

Adverse Childhood Experiences and Adulthood Mental Health: A Cross-Cultural
Examination among University Students in Seven Countries

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Abstract

While there is evidence that histories of adverse childhood experiences (ACEs) are common in university students and are associated with an increased risk of mental health difficulties, current research has limited geographic and cross-cultural representation. Comparing ACEs across diverse contexts using a standardized measure can illuminate geographic and sociocultural similarities or differences in exposure. The present study aimed to assess the prevalence of ACEs and their relationship with mental health symptoms in university students from seven countries. We sampled 5,945 university students from the United States, Canada, England, South Africa, Spain, Argentina and Uruguay. Participants completed the Adverse Childhood Experiences International Questionnaire (ACE-IQ) and the Inventory of Depression and Anxiety Symptoms (IDAS). Most participants (94.8%) reported exposure to at least one type of ACE and 61% reported exposure to four or more types. Repeated exposure to at least one ACE was reported by 70.2% and repeated exposure to at least four ACEs was reported by 21.2%. Spanish students had significantly lower ACE exposure than other students. Cumulative exposure to any ACE was significantly higher among students in lower income countries but when repeated exposure was considered these differences fell away. For the total sample, cumulative ACE exposure was significantly associated with increased severity of depression, anxiety and suicidality. Findings indicate that universities globally should be guided by a trauma-informed approach that recognizes students as a psychologically vulnerable group carrying a long-standing burden of childhood adversity.

Keywords: Adverse childhood experiences, university students, mental health, cross-cultural

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Introduction

Adverse childhood experiences (ACEs) are defined as “childhood events that vary in severity, are often chronic and occur in a child's family or social environment to cause harm or distress” (Kalmakis & Chandler, 2014, p.1497). These events include various forms of childhood abuse and neglect as well as family stressors such as parental mental illness, incarceration and divorce. The long-term mental health impacts of ACEs have become increasingly clear. In the general population, adults who have experienced ACEs are more likely than non-exposed adults to develop mood, anxiety, behavioral and substance use disorders, among others (Kessler, 2010). Exposure to multiple ACEs greatly increases this risk: adults who report a history of four or more different ACEs have significantly higher odds of having mental health difficulties than those without this level of exposure (Hamby et al., 2021; Hughes et al., 2017). There is growing evidence that cumulative exposure to ACEs results in increased allostatic load and cognitive and emotional deficits that extend into adulthood, creating life-long mental health vulnerabilities. Danese & McEwen, 2012; Grassi-Oliveira, Ashy & Stein, 2008; Kim et al., 2013; Pechtel & Pizzagalli, 2011).

While university students are often viewed as a relatively privileged group compared to the general population, accumulating evidence suggests that a history of ACEs is common in higher education samples and predicts an increased risk for mental health disorders (Karatekin, 2018; Watt et al., 2020; Windle et al., 2018). Indeed, a higher number of ACEs predicts worsening of depression, anxiety and suicidality over just a single semester (Karatekin, 2018).

Identifying the prevalence of ACEs in different university populations can inform targeted mental health promotion initiatives and enhanced service provision for at-risk students.

However, ACE prevalence rates in university students vary widely across studies, creating a rather confusing picture. The majority of research has been conducted in the United States, where the proportion of college students reporting at least one ACE has ranged from 48-75% (Forster et al., 2018; Karatekin, 2018; Khrapatina & Berman, 2017; Merians et al., 2019; Windle et al., 2018). In the few studies conducted with university populations outside the United States, the percentage of students reporting at least one ACE varies even more considerably: for example, 20% in the Ukraine (Burlaka et al., 2020), 45% in China (Ji & Wang, 2018), 50% in Korea (Kim, 2017), 56% in Northern Ireland (McGavock & Spratt, 2014), 58% in Zambia (Zhang et al., 2020), 74% in both Hong Kong (Ho et al., 2019) and Germany (Weihn et al., 2018) and 86% in Eritrea (Kelifa et al. 2020). The proportion that meets the threshold of four ACEs identified by Hughes et al. (2017) as significantly increasing the risk for mental illness is similarly diverse across countries: for example, 32% in Watt et al.'s (2020) United States study, 25% in Germany (Weihn et al., 2018), 19% in Hong Kong (Ho et al., 2019), 12% in Northern Ireland (McGavock & Spratt, 2014) and 8% in Korea (Kim et al., 2017).

