.630$).

As for Big Five personality traits, lifetime stressor count was not significantly correlated with openness to experience ($r=0.12$, $p=0.052$), but was weakly related to conscientiousness ($r=-0.14$, $p=0.017$), extraversion ($r=-0.25$, $p<0.001$), agreeableness ($r=-0.13$, $p=0.035$), and neuroticism ($r=0.16$, $p=0.007$). After

adjusting for age, sex, and negative affect, lifetime stressor count remained weakly related to all of the personality traits (openness to experience ($\beta=0.13$, $p=0.038$), conscientiousness ($\beta=-0.13$, $p=0.030$), extraversion ($\beta=-0.24$, $p<0.001$), and neuroticism ($\beta=0.18$, $p=0.003$) except for agreeableness ($\beta=-0.11$, $p=0.069$). Lifetime stressor severity was not significantly correlated with openness to experience ($r=0.07$, $p=0.221$), but was weakly related to conscientiousness ($r=-0.16$, $p=0.007$), extraversion ($r=-0.31$, $p<0.001$), agreeableness ($r=-0.21$, $p<0.001$), and neuroticism ($r=0.15$, $p=0.014$). After controlling for age, sex, and negative affect, these relations remained the same for openness to experience ($\beta=0.09$, $p=0.145$), conscientiousness ($\beta=-0.15$, $p=0.015$), extraversion ($\beta=-0.29$, $p<0.001$), agreeableness ($\beta=-0.18$, $p=0.003$), and neuroticism ($\beta=0.18$, $p=0.005$).

In contrast, the CTQ-SF was significantly correlated with extraversion ($r=-0.31$, $p<0.001$) and agreeableness ($r=-0.11$, $p=0.012$), but not with openness to experience ($r=-0.07$, $p=0.273$), conscientiousness ($r=-0.11$, $p=0.068$), or neuroticism ($r=-0.02$, $p=0.698$). When controlling for age, sex, and negative affect, these associations remained the same for openness to experience ($\beta=-0.05$, $p=0.413$), conscientiousness ($\beta=-0.09$, $p=0.139$), extraversion ($\beta=-0.29$, $p<0.001$), agreeableness ($\beta=-0.13$, $p=0.024$), and neuroticism ($\beta=-0.01$, $p=0.882$).

Finally, the PSS was significantly correlated with conscientiousness ($r=-0.14$, $p=0.017$), extraversion ($r=-0.48$, $p<0.001$), and agreeableness ($r=-0.33$, $p<0.001$), but not with openness to experience ($r=-0.03$, $p=0.592$) or neuroticism ($r=0.02$, $p=0.775$). After adjusting for age, sex, and negative affect, the PSS was significantly associated with conscientiousness ($\beta=-0.14$, $p=0.032$), extraversion ($\beta=-0.43$, $p<0.001$), and agreeableness ($\beta=-0.28$, $p<0.001$), but was not related to openness to experience ($\beta=0.04$, $p=0.588$) or neuroticism ($\beta=0.07$, $p=0.334$). All validity findings of the Turkish Adult STRAIN are presented in Table 2.

Table 2. Concurrent, discriminant, and predictive validity of the Turkish adult STRAIN.

Validity domain	Criterion variable	<i>r</i> for LSC/LSS	β /IRR (95% CI) for LSC/LSS
Concurrent validity	Childhood maltreatment	0.53***/0.48***	-
	Perceived stress	0.38***/0.42***	-
Predictive validity	Executive functioning deficits	0.24***/0.31***	0.22***/0.28***
	Sleep disturbance	0.34***/0.36***	0.31***/0.32***
	General mental health complaints	0.44***/0.49***	0.41***/0.45***
	General physical health complaints	0.45***/0.45***	0.44***/0.43***
	Doctor-diagnosed general health problems	-	1.016*** (1.005, 1.027)/ 1.006*** (1.002, 1.011)
	Doctor-diagnosed autoimmune disorders	-	0.996 (0.983, 1.010)/ 0.999 (0.993, 1.004)
	Social desirability	0.01 /0.06	0.00/0.06
Discriminant validity	Openness	0.12/0.07	0.13*/0.09
	Conscientiousness	-0.14*/-0.16**	-0.13*/-0.15*
	Extraversion	-0.25***/-0.31***	-0.24***/-0.29***
	Agreeableness	-0.13*/-0.21***	-0.11/-0.18**
	Neuroticism	0.16**/0.15*	0.18**/0.18**

LSC: lifetime stressor count; LSS: lifetime stressor severity; IRR: incidence rate ratio from Poisson models.

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

Test-retest reliability

To examine the test-retest reliability of the Turkish Adult STRAIN, we administered follow-up assessments to 100 randomly selected participants 1 month following the baseline assessment. Of these participants, 37 completed the follow-up assessment, with an average time interval of 34.43 days ($SD = 2.06$; range = 30–38). Intraclass correlation coefficients were 0.73 ($p < 0.001$) for lifetime stressor count and 0.72 ($p < 0.001$) for lifetime stressor severity, indicating that the Turkish Adult STRAIN shows acceptable-to-moderate reliability over time.

