

Frequency and Trend Analysis of Adverse Childhood Experiences (ACE) in First-year Late Adolescent Students Starting University for the First Time in Türkiye: A Repeated Cross-sectional Study, 2023–2026

Türkiye’de Üniversiteye İlk Kez Başlayan Geç Ergenlik Dönemi Birinci Sınıf Öğrencilerinde Çocukluk Çağı Olumsuz Yaşam Deneyimlerinin Sıklığı ve Eğilim Analizi: Tekrarlı Kesitsel Çalışma, 2023–2026

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Abstract

Introduction: Adverse Childhood Experiences (ACEs) refer to potentially traumatic experiences such as abuse, neglect, and household dysfunction that an individual experiences before the age of 18. This study aims to examine the frequency and temporal trends of Adverse Childhood Experiences (ACEs) among first-year late adolescents starting university for the first time between 2023 and 2026.

Materials and Methods: This research was conducted as a repeated cross-sectional study. Data were collected through an anonymous online questionnaire distributed via social media and student networks. Participants voluntarily joined from various regions of Türkiye. At the end of the study, the numbers of participants in 2023, 2024, 2025, and 2026 were 138, 137, 136, and 139, respectively, for a total of 550 students. The ACE-Q 10 scale was used to assess the frequency of adverse childhood experiences (ACEs). Changes over the years were analyzed using the Pearson Chi-square test, the Linear-by-Linear Association test, and multivariable logistic regression analyses.

Results: Fifty-three percent of participants reported experiencing at least one ACE, while 9.6% reported exposure to four or more ACEs. Emotional neglect was the most common type of child abuse across all years, followed by emotional abuse, with physical or medical neglect being the least frequent. Childhood sexual abuse increased significantly from 5.8% in 2023 to 17.4% in 2026 (p-trend=0.001). The prevalence of alcohol or substance abuse problems in the family also increased from 3.6% to 10.1% (p-trend=0.033). The percentage of students with four or more ACE scores increased significantly from 5.8% to 16.5% (p-trend = 0.004).

Conclusion: Among late adolescent students starting university, an increased trend was observed, particularly in cases of sexual abuse and high ACE burden. Although the findings are not nationally representative, they suggest a need for continued monitoring of ACEs and strengthening child protection and trauma-focused preventive programs.

Keywords

Adverse childhood experiences, child abuse, child neglect, students

Anahtar kelimeler

Olumsuz çocukluk deneyimleri, çocuk istismarı, çocuk ihmali, öğrenciler

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Öz

Giriş: Çocukluk çağı olumsuz yaşam deneyimleri (ÇÇOYD), bireyin 18 yaşına gelmeden önce yaşadığı istismar, ihmal ve aile içi işlev bozukluğu gibi potansiyel olarak travmatik deneyimleri ifade eder. Bu çalışma, 2023 ile 2026 yılları arasında ilk kez üniversiteye başlayan geç ergenlik dönemindeki birinci sınıf öğrencileri arasında ÇÇOYD sıklığını ve zamansal eğilimlerini incelemeyi amaçlamıştır.

Gereç ve Yöntem: Bu araştırma, tekrarlanan kesitsel tipte bir çalışma olarak yürütüldü. Veriler, sosyal medya ve öğrenci ağları aracılığıyla dağıtılan anonim çevrimiçi anket yoluyla toplandı. Katılımcılar Türkiye'nin çeşitli bölgelerinden gönüllü olarak katıldı. Çalışmanın sonunda, 2023, 2024, 2025 ve 2026 yıllarındaki katılımcı sayıları sırasıyla 138, 137, 136 ve 139 olup toplamda 550 öğrenciye ulaşılmıştır. Çocukluk çağı olumsuz yaşam deneyimlerinin sıklığını değerlendirmek için ACE-Q 10 ölçeği kullanıldı. Yıllar içindeki değişiklikler Pearson Chi-square ve Linear-by-Linear Association testi ve çok değişkenli lojistik regresyon analizleri kullanılarak incelendi.