Direct comparisons of ACE prevalence between university students in different countries is limited by measurement variation. For example, some studies have used all ten items from Felliti et al.'s (1998) original ACE measure (Khrapatina & Berman, 2017; Watt et al., 2020; Windle et al., 2018), some have used only selected items from that scale, leaving out ACEs such as emotional and physical neglect (Burlaka et al., 2020, Karatekin, 2017; Zhang et al., 2020). Others have used a combination of different measures (Ji & Wang, 2018). A few studies (Ho et al., 2019; Kelifa et al., 2020; Kim et al., 2017; Weihn et al., 2018) have used the World Health

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4 Organisation's (2018) 13-item Adverse Childhood Experiences-International Questionnaire
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6 (ACE-IQ), which includes ACEs not measured by Felitti et al.'s (1998) scale, such as peer
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8 violence and community violence. As with ACE research in the general population (Hughes et
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10 al., 2020; Lacey & Minnis, 2020), differences in the types and numbers of ACEs measured and
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12 variation in the wording of items can considerably hamper an overall picture of ACE exposure in
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14 university students worldwide and restrict direct comparisons of ACE prevalence across different
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16 university samples. By contrast, using a standardized ACE measure across contexts can provide
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18 a clearer overall picture of ACE exposure among students globally and identify real geographic
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20 and sociocultural similarities or differences across university populations.
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26 Alhowaymel and colleagues (2021) argue that "ACEs are influenced by globally diverse
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28 cultural, social, environmental, and economic factors" (pg. 22). For example, cultural and
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30 contextual norms regarding parental authority, gender roles and physical punishment can affect
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32 the prevalence of different forms of abuse (Finkelhor et al., 2013; Ho et al., 2020). Perceptions of
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34 whether behavior is abusive, and the willingness to disclose abusive experiences, may also vary
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36 across sociocultural contexts (Fontes & Plummer, 2010). Further, children growing up in lower-
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38 income countries may experience different types or severity of non-abuse family adversity than
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40 those residing in higher-income settings (Solberg & Peters, 2020). Like ACE research in general
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42 populations (Hughes et al., 2017; Massetti et al., 2020), the limited geographic representation of
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44 ACE research with university students restricts the identification of ACE patterns that may be
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46 universal or distinct to certain higher education settings. A better understanding of ACE
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48 exposure among university students in diverse geographic and socio-cultural contexts will
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50 enhance the degree to which campus mental health support programmers can understand and
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52 meet the specific needs of their student population.
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The present study aimed to assess exposure to a broad range of ACEs in an international sample of university students across seven different countries using a single standardized measure. Specifically, the aims of the present study were to: 1) examine cumulative exposure to ACEs in the international sample and in each specific country, 2) examine the prevalence of exposure to each type of ACE in the international sample and in each specific country, and 3) examine the association of cumulative ACE exposure with symptoms of depression and anxiety. Depression and anxiety were the most common and disabling mental health difficulties reported in the World Mental Health Surveys International College Student Project (Alonso et al., 2018; Auerbach, 2018).

Method

Participants and procedures

Participants were university students ($n = 9,171$) who were recruited from 12 universities spanning 7 countries (U.S. [five universities across four states: Colorado, New Mexico, New York, Virginia], Argentina, Spain, Uruguay, England, Canada [two universities in Ontario province], and South Africa) between February 2019 and March 2020 to complete an online survey exploring risk and protective factors of substance use outcomes. Across all sites, students completed the same core battery of measures translated into the native language. To minimize burden on participants, we utilized a planned missing data design (i.e., matrix sampling, Graham et al., 2006; Schafer, 1997) which has been used in other large multi-site college student studies (e.g., Bravo et al., 2018). For the purpose of this study the analytic sample was limited to 5,945 (70.1% female) students who completed the measure of ACEs (U.S., [$n = 2,917$; 66.9% female], Canada [$n = 1156$; 65.5% female], South Africa [$n = 472$; 82.8% female], Spain [$n = 471$; 70.7% female], Argentina [$n = 520$; 76.0% female], Uruguay [$n = 90$; 91.1% female], England [$n = 319$;

80.3% female].