Stressor exposure characteristics

Considering that the Adult STRAIN provides comprehensive information regarding several domains of lifetime stressors, we examined the differences in lifetime stressor exposure scores for males versus females across the 12 primary life domains and 5 core social-psychological

characteristics. Results of independent samples *t*-test showed that men reported more education stressors ($M_{\text{male}} = 0.14$, $SD = 0.51$ vs $M_{\text{female}} = 0.04$, $SD = 0.22$; $t(268) = 2.11$, $p = 0.036$, $d = 0.35$; see Figure 1). With respect to social-psychological characteristics assessed by the Turkish Adult STRAIN, there were no significant differences between women and men (see Figure 2).

Finally, we tested the predictive validity of various dimensions of lifetime stressor exposure counts assessed by the Turkish Adult STRAIN (timing: early life stress, adulthood life stress; type: acute life events, chronic difficulties; primary life domains: housing, education, work, treatment/health, marital/partner, reproduction, financial, legal/crime, other relationships, death, life-threatening situations, possessions; core social-psychological characteristics: interpersonal loss, physical danger, humiliation, entrapment, role change/disruption) in predicting the likelihood of being diagnosed with auto-immune disorders and general health problems. Results of Poisson generalized

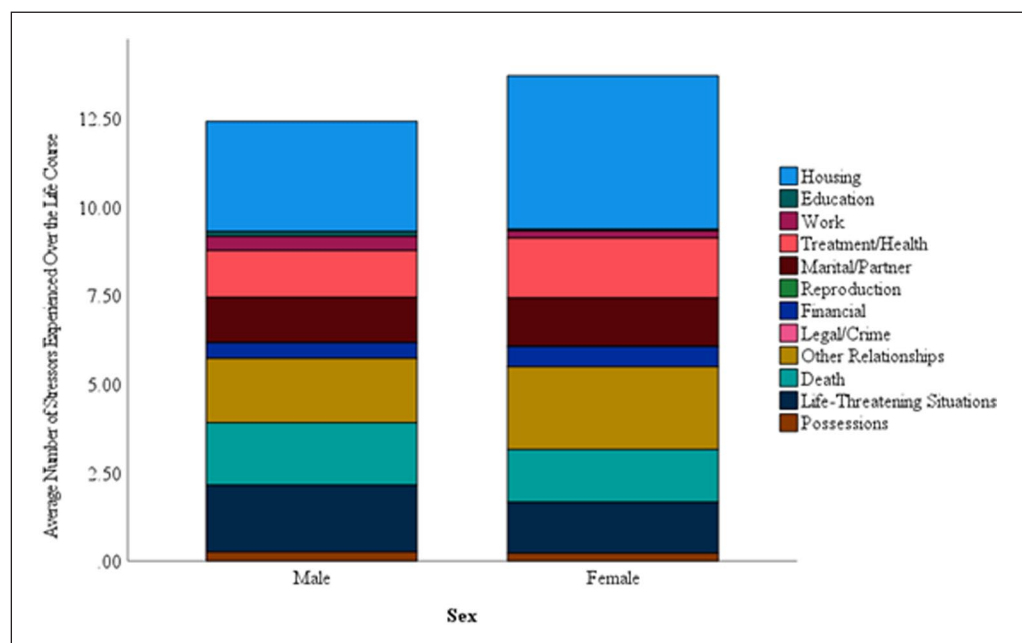


Figure 1. Lifetime stressor exposure by stressor count for males and females.

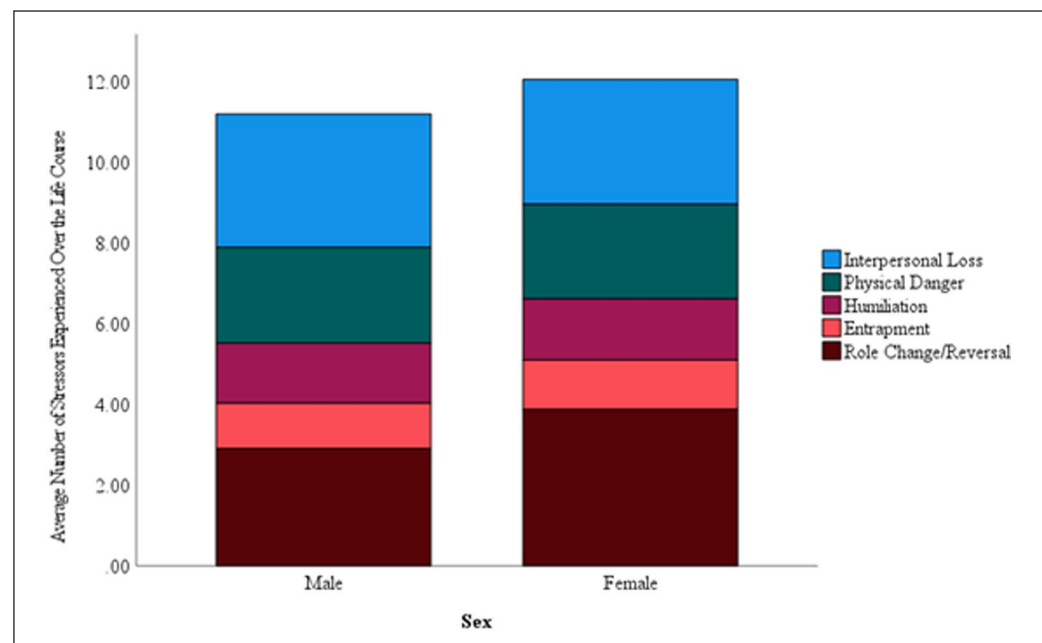


Figure 2. Lifetime stressor exposure by core social-psychological characteristics for males and females.