Bulgular: Katılımcıların %53'ü en az bir olumsuz çocukluk çağı olumsuz yaşam deneyimi (ÇÇOYD) yaşadığını bildirirken, %9,6'sı dört veya daha fazla ÇÇOYD'ye maruz kaldığını bildirmiştir. Duygusal ihmal, tüm yıllar boyunca en yaygın çocuk istismarı türü olurken, bunu duygusal istismar takip etmiş, fiziksel veya tıbbi ihmal ise en az sıklıkta görülmüştür. Çocukluk çağı cinsel istismarı, 2023'te %5,8'den 2026'da %17,4'e önemli ölçüde artmıştır (p-trend=0,001). Ailede alkol veya madde bağımlılığı sorunlarının yaygınlığı da %3,6'dan %10,1'e yükselmiştir (p-trend=0,033). Dört veya daha fazla ÇÇOYD puanına sahip öğrencilerin yüzdesi de %5,8'den %16,5'e önemli ölçüde artmıştır (p-trend = 0,004).

Sonuç: Üniversiteye yeni başlayan geç ergenlik dönemindeki öğrenciler arasında, özellikle cinsel istismar ve ÇÇOYD yükü vakalarında artış eğilimi gözlemlenmiştir. Bulgular ulusal düzeyde temsili olamasa da, ÇÇOYD'nin sürekli olarak izlenmesi ve çocuk koruma ile travma odaklı önleyici programların güçlendirilmesi ihtiyacını ortaya koymaktadır.

Introduction

Adverse childhood experiences (ACEs) refer to potentially traumatic experiences such as abuse, neglect, and domestic dysfunction that an individual is exposed to before the age of 18 (1). In recent years, the concept of ACEs has become a key research topic in child health, mental health, and public health. The main reason is that adverse experiences in childhood are not limited to childhood; they also create lifelong physical, psychological, and social effects (1-3).

Studies show that ACE exposure is associated with depression, anxiety, substance use disorders, cardiometabolic diseases, risky health behaviors, and early mortality in adulthood (4,5). Toxic stress caused by ACEs can leave lasting effects on the neuroendocrine system, immune system, and brain development in childhood (6). In particular, chronic activation of the hypothalamic-pituitary-adrenal axis and changes in inflammatory processes underlie lifelong health risks (7).

Experiences within the scope of ACE are generally assessed in two main groups: childhood maltreatment and household dysfunction (1). Emotional, physical, and sexual abuse, and emotional and physical neglect are included in childhood maltreatment. At the same time, domestic violence, parental separation, mental illness in family members, alcohol or substance use problems, and a history of crime are considered household dysfunctions (1-3).

One of the most important findings of ACE studies is the cumulative effect of exposures. It has been shown that individuals with four or more ACEs have a significantly

increased risk of mental disorders, chronic diseases, and adverse life outcomes (8). Recent meta-analytic studies report that health outcomes worsen with increasing ACE load, and that a significant dose-response relationship emerges (8-10).

Globally, ACEs are known to be quite common. A recent systematic review and meta-analysis reported that only 42% of children had never experienced an ACE, while 15% had four or more ACEs (11). Similarly, Centers for Disease Control and Prevention (CDC) data show that a large proportion of the adult population has experienced at least one ACE (1). However, ACE prevalence varies across countries, cultures, and socioeconomic conditions (1,11-13).

It is suggested that the negative life events to which children are exposed may have increased following the COVID-19 pandemic. It is stated that factors such as domestic economic problems, increased parental stress, social isolation, and distancing from educational environments during the pandemic period create new risks in terms of child abuse and neglect (14). Therefore, updated ACE assessments are particularly important after 2023, the post-pandemic period.

The period of starting university is a critical stage of life in which the effects of experiences individuals had during childhood and adolescence become visible in academic, social, and psychological areas (14). Recent studies show that the prevalence of ACE is high among university students and that childhood traumas have significant effects on academic success, psychological adjustment, and quality of life (12-17).

Adverse childhood experiences (ACEs) are common

among university students, with similar rates reported across many countries. However, there are almost no longitudinal or repeated cross-sectional trend studies that show an increase in ACE frequency over time (12-17). While studies have examined the prevalence of ACE in Türkiye, we have not found any research evaluating changes over time (12,13). Determining trends in ACE frequency, especially among late adolescent students who have recently started university, can inform the development of preventive public health policies.

This study aimed to determine the frequency of ACE among late-adolescent students starting university for the first time between 2023 and 2026 and to examine trends over time.

Materials and Methods

Study Design and Population

This research was conducted as a repeated cross-sectional study. The study population consisted of approximately 650,000 students starting university for the first time in Türkiye each year between 2023 and 2026. Sample size estimation was performed using an expected ACE prevalence of 12-15%, based on previously reported prevalence estimates among Turkish university students, with a 90% confidence level and a $\pm 5\%$ margin of error (18). Under these assumptions, the minimum required sample size was calculated to be 124 participants per study year.