For the U.S. sites, Canadian sites, England site, and South African site students were recruited from Psychology Department pools and received research participation credit. In Argentina and Uruguay students were recruited disseminating an invitation through online social networks, e-mail listings and flyers (only in Argentina). In Uruguay and Argentina, participants who completed the survey took part in a raffle of prizes (Uruguay: 10 cash prizes [each of ≈US\$ 20 at the time]; Argentina: 25 prizes each one of ≈US\$ 10 at the time [10 vouchers for a bookstore and 15 cash prizes]). In Spain an email was sent to all the students of the university inviting them to participate in the research. The participants received 5 euros for completing the survey, which was available until the funds were consumed. Study procedures were approved by the institutional review boards (or their international equivalent) at the participating universities.

Measures

ACE-IQ (WHO, 2018). The ACE-IQ was developed specifically for use as a cross-national measure of ACEs to allow direct standardized comparisons of ACE exposure, and associated risk factors and outcomes, across different countries (WHO, 2018). The ACE-IQ assesses exposure to 13 ACEs including different forms of family dysfunction (parental mental illness, substance abuse or incarceration, parental absence/divorce/separation, and family violence), physical, sexual and emotional abuse, physical and emotional neglect by parents or caregivers, peer bullying, witnessing community violence and exposure to collective violence. For the current study, exposure to collective violence (e.g., war, terrorism or militia violence) was excluded as its occurrence over the past 25 years has been rare in the countries sampled.

The ACE-IQ has two different scoring algorithms. In the binary scoring method, any level of exposure to an ACE (whether single or multiple exposures) is counted towards the total

score. In the frequency scoring method, certain ACEs (for example, family violence, physical abuse, emotional abuse) are only scored if they occurred frequently. The frequency method therefore uses a higher threshold for identifying ACEs. In the current study both scoring algorithms were used and then compared regarding both ACE prevalence and the relationship to mental health symptoms.

Mental health. Mental health symptoms were assessed using the 64-item Inventory of Depression and Anxiety Symptoms (IDAS; Watson et al., 2007). Participants reported how much they have felt or experienced each item during the past two weeks using a 5-point Likert Scale (1 = *not at all*, 5 = *extremely*). The IDAS contains 10 specific symptom scales (suicidality, lassitude, insomnia, appetite loss, appetite gain, ill temper, wellbeing, panic, social anxiety, and traumatic intrusions) and two broader scales (general depression and dysphoria). For purposes of the present study, we only examined the following scales: general depression ($\alpha = .92$), insomnia ($\alpha = .82$), suicidality ($\alpha = .87$), ill temper ($\alpha = .74$), social anxiety ($\alpha = .87$), panic ($\alpha = .89$) and traumatic intrusions ($\alpha = .83$).

Measures adaptation. As the ACE-IQ (WHO, 2018) and IDAS (Watson et al., 2007) were only available in English, members of the research team, bicultural and proficient in English and Spanish, and with expertise in test adaptation and knowledge about both constructs (childhood adversity and psychopathology), translated the original English versions of the ACE-IQ (WHO, 2018) and IDAS (Watson et al., 2007) into Spanish. Then, members of the research team compared the versions and, after a thorough discussion, composed the final version of both instruments.