linear regression analyses indicated that none of these lifetime stressor counts were associated with the risk of being diagnosed with autoimmune disorders in this relatively young sample ($ps > 0.05$). As expected, however, counts of adulthood stressors (IRR = 1.022, 95% CI(1.009, 1.036), $p = 0.001$), acute life events (IRR = 1.028, 95% CI(1.009, 1.047), $p = 0.003$), chronic difficulties (IRR = 1.023, 95% CI(1.002, 1.045), $p = 0.031$), treatment/health (IRR = 1.095, 95% CI(1.051, 1.142), $p < 0.001$), physical danger (IRR = 1.040, 95% CI(1.010, 1.072), $p = 0.010$), and role change/disruption stressors (IRR = 1.031, 95% CI(1.003, 1.059), $p = 0.028$) were all significantly associated with greater doctor-diagnosed general health problems.

Discussion

Lifetime stressor exposure has been consistently shown to be one of the most robust predictors of various mental and physical health problems (Dorsey et al., 2022; Epel et al., 2018; Lupien et al., 2009; Mayer et al., 2019). To measure the accrued effect of lifetime stressor on health, Slavich developed the STRAIN for English-speaking populations (Slavich and Shields, 2018), which assesses various components of stressor exposure from a life course perspective. We sought to extend this work by adapting the Adult STRAIN to the Turkish culture among young individuals; we then investigated the acceptability, feasibility, and psychometric properties of the instrument. Our findings suggest that the Turkish Adult STRAIN yields valid and highly reliable measures of lifetime stressor exposure across the entire lifespan, providing evidence for its cross-cultural feasibility and validity. Moreover, the pattern of concurrent, discriminant, and predictive validity observed in the Turkish sample closely parallels those reported in other cultural contexts—including the United States (Slavich and Shields, 2018), Germany (Sturmbauer et al., 2019), Brazil (Cazassa et al., 2020), Netherlands (Engels et al., 2023), and Korea (Kim et al., 2025)—demonstrating that the STRAIN exhibits

strong cross-cultural consistency in both magnitude and direction of associations with theoretically relevant constructs (see Table 3).

Regarding the usability and acceptability of the Turkish Adult STRAIN, our findings indicated that participants completed the inventory in approximately 19 minutes. This is consistent with prior research, which reported completion times ranging from 16 to 24 minutes (Cazassa et al., 2020; Slavich and Shields, 2018; Sturmbauer et al., 2019). In addition, participants did not report any issues or complaints about the individual items of the Turkish Adult STRAIN or the survey. Additionally, our study showed a very high completion rate of 97%, aligning with earlier findings of 90.8% and 93.1% completion rates (Cazassa et al., 2020; Slavich and Shields, 2018). Overall, these results suggest that the Turkish Adult STRAIN is user-friendly and well-accepted by participants, supporting its usability and feasibility.

We investigated how lifetime stressor count and severity, as evaluated by the STRAIN, related to other measures of childhood maltreatment and perceived stress to assess concurrent validity. Similar to findings from the original STRAIN validation study (Slavich and Shields, 2018) and other adaptation studies (Cazassa et al., 2020; Sturmbauer et al., 2019), the Turkish Adult STRAIN demonstrated moderate-to-strong correlations with these other stress assessment scales. These findings suggest that the Turkish Adult STRAIN accurately reflects the extent of life stressor exposure as it relates to childhood trauma and perceived stress, supporting its concurrent validity. Furthermore, we found significant correlations between the Turkish Adult STRAIN and various health outcomes, including executive functioning deficits, sleep disturbances, general mental health complaints, general physical health complaints, and doctor-diagnosed general health problems. This highlights the Turkish Adult STRAIN's ability to predict important health outcomes, suggesting strong predictive validity. These findings not only corroborate the findings of the development and adaptation studies of the Adult STRAIN but also support the notion that

Table 3. Comparison of key findings from all Adult STRAIN validation studies.