To ensure comparable sample sizes and similar levels of statistical precision across the four survey periods, a target of approximately 140 participants was established for each year. Data were collected anonymously via Google Forms, and responses were retained after submission. Therefore, rather than deleting completed questionnaires after data collection, recruitment was prospectively closed when approximately 140 responses had been obtained in each survey period. This approach was adopted to minimize imbalances in sample size between years and to maintain consistency across repeated cross-sectional assessments.

The study used a voluntary online convenience sampling approach rather than probability-based sampling. Data were collected through an anonymous online questionnaire distributed via social media and student networks. Participants voluntarily joined from various regions of Türkiye. Therefore, the sample should not be considered nationally representative, and the findings should be interpreted within the context of the study population.

At the end of the study, the number of individuals reached and included in 2023, 2024, 2025, and 2026 was 138, 137,

136, and 139, respectively, for a total of 550 students. With these numbers, the margins of error at the end of the study, at a 90% confidence level, were $\pm 4.72\%$, $\pm 4.74\%$, $\pm 4.76\%$, and $\pm 4.71\%$, respectively.

Data Collection Procedures

Data were collected via an online survey. Participants volunteered for the research, and all data were collected anonymously. The ACE-Q 10 scale was used to determine the frequency of childhood adverse life experiences (ACE). The scale was developed by the CDC and Permanente in 1997, and its Turkish validity and reliability were tested by Gündüz et al. (19) in 2018. Variables within the scope of ACE in the scale were evaluated under two main headings:

Childhood Maltreatment

- Emotional abuse
- Physical abuse
- Sexual abuse
- Emotional neglect
- Physical/Medical negligence

Household Dysfunction

- Domestic violence
- Parental separation/divorce
- Presence of a member of the family with a mental illness
- Alcohol or substance use problem in the family
- Family history of crime or prison

The scale was scored from 0 to 10, with no cutoff points. Higher scores indicated greater exposure to adverse childhood experiences. A score of 0 indicated no ACE exposure, whereas a score of 10 indicated exposure across all ACE domains. (19).

Statistical Analysis

The data obtained in the study were entered into SPSS 22 (Statistical Package for the Social Sciences) and analyzed using descriptive and comparative statistics. Descriptive statistics were presented as frequency and percentage. The normality assumption was assessed by examining the histogram, q-q plot, and skewness and kurtosis values, and by applying the Shapiro-Wilk test. Categorical data were evaluated using the chi-square test. Differences between years were evaluated using the Pearson chi-square test. The Linear-by-Linear Association test was used to determine temporal trends. The statistical significance level was accepted as $p < 0.05$. To determine whether observed temporal changes were independent of potential differences in participant characteristics across study years, multivariable logistic

regression analyses were additionally performed. Year of enrollment was entered as an ordinal variable (2023–2026), and the models were adjusted for gender and employment status. Separate models were constructed for childhood sexual abuse, alcohol/substance use problems within the family, and high ACE burden (ACE score ≥ 4). Adjusted odds ratios (aORs) and 95% confidence intervals (95% CIs) were calculated. Statistical significance was set at $p < 0.05$.

Ethics Committee Approval

The authors affirm that all procedures and experiments conducted in this study complied with the ethical standards outlined in the Declaration of Helsinki (1975), as revised in 2008, as well as relevant national regulations. Ethical approval for the study was obtained from the Istanbul Medipol University Clinical Research Ethics Committee (decision no: E-10840098-772.02-7504, date: 29.11.2023).

Results

Participant Characteristics

Of the 550 students participating in the study, 69.6% were female, and 30.4% were male, with a mean age of 19.21 ± 1.77 years. Most participants (83.8%) were not working during their university education. Overall, 53.1% of students reported at least one adverse childhood experience (ACE), 43.1% reported at least one form of childhood maltreatment, and 32.4% reported at least one form of household dysfunction. An ACE score of four or higher was observed in 9.6% of the participants. The general characteristics of all participants were summarized in Table 1.