Statistical analyses

To test study aims, we first conducted descriptive analyses to examine the percent of

1 students who endorsed each ACE-IQ category for both the binary and frequency total score. To
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4 examine country differences, we conducted two one-way ANOVAs comparing the means on the
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7 binary and frequency total scores across countries (a Bonferroni correction was used to detect
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10 specific differences across countries). To examine associations between the ACE-IQ binary and
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13 frequency total scores with mental health outcomes we conducted both: a) a bivariate correlation
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16 model and b) a comprehensive multivariate regression model. Both models were conducted
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19 using *Mplus 8.3* (Muthén & Muthén 1998-2018). Within the multivariate regression model, both
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22 ACE-IQ binary and frequency total scores were simultaneously estimated as statistical predictors
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25 of mental health outcomes (gender, age, and childhood subjective socioeconomic status were
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28 included as covariates). We examined the unique direct effects of each predictor variable on
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31 mental health outcomes using bias-corrected bootstrapped estimates (Efron & Tibshirani, 1993)
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34 based on 10,000 bootstrapped samples, which is robust to small departures from normality
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37 (Erceg-Hurn & Mirosevich, 2008). Missing data were handled using full information maximum
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40 likelihood (Muthén & Muthén, 1998-2018). Given our large sample size (i.e., large statistical
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43 power), statistical significance was determined by 99% confidence intervals that do not contain
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46 zero for all analyses.

43 Results

45 The mean number of endorsed ACEs and the prevalence of endorsement of each specific
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47 ACE in the total sample and in each country are reported in Table 1 (binary total score) and
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50 Table 2 (frequency total score).

53 *Overall exposure to ACEs*

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55 Within the total sample and using the binary scoring method, 94.8% of students reported
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58 experiencing at least one ACE (U.S., 93.1%; Canada, 95.6%; South Africa, 98.3%; Spain,

91.1%; Argentina, 99.4%; Uruguay, 98.9%; England, 97.2%) and 61.0% reported experiencing 4 or more ACEs (U.S., 58.7%; Canada, 62.3%; South Africa, 71.8%; Spain, 41.6%; Argentina, 75.8%; Uruguay, 80%; England, 57.4%). Within the total sample and using the more conservative frequency scoring method, 70.2% of students reported experiencing at least one ACE (U.S., 70.9%; Canada, 67.6%; South Africa, 78.8%; Spain, 52.9%; Argentina, 78.7%; Uruguay, 82.2%; England, 68.0%) and 21.2% reported experiencing four or more ACEs (U.S., 22.9%; Canada, 19.5%; South Africa, 22.7%; Spain, 9.8%; Argentina, 25.6%; Uruguay, 25.6%; England, 18.2%). As reflected in Table 1, the mean number of ACEs on the binary total score was above 4 for the full sample and for each individual country except Spain. Using the higher threshold for ACE exposure (see Table 2), the mean number of ACEs for the full sample dropped to 2.0 and was below 2.5 for all seven countries.

In examining country differences on the binary total score, we found statistically significant differences [$F(6, 5938) = 33.73, p < .001$] such that South African, Argentinian, and Uruguayan students (these students did not differ from each other) reported significantly higher total scores compared to United States, English, and Canadian students (these students did not differ from each other). All student samples reported a significantly higher score than Spanish students. In examining country differences on the frequency total score, we found statistically significant differences [$F(6, 5938) = 19.94, p < .001$] such that Spanish students again reported a significantly lower score than students from all other countries. Further, we found that Argentinian students reported a higher total score than Canadian students (see Table 1 for means).

Prevalence of exposure to specific ACEs

With the binary scoring method for the total sample, the most frequently endorsed ACE

category was violence against household members (70.3%), followed by emotional abuse (67.1%). Physical abuse was reported by almost half the sample (47.8%) and sexual abuse by 18.5%. Exposure to violence outside the home was also common, with over half the total sample reporting exposure to community violence (62%) and bullying (56%). The most common family adversity other than familial violence was parental death or separation (32.4%) and the least common was familial incarceration (7.8%). The lowest endorsed category for the full sample was emotional neglect (6.6%).