Study/language	N	Age (mean ± SD/range)	Participants	Concurrent validity for LSC/LSS	Predictive validity for LSC/LSS	Discriminant validity for LSC/LSS
Present study, Turkish	270	20.69 ± 2.04 (18–30)	University students	CTQ ($r = 0.48/0.53$), PSS ($r = 0.46/0.58$)	BDEFS ($r = 0.24/0.31$), PSQI ($r = 0.34/0.36$), K6 ($r = 0.44/0.49$), PHQ ($r = 0.45/0.45$), DGHP (IRR = 1.016/1.006), DAD (IRR = 0.996/0.999)	SDS (0.01/0.06), TIPI ($r = -0.25$ to 0.16/−0.31 to 0.15)
Slavich and Shields (2018), English (original)	205	37.82 ± 11.7 (19–68)	Community adults	CTQ ($r = 0.55/-$), PSS ($r = 0.15/-$)	K6 ($r = 0.32/-$), PHQ ($r = 0.47/-$), PSQI ($r = 0.49/-$), BDEFS ($r = 0.18/-$), DGHP (IRR = 1.026/−), DAD (IRR = 1.034)	TIPI ($r_s > 0.05$), SDS ($r_s > 0.05$)
Sturmhuber et al. (2019), German	298	30.3 ± 12.9 (18–80)	Community adults	ACE ($r = 0.62/0.62$), CTQ ($r = 0.64/0.62$), PSS ($r = 0.25/0.32$), LEC-5 (0.50/0.48)	STAI trait anxiety (0.22/0.27), STAI state anxiety ($r = 0.26/0.28$), CESD ($r = 0.26/0.31$)	TIPI ($r = -0.08$ to 0.16/−0.13 to 0.12)
Cazassa et al. (2020), Brazilian Portuguese	330	32.16 ± 13.55 (18–76)	Community adults	CTQ ($r = 0.59/0.58$), PSS ($r = 0.38/0.39$)	K-6 ($r = 0.44/0.45$), PHQ ($r = 0.37/0.41$), PSQI ($r = 0.40/0.42$), DGHP (IRR = 1.031/1.014), DAD (IRR = 1.028/1.011)	SDS ($r = -0.21/-0.21$), TIPI ($r = -0.11$ to 0.26/−0.12 to 0.25)
Engels et al. (2023), Dutch	87	59.17 ± 13.36 (31–81)	Cognitively unimpaired adults	PSS ($r = 0.23/0.36$), DASS stress ($r = 0.21/0.24$)	HDRS ($r = 0.17/0.28$), Plasma cortisol ($r = -0.22/-0.16$)	–
Kim et al. (2025), Korean	218	29.5 ± 6.02 (19–50)	Adults recruited from a psychiatric setting	CTQ ($r = 0.61/0.60$), LEC-5 ($r = 0.49/0.47$)	STAI state anxiety ($\beta = 0.44/0.20$), STAI trait anxiety ($\beta = 0.47/0.23$), PHQ ($\beta = 0.27/0.12$), GAD-7 ($r = 0.17/0.08$)	–

LSC: lifetime stress count; LSS: lifetime stress severity; ACE: adverse childhood experience questionnaire; CTQ: childhood trauma questionnaire; PSS: perceived stress scale; LEC-5: life event checklist for DSM-5; STAI: state-trait anxiety inventory; CESD: center for epidemiological studies depression; GAD-7: general anxiety scale; TIPI: ten-item personality inventory; SDS: social desirability scale; BFI: big five inventory; DASS: depression anxiety stress scale; K6: Kessler psychological distress scale; PHQ: the physical health questionnaire; PSQI: the Pittsburgh sleep quality index; DGHP: doctor-diagnosed general health problems; DAD: doctor-diagnosed autoimmune disorders; BDEFS: the Barkley deficits in executive functioning scale; IRR: incidence rate ratios; HDRS: Hamilton depression rating scale.

cumulative lifetime stressor exposure is a robust predictor of physical and psychological health issues. Overall, the data indicate that the Turkish Adult STRAIN is a sound and valid tool for measuring stress exposure from a lifetime perspective.

Our study also aimed to examine the discriminant validity of the Turkish Adult STRAIN by evaluating its correlations with personality traits, as measured by the TIPI, and social desirability, assessed using the SDS-17. Consistent with our hypothesis and the findings from the original Adult STRAIN study (Slavich and Shields, 2018), we anticipated that the Turkish Adult STRAIN would show weak correlations with social desirability and Big Five personality traits, as it is designed to measure life stress exposure rather than emotional responses or personality characteristics. As expected, both lifetime stressor count and severity showed non-significant correlations with social desirability, reinforcing the idea that these measures are relatively unaffected by social desirability bias. Additionally, while some correlations with personality traits were observed, unlike the original study (Slavich and Shields, 2018), these were very weak and consistent with prior findings (Cazassa et al., 2020; Sturmhuber et al., 2019). These results thus suggest that although there is a weak association between personality and stressor exposure as assessed by the STRAIN, the Turkish Adult STRAIN predominantly captures stressor exposure independently of these traits. Moreover, we found that the Turkish Adult STRAIN demonstrated better discriminant validity compared to the PSS, which showed stronger correlations with personality traits. However, the discriminant validity of the Turkish Adult STRAIN was comparable to that of the CTQ-SF, with both showing nearly the same significant correlations with personality traits.

As with the original study and other adaptation studies (Cazassa et al., 2020; Slavich and Shields, 2018), we also examined the test-retest reliability of the Turkish Adult STRAIN. Unlike those studies, the Turkish Adult STRAIN demonstrated moderate/acceptable test-retest

reliability (Koo and Li, 2016), with ICCs of 0.73 for lifetime stressor count and 0.72 for lifetime stressor severity. This relatively lower test-retest reliability may be attributed to the small sample size, as only 37 out of 100 participants completed the survey a second time, which is still considered sufficient for examining test-retest reliability (Adam et al., 2024). Nonetheless, future studies with larger sample sizes are needed to confirm that the Turkish Adult STRAIN can consistently measure lifetime stressors over time.

This study also investigated the differences in lifetime stressor exposure between males and females. We found that men experienced more education stressors, which is not supported by data obtained in the original STRAIN (Slavich and Shields, 2018) and another adaptation study (Cazassa et al., 2020), but could be related to the different cultural setting. The broader literature has provided evidence on gender differences, which shows that women tend to experience more stressors and heightened responses (Sacco et al., 2014).