Trends in Childhood Abuse and Neglect Experiences

Throughout the four years, the most common type of child abuse was emotional neglect, followed by emotional

Table 1. Participants' sociodemographic and Adverse Childhood Experiences (ACEs) characteristics

Categories		All participants N (%)
2023		138 (25.1)
2024		137 (24.9)
2025		136 (24.7)
2026		139 (25.3)
Gender	Female	383 (69.6)
	Male	167 (30.4)
Employment status while at university	Not working	461 (83.8)
	Working	89 (16.2)
Childhood maltreatment (CM)		
Emotional abuse		115 (20.9)
Physical abuse		49 (8.9)
Sexual abuse		57 (10.4)
Emotional neglect		167 (30.4)
Physical/Medical neglect		11 (2)
Household dysfunction (HD)		
Domestic violence		32 (5.8)
Parental separation/divorce		56 (10.2)
Presence of a member of the family with a mental illness		114 (20.7)
Alcohol or substance use problem in the family		29 (5.3)
Family history of crime or prison		19 (3.5)
Those who have at least one ACE		292 (53.1)
Those with an ACE score of 4 and above		53 (9.6)
Those that are at least one CM		237 (43.1)
Those with at least one HD		178 (32.4)

abuse, while physical or medical neglect was the least frequent.

The frequency of emotional abuse increased from 17.4% in 2023 to 25.2% in 2026. However, this increase was not statistically significant (p -trend = 0.182).

An increase was also observed in the frequency of physical abuse, from 4.4% to 10.8%, but the linear trend was not significant (p -trend=0.076).

The frequencies of emotional neglect and physical neglect remained largely constant throughout the years. The findings were summarized in detail in Table 2.

A remarkable increase was detected in the frequency of sexual abuse. The rate, which was 5.8% in 2023, increased to 17.4% in 2026, showing a significant linear increase (p =0.008; p -trend=0.001). To determine whether the increase in childhood sexual abuse over time was independent of changes in participant characteristics, a multivariable logistic regression analysis was performed, adjusting for gender and employment status. Year remained a significant predictor of childhood sexual abuse (aOR=1.38, 95% CI: 1.04–1.82, p =0.026). This indicates that the odds of reporting childhood sexual abuse increased by approximately 38%

with each successive study year. Employment status was also independently associated with childhood sexual abuse (aOR=2.04, 95% CI: 1.04–4.00, p =0.038), whereas gender was not significantly associated (p =0.342). The findings were summarized in detail in Table 3.

Trends in Household Dysfunction

Parental separation showed a significant difference between years (p = 0.007), but no linear increase or decrease trend was detected.

The frequency of alcohol or substance use problems in the family increased from 3.6% in 2023 to 10.1% in 2026 and showed a significant linear increase (p = 0.029; p -trend = 0.033). In a multivariable logistic regression model adjusted for gender and employment status, year of enrollment was not independently associated with reporting alcohol or substance use problems within the family (aOR=1.26, 95% CI: 0.86–1.85, p =0.233). Employment status showed a borderline association (aOR=2.38, 95% CI: 0.97–5.79, p =0.057), whereas gender was not significantly associated (p =0.463).

There was no significant change over the years in terms of domestic violence, presence of mental illness in the

Table 2. Frequency and trend analysis of Adverse Childhood Experiences (ACEs) over the years in late adolescent students starting university

	2023	2024	2025	2026	Pearson Chi-square	Linear by linear
	Yes N (%)	Yes N (%)	Yes N (%)	Yes N (%)	p-value	P-trend
Childhood maltreatment (CM)						
Emotional abuse	24 (17.4)	30 (21.9)	26 (19.1)	35 (25.2)	0.406	0.182
Physical abuse	6 (4.4)	14 (10.2)	14 (10.3)	15 (10.8)	0.197	0.076
Sexual abuse	8 (5.8)	10 (7.3)	15 (11)	24 (17.4)	0.008	0.001
Emotional neglect	44 (31.9)	39 (28.5)	41 (30.1)	43 (31.2)	0.935	0.977
Physical/Medical neglect	5 (3.6)	2 (1.5)	1 (0.7)	3 (2.2)	0.367	0.345
Household dysfunction (HD)						
Domestic violence	6 (4.3)	8 (5.8)	7 (5.1)	11 (8)	0.611	0.254
Parental separation/divorce	17 (12.3)	5 (3.7)	12 (8.8)	22 (15.9)	0.007	0.167
Presence of a member of the family with a mental illness	25 (18.1)	24 (17.6)	30 (22.1)	35 (25.4)	0.348	0.091
Alcohol or substance use problem in the family	5 (3.6)	6 (4.4)	4 (2.9)	14 (10.1)	0.029	0.033
Family history of crime or prison	4 (2.9)	4 (3)	5 (3.7)	6 (4.3)	0.902	0.467
Those who have at least one ACE	67 (48.6)	69 (50.4)	74 (54.4)	82 (59)	0.309	0.062
Those with an ACE score of 4 and above	8 (5.8)	11 (8)	11 (8.1)	23 (16.5)	0.013	0.004
Those that are at least one CM	52 (37.7)	57 (41.6)	59 (43.4)	69 (49.6)	0.240	0.045
Those with at least one HD	40 (29)	39 (28.5)	45 (33.1)	54 (38.8)	0.224	0.055