By contrast, on the frequency scoring method only a minority of the total sample were exposed to violence, abuse or neglect. For example, rates of physical abuse dropped to 7.4%, physical neglect to 7.5%, emotional abuse to 16.4%, family violence to 28.2%, community violence to 7.5% and bullying to 11.7%. On this scoring algorithm the most frequently endorsed ACEs in the total sample were parental separation (32.4%), violence against family members (28.2%) and emotional neglect (26.9%; see limitations section) while the lowest endorsed category was physical abuse (7.4%). Comparing rates for specific ACEs across countries on the more conservative scoring algorithm, Uruguay reported the highest rates for seven of the 12 ACEs: physical (9.0%), emotional (20.2%) and sexual abuse (32.6%), violence against family members (36%), familial mental illness (37.1%), parental loss (43%) and bullying (23.6%). Physical neglect (8.8%), familial substance use (17.9%) and familial incarceration (11.3%) were highest in the United States sample. South African students reported the highest rate of emotional neglect (30.8%) while community violence was highest amongst Argentinian students (10.7%). The Spanish sample reported the lowest prevalence rates for every ACE except physical neglect, which was lowest in the Uruguay sample, and sexual abuse, which was lowest in England.

ACE-IQ Scores and mental health

Correlations between ACE-IQ binary and frequency total scores and mental health symptoms among the total sample are reported in Table 3. Further, effects from the comprehensive regression model are also reported in Table 3. Higher scores on both the ACE-IQ binary and frequency total score were correlated with more severe symptoms on all seven symptom scales. Within the comprehensive regression model and controlling for the predictive effects of each other and covariates, both binary and frequency total scores were statistically significantly associated with mental health symptoms, with two exceptions: the binary score was not significantly associated with suicidality.

It is important to note that we tested for structural invariance of the correlational and the regression models across countries (i.e., examining moderation), by conducting χ^2 difference tests comparing a freely estimated multi-group model to a constrained multi-group model (i.e., constraining the correlation/regression paths of the model) to determine whether constraining the paths to be equivalent across countries resulted in a worse fitting model. Given that the χ^2 test statistic is sensitive to sample size (Brown, 2015), we also relied on model comparison criteria of $\Delta CFI \leq .01$ (Cheung & Rensvold, 2002). Overall, constrained multi-group models indicated model invariance across countries (correlation model: CFI = .996; $\Delta CFI = .004$; regression model: CFI = .999; $\Delta CFI = .001$), indicating associations were similar in strength across countries.

Discussion

The prevalence and mental health impact of ACEs in university populations has only been recently examined and current findings are limited by both measurement variation and a lack of geographic representation. To our knowledge, this is the first study to report on exposure

to a comprehensive range of ACEs, and associated mental health difficulties, in a cross-country sample of university students using a single measure. The sample included students from North America, Europe, Africa and South America. We assessed ACE prevalence and associations between cumulative ACEs and mental health using both scoring methods offered by the ACE-IQ, which effectively reflect two different definitions of ACE exposure.

Cumulative ACE exposure

According to previous research, an accumulation of four or more different ACEs predicts significantly higher risk of mental health difficulties in adult populations (Hamby et al., 2021; Hughes et al., 2017). On the binary scoring method, which assesses exposure to different adversities independent of frequency, the average total number of ACEs for the full sample was above four (4.32) and 60% of the sample had experienced four or more ACEs. Students in every country except Spain had a mean number of ACE exposures above this threshold and are therefore, on average, in the high-risk range for mental health difficulties.

Further, students from countries with the lowest per capita gross national incomes (GNIs) in the sample (South Africa, Argentina and Uruguay) had a significantly higher total number of ACEs than those from countries with the highest per capita GNIs (the United States, United Kingdom and Canada). This is in line with findings that lower socioeconomic position is associated with a greater risk of ACEs (Alhowaymel et al., 2021; Walsh et al., 2019) and punitive parenting (Roubinov & Boyce, 2017), possibly because financial hardship and disadvantaged neighborhood conditions increase parental stress levels (Bywaters et al., 2015; Crouch et al., 2019). Cross-cultural differences in parenting norms and practices, for example more authoritarian versus more authoritative parenting styles, may also contribute to geographical variations in ACEs (Finkelhor et al., 2013; Ho et al., 2020). However, parenting