Considering that the Adult STRAIN not only assesses lifetime stressor count and severity but also a number of different dimensions of lifetime stressor exposure (see Table 1), we examined the predictive validity of the Turkish Adult STRAIN with the likelihood of being diagnosed with auto-immune disorders and general health problems. Our findings suggest that adulthood stressors, acute life events, chronic difficulties, and stressors involving the primary life domains of treatment/health and marital/partner, as well as those in the core social-psychological characteristics of physical danger and role change/disruption, predicted greater general health problems. Similar to the present results, prior research has suggested that lifetime stressor exposure is likely to increase the risk of general health problems, such as depression, anxiety, posttraumatic stress disorder, cardiovascular disease, chronic pain, and certain types of cancer (Dalton et al., 2016; Marin et al., 2011; Shields and Slavich, 2017; Slavich, 2016). Contrary to expectations and prior evidence using the Adult STRAIN

(Cazassa et al., 2020; Slavich and Shields, 2018), we did not find a significant associations between lifetime stressor exposure and likelihood of being diagnosed with autoimmune disorders. One possible explanation for this finding could be that the relatively young age of our sample may have limited the likelihood of experiencing autoimmune disorders (95% had only one autoimmune health problem), which often develop later in life. Furthermore, genetic predispositions and other environmental factors, which were not accounted for in the present study, could play a more significant role in the development of autoimmune disorders than the lifetime stressors assessed in this relatively young sample. Finally, the sample size may not have been large enough to detect subtle associations between lifetime stressor exposure and autoimmune disorder risk in this young sample.

Moreover, although the present sample was relatively young and primarily composed of university students, the descriptive and psychometric patterns observed for the Turkish Adult STRAIN closely parallel those found in other international validations conducted with broader and older adult populations. In the present study, participants reported an average of 13.12 lifetime stressors ($SD=8.89$) and a mean lifetime stressor severity of 32.37 ($SD=21.13$). These values are strikingly similar to those reported in the German validation, which included adults aged 18–80 ($M_{count}=15.65$; $M_{severity}=37.61$; Sturmbauer et al., 2019), the Dutch validation with adults aged 31–81 ($M_{count}=14.08$; $M_{severity}=30.14$; Engels et al., 2023), and even somewhat higher than those obtained in the Korean validation conducted with an adult psychiatric sample ($M_{count}=10.45$; $M_{severity}=25.17$; Kim et al., 2025). This convergence across populations that differ substantially in age, culture, and clinical characteristics suggests that lifetime stressor exposure, as assessed by the STRAIN, represents a stable and generalizable construct rather than one strongly determined by age or life stage. Moreover, community and clinical studies using the STRAIN have consistently

shown similar associations between cumulative stressor exposure and diverse mental and physical health outcomes (e.g. McLoughlin et al., 2021; Shields and Slavich, 2017), further supporting the robustness and external validity of the measure. Collectively, these findings indicate that despite our younger cohort, the Turkish Adult STRAIN demonstrates patterns of stress exposure and health correlations that are broadly consistent with those observed across other international samples.

Finally, while the present study focused on the psychometric evaluation of the Turkish Adult STRAIN, it is important to clarify why traditional measurement invariance analyses were not conducted across language versions. This is because the STRAIN is not designed to assess a latent construct but, rather, represents a formative index of cumulative lifetime stressor exposure, in which each item reflects a distinct, non-redundant life experience (e.g. financial hardship, interpersonal conflict, or health-related adversity). In reflective measurement models, items are expected to covary as indicators of an underlying factor, which makes invariance testing across groups conceptually meaningful. In contrast, in formative models such as those that apply to the STRAIN, covariance among items is neither expected nor theoretically interpretable (Bollen and Diamantopoulos, 2017; Carstensen et al., 2020). For this reason, traditional measurement invariance approaches (configural, metric, scalar) are not suitable or relevant. Instead, the cross-cultural validity of the STRAIN is best established through rigorous translation procedures, conceptual equivalence checks, and consistent patterns of criterion-related validity across independent cultural adaptations (e.g. Cazassa et al., 2020; Sturmbauer et al., 2019). It is still possible that certain stressor descriptions may carry slightly different connotations across languages. To mitigate such potential differences, we employed a multi-step translation and back-translation process with expert review to ensure semantic and conceptual equivalence of all items. This approach ensures that the Turkish Adult STRAIN captures culturally relevant

stressor experiences while preserving the conceptual foundation of lifetime stress exposure.

Limitations

Despite the strengths of the present study, several limitations should be noted. First, the sample predominantly consisted of young adult women with a relatively narrow age range, which may have limited the range of lifetime stressor exposure and could affect the generalizability of these results to older or more diverse populations. However, it is noteworthy that the mean lifetime stressor count and severity observed in our sample were broadly comparable to those reported in previous validations conducted with older and more heterogeneous adult samples (Engels et al., 2023; Kim et al., 2025; Sturmbauer et al., 2019). These descriptive similarities suggest that, although younger participants likely have experienced fewer life events overall, they nonetheless report comparable cumulative stress exposure levels on average. Taken together, these findings provide preliminary support for the STRAIN's applicability in younger populations, though future studies should include more diverse samples in terms of gender and age, given that older adults experience more lifetime and chronic stressors, leading in turn to physical and mental health problems (de Frias and Whyne, 2015; Gouin et al., 2008; Majnarić et al., 2021; Murayama et al., 2020). Second, the participants were healthy young adults, highlighting the need for studies investigating the Turkish Adult STRAIN's use in different clinical populations to explore its potential for identifying individuals at risk for stress-related health problems.