family, and criminal history in the family. The findings were summarized in detail in Table 2 and 3.

Trends in Total ACE Score

The proportion of students with at least one ACE increased from 48.6% in 2023 to 59.0% in 2026. This increase was close to the limit of statistical significance (p -trend = 0.062).

The proportion of students with an ACE score of four or higher increased from 5.8% to 16.5%, showing a significant linear increase ($p=0.013$; p -trend=0.004).

A significant increase was also found in the proportion of students who experienced at least one childhood abuse (p -trend=0.045). The increase in the rate of experiencing household dysfunction was found to be borderline significant (p -trend=0.055).

To determine whether the increase in high ACE burden over time was independent of changes in participant characteristics, a multivariable logistic regression analysis was performed, adjusting for gender and employment status. Year remained a significant predictor of having an ACE score

Table 3. Multivariable logistic regression analyses of temporal trends in high ACE burden, childhood sexual abuse, and family alcohol/substance use problems, adjusted for gender and employment status

	ACE score of 4 and above			Sexual abuse			Alcohol or substance use problem in the family		
	aOR (%95 CI)	P value	Nagelkerke R-squared	aOR (%95 CI)	p-value	Nagelkerke R-squared	aOR (%95 CI)	P value	Nagelkerke R-squared
Years (2023-2026)	1.41 (1.06-1.87)	0.019	0.032	1.38 (1.03-1.82)	0.026	0.060	1.26 (0.86-1.85)	0.233	0.046
Female sex	0.80 (0.43-1.47)	0.474		0.73 (0.38-1.39)	0.342		1.39 (0.57-3.35)	0.463	
Working students	1.43 (0.70-2.92)	0.322		2.04 (1.04-4.00)	0.038		2.38 (0.97-5.79)	0.057	

aOR: Adjusted odds ratio, CI: Confidence interval, reference categories were male sex and non-working students

Table 4. Examining the frequency of Adverse Childhood Experiences (ACEs) in all participants according to gender and current employment status

	Gender			Employment status while at university		
	Female Yes N (%)	Male Yes N (%)	p-value	Not working Yes N (%)	Working Yes N (%)	p-value
Childhood maltreatment (CM)						
Emotional abuse	74 (19.3)	41 (24.6)	0.165	97 (21)	18 (20.2)	0.862
Physical abuse	28 (7.3)	21 (12.7)	0.044	38 (8.3)	11 (12.4)	0.214
Sexual abuse	43 (11.3)	14 (8.4)	0.310	39 (8.5)	18 (20.5)	0.001
Emotional neglect	126 (33)	41 (24.6)	0.048	142 (30.8)	25 (28.4)	0.655
Physical/Medical neglect	5 (1.3)	6 (3.6)	0.080	7 (1.5)	4 (4.5)	0.064
Household dysfunction (HD)						
Domestic violence	22 (5.8)	10 (6)	0.916	24 (5.2)	8 (9.1)	0.154
Parental separation/divorce	39 (10.2)	17 (10.2)	0.984	46 (10)	10 (11.4)	0.699
Presence of a member of the family with a mental illness	85 (22.3)	29 (17.4)	0.189	93 (20.2)	21 (23.9)	0.440
Alcohol or substance use problem in the family	22 (5.8)	7 (4.2)	0.450	19 (4.1)	10 (11.4)	0.015
Family history of crime or prison	11 (2.9)	8 (4.8)	0.259	13 (2.8)	6 (6.9)	0.058
Those who have at least one ACE	206 (53.8)	86 (51.5)	0.621	235 (51)	57 (64)	0.024
Those with an ACE score of 4 and above	35 (9.1)	18 (10.8)	0.549	39 (8.5)	14 (15.7)	0.033
Those that are at least one CM	168 (43.9)	69 (41.3)	0.579	190 (41.2)	47 (52.8)	0.043
Those with at least one HD	130 (33.9)	48 (28.7)	0.231	139 (30.2)	39 (43.8)	0.012

of four or more (aOR=1.41, 95% CI: 1.06–1.87, $p=0.019$). This finding indicates that the odds of having a high ACE burden increased by approximately 41% with each successive study year. Neither gender ($p=0.474$) nor employment status ($p=0.322$) was significantly associated with having an ACE score of four or more. The findings were summarized in detail in Table 2 and 3.