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4 styles within a specific country are not always homogenous (Roman et al., 2016). A nuanced
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6 approach is needed to explore cross-cultural differences in ACEs such as child maltreatment or
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8 neglect, as parenting practices need to be understood and evaluated within their specific cultural
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10 and community context (Raman & Hodes, 2012).
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14 The more conservative ACE-IQ scoring algorithm for ACE exposure requires repeated
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16 rather than single or occasional exposure to experiences of abuse, neglect, and violence. On this
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18 scoring approach the average number of ACEs in the total sample was 2.0. While this is lower
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20 than the binary rate, it nevertheless confirms that exposure to multiple forms of ACEs is the
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22 norm in this international sample of students. Further, a fifth of the sample reported four or more
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24 exposures even on this more conservative measure.
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28 Notably, most of the significant cross-country differences in overall ACE exposure
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30 disappeared when the more conservative scoring measure was used. This suggests that
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32 cumulative exposure to *any* adverse childhood events may differ significantly across students in
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34 different countries, possibly due to income differentials, but rates of exposure to repeated,
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36 sustained childhood adversity may be more universal across university populations. It is possible
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38 that in lower-income countries, which have lower levels of education and fewer child-rearing
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40 support services, occasional punitive parenting practices (such as shouting or slapping) may be
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42 more normative than in higher-income contexts, while more systematic abuse may be less
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44 acceptable across a range of countries, regardless of income level.
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50 On both scoring algorithms, Spanish students reported significantly lower ACE exposure
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52 than students in other countries. Previous studies with the Spanish general population (Perales et
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54 al., 2013) and Spanish young adults (Gomis-Pomares & Villanueva, 2020) also report lower
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56 ACE rates than those reported in samples from other countries (Masseti et al., 2020). These
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4 results may suggest the existence of specific protective factors. Spain is a developed country
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6 representing the “family welfare regime” (Parra et al., 2019, pp. 3), a model characterized by
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8 strong familial bonds that are sustained even during emerging adulthood due to high economic
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10 dependence, living with the family and the pervasiveness of the Catholic tradition. All these
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12 features likely shape patterns of parenting and social support which, alongside a relatively strong
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14 economy, may reduce the prevalence of ACEs. This family model is also highly prevalent in
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16 South America, yet it might be less effective under conditions of chronic financial hardship. It is
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18 also possible that more subjective factors, such as culturally based perceptions of childhood
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20 experiences or norms for disclosing childhood adversities, account for the lower ACE rates
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22 reported by the Spanish sample.
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28 *Prevalence of exposure to specific ACEs*

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31 Exposure to any instance of childhood violence, abuse and neglect was highly prevalent
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33 in our total sample. A series of meta-analyses, based largely on retrospective self-report
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35 measures assessing any exposure during childhood, reported global prevalence rates of 22.6% for
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37 physical abuse, 12.7%, for sexual abuse, 33.6% for emotional abuse, 16.3% for physical neglect
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39 and 18.4% for emotional neglect (Stoltenborgh et al., 2015). Except for emotional neglect (see
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41 limitations section), the prevalence rates in our total sample were all substantially higher. On the
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43 frequency scoring algorithm, only a minority of our total sample was exposed to these adversities
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45 repeatedly, but the prevalence rates were nevertheless concerning, ranging from 7.4% to 28.2%
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47 across the different abuse, violence and neglect types. In the World Mental Health Surveys
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49 (WMHS) with general adult populations in nine countries (Kessler et al., 2010), the prevalence
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51 of repeated physical abuse was comparable with ours, but rates of repeated sexual abuse, neglect
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53 and family violence were substantially lower (emotional abuse, bullying and community
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4 violence were not assessed). On both scoring algorithms, then, our international sample of
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6 university students had higher prevalence rates for many ACEs than would be expected based on
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8 previous global prevalence studies. In post-hoc analyses for their meta-analyses, Stoltenborgh
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10 and colleagues found that college students reported significantly higher rates of both physical
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12 (Stoltenborgh et al., 2013) and emotional abuse (Stoltenborgh et al., 2012) than other
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14 populations. While this may suggest a particularly high burden of ACEs in tertiary education
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16 settings, it is also possible that university students have fresher recall of childhood experiences
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18 than general populations of adults (Kim et al., 2017) and are also more willing than both older
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20 adults and adolescents to disclose ACEs to researchers, particularly if the research topic is linked
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22 to courses they are studying, such as Psychology.
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29 It is important to note that on both the binary and frequency scoring methods, childhood
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31 emotional abuse was commonly endorsed. Emotional abuse has often been neglected in child
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33 maltreatment studies (Stoltenborgh et al., 2012) and has been excluded from several previous
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35 ACE studies with university students. Our findings emphasise the importance of routinely
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37 including this form of childhood adversity in ACE research with university students and other
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39 populations.
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43 *Relationship between ACE exposure and mental health difficulties*