Third, the self-report nature of the Adult STRAIN and other measures used in this study, even though they were previously validated, might introduce response biases that are difficult to estimate. Incorporating objective stress indicators, such as cortisol levels or inflammatory markers, could address this limitation and provide more robust evidence for the Turkish Adult STRAIN's impact on health. Fourth, the cross-sectional design of the study precludes causal inferences, and longitudinal studies are

needed to examine the temporal relations between lifetime stressor exposure and health outcomes, potentially providing more evidence for its predictive validity. Finally, future research including both Turkish- and English-speaking participants could explore potential cross-cultural differences in the frequency or interpretation of specific stressors, though traditional measurement invariance analyses are not relevant or applicable to formative measures such as the STRAIN.

Conclusion

In conclusion, the present study suggests that, like the original Adult STRAIN validation study and other validation studies (Cazassa et al., 2020; Slavich and Shields, 2018; Sturmbauer et al., 2019), the Turkish Adult STRAIN has good usability, acceptability, and excellent validity, making it a valuable tool for assessing lifetime stressor exposure in young Turkish adults. Its robust psychometric properties indicated that it can be effectively used in both research and clinical settings to identify individuals at risk for stress-related health issues, estimate the impact of stress on health and well-being, and inform interventions aimed at mitigating the adverse effects of stress across the lifespan (Black and Slavich, 2016; Kim et al., 2024; Shields et al., 2020). The validation of the Turkish Adult STRAIN also contributes to the cross-cultural applicability of the inventory, supporting its use in diverse cultural contexts.

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Ethical considerations

The study was approved by Koç University Committee on Human Research (Approval Number: 2020.052.IRB3.024; Date: 02.05.2020).

Consent to participate

Informed consent was obtained from all participants involved in this study.

Consent for publication

Consent for publication is not applicable to this article as it does not contain any identifiable data.

Author contributions

Melike Guzey: Conceptualization, Methodology, Formal analysis, Writing–Original Draft; Ibrahim Yigit: Conceptualization, Methodology, Formal analysis, Writing–Original Draft; Grant S. Shields: Writing–Review & Editing, Funding; George M. Slavich: Writing–Review & Editing, Funding, Supervision.

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Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data availability statement

The data used in this study are available on reasonable request from the corresponding author.*

Trial pre-registration number/date

N/A – This is not a clinical trial.

References

Adam BM, Diana OE, Ping FDH, et al. (2024) Sample size determination for conducting a pilot study to assess reliability of a questionnaire.

Restorative Dentistry & Endodontics 49(1): 1–8.

Ağargün MY, Kara H and Anlar Ö (1996) The validity and reliability of the Pittsburgh sleep quality index. *Türk Psikiyatri Dergisi* 7(2): 107–115.

Atak H (2013) The Turkish adaptation of the ten-item personality inventory. *Nöro Psikiyatri Arşivi* 50(4): 312–319.

Barkley RA (2011) *Barkley deficits in executive functioning scale (BDEFS)*. Guilford Press.

Bernstein DP, Fink, L, Handelsman L, et al. (1994) *Childhood Trauma Questionnaire (CTQ) [Database record]*. APA PsycTests. <https://doi.org/10.1037/t02080-000>.

Bernstein DP, Stein JA, Newcomb MD, et al. (2003) Development and validation of a brief screening version of the childhood trauma questionnaire. *Child Abuse & Neglect* 27(2): 169–190.

Black DS and Slavich GM (2016) Mindfulness meditation and the immune system: A systematic review of randomized controlled trials. *Annals of the New York Academy of Sciences* 1373(1): 13–24.

Bollen KA and Diamantopoulos A (2017) In defense of causal-formative indicators: A minority report. *Psychological Methods* 22(3): 581–596.

Bower JE, Crosswell AD and Slavich GM (2014) Childhood adversity and cumulative life stress: Risk factors for cancer-related fatigue. *Clinical Psychological Science* 2(1): 108–115.

Buyssse DJ, Reynolds Cf 3rd, Monk TH, et al. (1989) The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research. *Psychiatry Research* 28(2): 193–213.

Carstensen TBW, Ørnbøl E, Fink P, et al. (2020) Adverse life events in the general population: A validation of the cumulative lifetime adversity measure. *European Journal of Psychotraumatology* 11(1): 1717824.

Cazassa MJ, Oliveira MDS, Spahr CM, et al. (2020) The stress and adversity inventory for adults (adult STRAIN) in Brazilian Portuguese: Initial validation and links with executive function, sleep, and mental and physical health. *Frontiers in Psychology* 10: 494354.

Chrousos GP (2009) Stress and disorders of the stress system. *Nature Reviews Endocrinology* 5(7): 374–381.

Cohen S, Janicki-Deverts D and Miller GE (2007) Psychological stress and disease. *Journal of the American Medical Association* 298(14): 1685–1687.