ACE Distribution by Gender and Employment Status

Physical abuse was more frequent in male students than in female students (12.7% vs. 7.3%; $p=0.044$). In contrast, emotional neglect was more common in females (33.0% vs. 24.6%; $p=0.048$).

Childhood sexual abuse (20.5% vs. 8.5%; $p=0.001$), family history of alcohol or substance use (11.4% vs. 4.1%; $p=0.015$), at least one ACE score (64.0% vs. 51.0%; $p=0.024$), and four or more ACE scores (15.7% vs. 8.5%; $p=0.033$) were significantly higher among students who worked during their university education. The findings were summarized in detail in Table 4.

Discussion

This study examined temporal changes in adverse childhood experiences among late-adolescent students who began university between 2023 and 2026 and reported significant findings. Emotional neglect and abuse were the most common types of child maltreatment each year.

The most striking result of the study was the significant increase observed in the frequency of childhood sexual abuse. The observed increase in childhood sexual abuse remained significant after adjustment for gender and employment status, suggesting that the temporal trend cannot be explained solely by shifts in the demographic composition of the sample. The nearly threefold increase in the frequency of sexual abuse over the four years is a significant warning for child protection systems. This increase may be related not only to the actual rise in frequency but also to increased awareness of sexual abuse and strengthened reporting behaviors. In addition, the change in the risk environments to which children are exposed in the post-pandemic period may also be influential. International reports indicate that children distancing themselves from safe social support systems during the pandemic period may increase the risk of abuse (14).

The marked increase in reported childhood sexual abuse may also reflect broader social changes occurring in Türkiye during the study period. Economic instability and increasing financial pressures on families have been associated with

heightened parental stress, family conflict, and reduced supervision of children, all of which may contribute to increased vulnerability to abuse (20). In parallel, adolescents have experienced unprecedented levels of digital exposure. Increased use of social media, online gaming platforms, and digital communication may expand opportunities for online grooming, sexual exploitation, and exposure to inappropriate sexual content (21). It is also possible that increased public discussion of child sexual abuse in traditional and social media has improved awareness and willingness to disclose previously unreported experiences (22). Therefore, the observed increase may reflect a combination of genuine changes in risk exposure and greater recognition and reporting of childhood sexual abuse.

In this study, 53.1% of the students reported experiencing at least one ACE. This rate is largely consistent with the international literature. Current systematic reviews indicate that the prevalence of ACE exceeds 50% among university students and young adults (1,3,12,13). In addition, CDC data reports that approximately two-thirds of adults have experienced at least one ACE in their lives (1). Our findings show that childhood trauma is a widespread public health problem in Turkey as well.

One of the most striking findings of the study is the significant increase in the proportion of students with an ACE score of four or higher over the years. Importantly, the increasing prevalence of high ACE burden (ACE score ≥ 4) remained significant after adjustment for gender and employment status. This suggests that the observed temporal increase reflects a genuine trend rather than changes in the sample's demographic composition. Having an ACE score of four or higher is considered an indicator of high risk for mental disorders, substance use, suicidal behavior, and chronic diseases (8-10). Therefore, the increase observed in our study should be carefully evaluated in terms of future mental health and public health burdens.

In our study, emotional neglect and abuse were the most common types of child abuse in all four years from 2023 to 2026. Unlike other types of child abuse, emotional neglect and abuse often leave no visible marks, making it an insufficiently addressed problem in societies where violence is socially acceptable. The lack of visible traces of abuse can lead to it going unnoticed in society. Unlike forms of maltreatment that result in visible physical injury, emotional abuse and neglect may be less readily recognized in settings where certain disciplinary practices are culturally normalized or regarded as part of routine child-rearing (23). As a result, these experiences may remain underrecognized by both

families and professionals despite their substantial long-term psychological impact. Continuous emotional abuse and neglect by the family cause chronic stress in the body. Chronic stress, when inflicted by the caregiver and occurring during critical life stages, leads to toxic stress, disrupting the body's balance through biological embedding and negatively impacting psychological resilience (24-26).