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46 In previous studies with university samples in specific countries, cumulative ACE
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48 exposure has consistently predicted depression and anxiety (Burlaka et al., 2020; Karatekin,
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50 2017; Kim et al., 2017; Watt et al., 2020; Windle et al., 2018), regardless of how ACES are
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52 defined or measured. Our study replicates these findings with a more diverse, internationally
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54 representative sample: regardless of how *frequently* specific adversities occurred, increased
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56 exposure to different *types* of ACEs in childhood was associated with greater severity of
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4 depression and anxiety symptoms at the university level. The high rates of depression and
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6 anxiety in international samples of university students (Auerbach et al., 2018) may then partly be
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8 explained by cumulative ACE exposure, which is the norm rather than the exception for our
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10 international sample.
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14 In previous studies with smaller samples of university students in specific countries, both
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16 binary (Wang et al., 2019; Zhang et al., 2020) and frequency (Karatekin, 2018) approaches to
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18 cumulative ACE exposure have predicted suicidality. Suicidality in our larger, international
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20 student sample was predicted only by cumulative ACEs, suggesting that repeated childhood
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22 experiences of abuse, neglect and violence are more likely than occasional experiences to create
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24 risk for suicidality in young adulthood. Suicide is a leading cause of student death (Turner,
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26 Bauerle, & Keller, 2013) and targeting suicide prevention initiatives towards students with
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28 histories of cumulative, repeated childhood adversity may help to reduce suicide risk and overall
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30 mortality in this population.
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36 Our cross-sectional study prevents any definitive conclusions about the exact nature of
37
38 the relationship between cumulative ACE exposure and later mental health difficulties. The
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40 pathways and mechanisms of this relationship need further exploration. We recommend that the
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42 next stage of research on ACEs among university populations should focus more on examining
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44 potential moderating factors (to identify which university students who have experienced
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46 multiple ACEs are most at risk of different mental health difficulties), mediating factors (to
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48 direct prevention and intervention efforts towards addressing key processes whereby past ACE
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50 exposures create current mental health difficulties) and the specific patterning of adversities that
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52 increases risk for specific mental health disorders (Lacey et al., 2020). This more fine-grained
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54 approach will better equip universities to identify and support those ACE-exposed students who
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4 may be most at risk of mental health difficulties.

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7 *Limitations and directions for future research*

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9 Strengths of our study include the use of a large international sample, a standardized
10 measure including a broad range of ACEs and the inclusion of both a binary and a frequency
11 approach to assessing ACEs. These address many of the common conceptual and methodological
12 limitations of ACE research (Lacey & Minnis, 2020). Our findings using the two ACE-IQ
13 scoring methods confirm that different definitions and thresholds for ACEs can yield quite
14 different pictures of overall exposure. While there is ongoing debate about which ACE
15 assessment methods are optimal (Lacey & Minnis, 2020), it at least seems clear that binary and
16 frequency/severity measures should not be directly compared with one another when considering
17 ACE prevalence rates and that definitions of ACE exposure (any experience versus repeated
18 experiences) should always be stated explicitly by researchers.