- Cohen S, Kamarck T and Mermelstein R (1983) A global measure of perceived stress. *Journal of Health and Social Behavior* 24: 385–396.
- Crosswell AD and Lockwood KG (2020) Best practices for stress measurement: How to measure psychological stress in health research. *Health Psychology Open* 7(2): 2055102920933072.
- Cuneo MG, Schrepf A, Slavich GM, et al. (2017) Diurnal cortisol rhythms, fatigue and psychosocial factors in five-year survivors of ovarian cancer. *Psychoneuroendocrinology* 84: 139–142.
- Dalton ED, Hammen CL, Brennan PA, et al. (2016) Pathways maintaining physical health problems from childhood to young adulthood: The role of stress and mood. *Psychology and Health* 31(11): 1255–1271.
- de Frias CM and Whyne E (2015) Stress on health-related quality of life in older adults: The protective nature of mindfulness. *Aging & Mental Health* 19(3): 201–206.
- Dorsey A, Scherer E, Eckhoff R, et al. (2022) *Measurement of human stress: A multidimensional approach*. RTI Press Publication No. OP-0073-2206. Research Triangle Park, NC: RTI Press. <https://doi.org/10.3768/rti-press.2022.op.0073.2206>
- Engels N, Riphagen JM, Van Egroo M, et al. (2023) Preliminary validation of the stress and adversity inventory for adults (adult STRAIN) in Dutch and its associations with in-vivo locus coeruleus integrity. *Alzheimer's & Dementia* 19: e082786.
- Epel ES, Crosswell AD, Mayer SE, et al. (2018) More than a feeling: A unified view of stress measurement for population science. *Frontiers in Neuroendocrinology* 49: 146–169.
- Gençöz T (2000) Positive and negative affect schedule: A study of validity and reliability. *Türk Psikoloji Dergisi* 15(46): 19–28.
- Goldfarb EV, Shields GS, Daw ND, et al. (2017) Low lifetime stress exposure is associated with reduced stimulus-response memory. *Learning & Memory* 24(4): 162–168.
- Gosling SD, Rentfrow PJ and Swann WB (2003) A very brief measure of the big-five personality domains. *Journal of Research in Personality* 37(6): 504–528.
- Gouin JP, Hantsoo L and Kiecolt-Glaser JK (2008) Immune dysregulation and chronic stress among older adults: A review. *Neuroimmunomodulation* 15(4-6): 251–259.
- Horowitz M, Wilner N and Alvarez W (1979) Impact of event scale: A measure of subjective stress. *Psychosomatic Medicine* 41(3): 209–218.
- Juruena MF, Eror F, Cleare AJ, et al. (2020) The role of early life stress in HPA axis and anxiety. In: Kim Y.-K (ed.) *Anxiety Disorders: Rethinking and Understanding Recent Discoveries*. Springer, (pp.141–153).
- Kessler RC, Barker PR, Colpe LJ, et al. (2003) Screening for serious mental illness in the general population. *Archives of General Psychiatry* 60(2): 184–189.
- Kim ES, Kim YT, Oh KS, et al. (2025) The stress and adversity inventory for adults (adult STRAIN) in Korean: Initial validation and associations with psychiatric disorders. *Brain Sciences* 15(1): 32.
- Kim LY, Schüssler-Fiorenza Rose SM, Mengelkoch S, et al. (2024) California stress, trauma, and resilience study (CalSTARS) protocol: A multiomics-based cross-sectional investigation and randomized controlled trial to elucidate the biology of ACEs and test a precision intervention for reducing stress and enhancing resilience. *Stress* 27(1): 2401788.
- Koolhaas JM, Bartolomucci A, Buwalda B, et al. (2011) Stress revisited: A critical evaluation of the stress concept. *Neuroscience and Biobehavioral Reviews* 35(5): 1291–1301.
- Koo TK and Li MY (2016) A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of Chiropractic Medicine* 15(2): 155–163.
- Lam JCW, Shields GS, Trainor BC, et al. (2019) Greater lifetime stress exposure predicts blunted cortisol but heightened DHEA responses to acute stress. *Stress and Health* 35(1): 15–26.
- Lupien SJ, McEwen BS, Gunnar MR, et al. (2009) Effects of stress throughout the lifespan on the brain, behaviour and cognition. *Nature Reviews Neuroscience* 10(6): 434–445.
- Majnarić LT, Bosnić Z, Guljaš S, et al. (2021) Low psychological resilience in older individuals: An association with increased inflammation, oxidative stress and the presence of chronic medical conditions. *International Journal of Molecular Sciences* 22(16): 8970.
- Marin MF, Lord C, Andrews J, et al. (2011) Chronic stress, cognitive functioning and mental health. *Neurobiology of Learning and Memory* 96(4): 583–595.