An important finding in our study is the increased frequency of alcohol or substance use problems within the family. Although the unadjusted trend analysis suggested an increase in alcohol or substance use problems within the family over time, this association was no longer significant after adjustment for gender and employment status. Therefore, the observed increase should be interpreted cautiously. Substance use within the family not only poses a direct risk of neglect and abuse for children but also creates multifaceted negative effects through insecure family environments, economic difficulties, and psychological stress (27). The literature has shown a strong association between substance use within the family and childhood traumas (27,28).

The higher frequency of physical abuse among male students in our study is consistent with previous research. It is reported that in some cultures, male children are more often subjected to physical punishment for disciplinary purposes (29,30). In contrast, the higher frequency of emotional neglect among female students may be related to gender roles and family expectations (31). However, these differences need to be evaluated within a cultural context.

It is noteworthy that students who work during their university education have a higher ACE load. ACE exposure is associated with economic vulnerability, difficulties in educational processes, and reduced quality of life (1,32). Therefore, the higher ACE rates observed among working students suggest that childhood disadvantages persist into young adulthood.

The toxic stress model currently explains the long-term effects of ACEs. Individuals exposed to continuous traumatic experiences during childhood may develop permanent changes in their neuroendocrine and immunological systems; this can increase their susceptibility to mental and physical illnesses in adulthood (4-7). Recent studies on neurocognitive functions also show that ACEs negatively affect cognitive development in children and adolescents (8-10).

Recent neurodevelopmental research has provided more specific biological explanations for these associations (33-35). Exposure to chronic childhood adversity has been linked to alterations in the connectivity between the prefrontal

cortex and the amygdala (34). These neural circuits play a central role in emotional regulation, threat detection, and executive functioning. Dysregulation of these networks may contribute to increased emotional reactivity, impaired impulse control, and vulnerability to anxiety and depressive disorders (33). In addition, accumulating evidence suggests that adverse childhood experiences can influence epigenetic regulation of stress-response systems, including genes involved in the hypothalamic-pituitary-adrenal axis (33,34). These biological changes may be particularly relevant during late adolescence, a developmental period characterized by ongoing maturation of higher-order cognitive and emotional regulatory systems (35).

The period of starting university is a critical life stage during which the effects of experiences from childhood and adolescence become visible in academic, social, and psychological domains (14). It is reported that ACEs are strongly associated with depression, anxiety, stress, and lower life satisfaction in first-year students, and therefore this period is a stage where the effects of ACEs become more pronounced in mental health (16). Therefore, evaluating changes in ACE burden in newly enrolled university students is important for assessing the current state of childhood trauma in society.

The results of our study contain important messages for child protection policies. Current public health approaches recommended by the CDC and the World Health Organization show that parent support programs, economic empowerment policies, safe school environments, and trauma-informed health services are effective in preventing ACEs (36). Conducting ACE screenings in psychological counseling services for university students and supporting high-risk individuals early on may be beneficial. Interventions at this stage can be critical for preventing the transfer of chronic stress to later ages, as late adolescents can receive long-term support in university settings before entering the workforce, i.e., before additional stressors are added.

Study Limitations

This study has some limitations. Collecting data through self-report may introduce recall bias. Also, since the research was conducted only within the university population, the generalizability of the results to the entire youth population is limited. However, the fact that data were collected using similar methods each year is a significant strength of the study for evaluating trends.

Although participants were recruited from different regions of Türkiye, the use of an online convenience

sampling method limits the representativeness of the sample. Therefore, the findings may not be generalizable to all first-year university students in Türkiye.

Conclusion

In conclusion, this study demonstrates the prevalence of ACEs among newly enrolled university students in Turkey, with an upward trend in some ACE indicators. High ACE burdens, increased rates of sexual abuse, and increased frequency of alcohol or substance use problems in the family are particularly noteworthy from a child health and public health perspective. Conducting ACE screenings in psychological counseling services for first-year university students in late adolescence and providing early support to high-risk individuals could be beneficial. Interventions during this period may be critical in preventing the transmission of chronic stress into later life.

Ethics

Ethics Committee Approval: Ethical approval for the study was obtained from the İstanbul Medipol University Clinical Research Ethics Committee (decision no: E-10840098-772.02-7504, date: 29.11.2023).

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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Footnotes

Conflict of Interest: No conflict of interest was declared by the authors.

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