- Mayer SE, Prather AA, Puterman E, et al. (2019) Cumulative lifetime stress exposure and leukocyte telomere length attrition: The unique role of stressor duration and exposure timing. *Psychoneuroendocrinology* 104: 210–218.
- McLoughlin E, Fletcher D, Slavich GM, et al. (2021) Cumulative lifetime stress exposure, depression, anxiety, and well-being in elite athletes: A mixed-method study. *Psychology of Sport and Exercise* 52: 101823.
- Murayama Y, Yamazaki S, Yamaguchi J, et al. (2020) Chronic stressors, stress coping and depressive tendencies among older adults. *Geriatrics and Gerontology International* 20(4): 297–303.
- Olvera Alvarez HA, Provencio-Vasquez E, Slavich GM, et al. (2019) Stress and health in nursing students: The nurse engagement and wellness study. *Nursing Research* 68(6): 453–463.
- Örücü MÇ and Demir A (2009) Psychometric evaluation of perceived stress scale for Turkish university students. *Stress and Health: Journal of the International Society for the Investigation of Stress* 25(1): 103–109.
- Rezan A and Eroglu Ç (2012) Psychometric properties of Turkish version of childhood trauma questionnaire among adolescents with gender differences. *Psychology* 03(10): 916–922.
- Roberti JW, Harrington LN and Storch EA (2006) Further psychometric support for the 10-item version of the perceived stress scale. *Journal of College Counseling* 9(2): 135–147.
- Sacco P, Buchholz KK and Harrington D (2014) Gender differences in stressful life events, social support, perceived stress, and alcohol use among older adults: Results from a national survey. *Substance Use & Misuse* 49(4): 456–465.
- Şar V, Öztürk PE and İkikardeş E (2012) Çocukluk çağı ruhsal travma ölçeğinin Türkçe uyarlamasının geçerlilik ve güvenilirliği. *Türkiye Klinikleri Journal of Medical Sciences* 32(4): 1054–1063.
- Schat ACH, Kelloway EK and Desmarais S (2005) The physical health questionnaire (PHQ): Construct validation of a self-report scale of somatic symptoms. *Journal of Occupational Health Psychology* 10(4): 363–381.
- Shields GS, Moons WG and Slavich GM (2017b) Better executive function under stress mitigates the effects of recent life stress exposure on health in young adults. *Stress* 20(1): 92–102.
- Shields GS, Doty D, Shields RH, et al. (2017a) Recent life stress exposure is associated with poorer long-term memory, working memory, and self-reported memory. *Stress* 20(6): 598–607.
- Shields GS, Ramey MM, Slavich GM, et al. (2019) Determining the mechanisms through which recent life stress predicts working memory impairments: Precision or capacity? *Stress* 22(2): 280–285.
- Shields GS and Slavich GM (2017) Lifetime stress exposure and health: A review of contemporary assessment methods and biological mechanisms. *Social and Personality Psychology Compass* 11(8): e12335.
- Shields GS, Spahr CM and Slavich GM (2020) Psychosocial interventions and immune system function: A systematic review and meta-analysis of randomized clinical trials. *JAMA Psychiatry* 77(10): 1031–1043.
- Slavich GM (2016) Life stress and health: A review of conceptual issues and recent findings. *Teaching of Psychology* 43(4): 346–355.
- Slavich GM and Irwin MR (2014) From stress to inflammation and major depressive disorder: A social signal transduction theory of depression. *Psychological Bulletin* 140(3): 774–815.
- Slavich GM, Roos LG, Mengelkoch S, et al. (2023) Social safety theory: Conceptual foundation, underlying mechanisms, and future directions. *Health Psychology Review* 17(1): 5–59.
- Slavich GM and Shields GS (2018) Assessing lifetime stress exposure using the stress and adversity inventory for adults (adult STRAIN): An overview and initial validation. *Psychosomatic Medicine* 80(1): 17–27.
- Slavich GM, Stewart JG, Esposito EC, et al. (2019) The stress and adversity inventory for adolescents (adolescent STRAIN): Associations with mental and physical health, risky behaviors, and psychiatric diagnoses in youth seeking treatment. *Journal of Child Psychology and Psychiatry* 60(9): 998–1009.
- Slavich GM, Way BM, Eisenberger NI, et al. (2010) Neural sensitivity to social rejection is associated with inflammatory responses to social stress. *Proceedings of the National Academy of Sciences* 107(33): 14817–14822.
- Smith T, Johns-Wolfe E, Shields GS, et al. (2020) Associations between lifetime stress exposure and prenatal health behaviors. *Stress and Health* 36(3): 384–395.

- Stöber J (2001) The social desirability scale-17 (SDS-17): Convergent validity, discriminant validity, and relationship with age. *European Journal of Psychological Assessment* 17(3): 222.
- Sturmbauer SC, Shields GS, Hetzel EL, et al. (2019) The stress and adversity inventory for adults (adult STRAIN) in German: An overview and initial validation. *PLoS One* 14(5): e0216419.
- Toussaint L, Shields GS, Dorn G, et al. (2016) Effects of lifetime stress exposure on mental and physical health in young adulthood: How stress degrades and forgiveness protects health. *Journal of Health Psychology* 21(6): 1004–1014.
- Tran US, Stieger S and Voracek M (2012) Psychometric analysis of Stöber's social desirability scale (SDS-17): An item response theory perspective. *Psychological Reports* 111(3): 870–884.
- Watson D, Clark LA and Tellegen A (1988) Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology* 54(6): 1063–1070.
- Weber J, Angerer P and Apolinário-Hagen J (2022) Physiological reactions to acute stressors and subjective stress during daily life: A systematic review on ecological momentary assessment (EMA) studies. *PLoS One* 17(7): e0271996.