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34 Our study also has some limitations. First, the ACE-IQ relies on retrospective self-report
35 data, which is subject to inaccurate recall and reporting bias (Hughes et al., 2017; Naicker et al.,
36 2017). However, retrospective assessments of major and more easily defined childhood
37 adversities have been shown to have acceptable psychometric properties (Hardt & Rutter, 2004).
38 Second, the somewhat ambiguous wording of the scoring instructions for emotional neglect on
39 the ACE-IQ resulted in a higher prevalence of this ACE on the more conservative frequency
40 algorithm compared with the less conservative binary algorithm. It is likely that inverse rates in
41 fact apply. In the absence of further scoring clarification from the WHO the rates of emotional
42 neglect reported here should be treated with caution. Third, the use of volunteer student samples
43 is subject to selection bias. For example, either more psychologically vulnerable students or
44 psychologically healthy students may elect to participate in online surveys. Furthermore, most
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4 countries sampled from one university and results may not replicate among students from
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6 differing regions within each country. Finally, we assessed self-reported mental health
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8 difficulties rather than the presence of clinically significant, diagnosed mental disorders.
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10 However, the IDAS scales are good predictors of the presence of clinical diagnoses (Stasik-
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12 O'Brien et al., 2019).
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15 16 **Conclusion** 17

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19 The majority of students in our international sample have experienced multiple forms of
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21 childhood adversity and, even on the most conservative measure, a fifth have experienced four or
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23 more. Further, cumulative exposure to any and to repeated forms of childhood adversity both
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25 predicted worse mental health at university level. These findings indicate that university students
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27 across countries carry a long-standing psychological burden of childhood adversity. Greater
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29 investment in policies and programmes to reduce child maltreatment and other severe family
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31 adversities could yield a long-term developmental benefit by reducing risk for mental health
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33 difficulties in emerging adulthood. Our findings further highlight the urgent need for the
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35 development of trauma-informed university campuses, in parallel with the growing movement
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37 for trauma-informed schools (Overstreet & Chafouleas, 2016). All university stakeholders
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39 (including students, faculty, residence staff, management, and campus health service providers)
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41 should be educated about, and sensitive to, the prevalence of childhood adversity and its long-
42
43 term impact on student mental health and functioning (SAMHSA, 2015). In addition, campus
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45 mental health treatment services should be augmented by resilience-focused mental health
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47 promotion initiatives based on a trauma framework (Oehme et al., 2019). Finally, future research
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49 should aim to identify which ACE-exposed students have the highest risk for negative mental
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51 health outcomes, and which factors may ameliorate this risk, to better support students through
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their university years.

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Table 1

Endorsement of ACE-IQ categories for binary total score across countries and total sample

	United States (<i>n</i> = 2197)	Canada (<i>n</i> = 1156)	South Africa (<i>n</i> = 472)	Spain (<i>n</i> = 471)	Argentina (<i>n</i> = 520)	Uruguay (<i>n</i> = 90)	England (<i>n</i> = 319)	Total Sample (<i>n</i> = 5945)
<i>Binary Score (M, SD)</i>	4.24 (2.64)	4.28 (2.31)	4.99 (2.36)	3.27 (2.22)	5.14 (2.28)	5.43 (2.30)	4.07 (2.26)	4.32 (2.51)
<i>Category (% endorsed)</i>								
Physical abuse	44.8%	49.0%	61.9%	31.1%	64.5%	74.2%	40.8%	47.8%
Physical neglect	29.1%	27.0%	29.6%	19.1%	32.5%	24.4%	23.6%	27.9%
Emotional abuse	62.6%	72.3%	74.5%	61.9%	75.9%	84.3%	66.1%	67.1%
Emotional neglect	6.5%	6.8%	7.2%	4.2%	8.5%	6.7%	6.3%	6.6%
Sexual abuse	16.7%	16.3%	21.9%	16.2%	32.8%	32.6%	14.8%	18.5%
Violence against household members	67.5%	75.8%	81.4%	51.5%	77.4%	78.7%	73.7%	70.3%
Living with household members who were substance abusers	17.9%	11.6%	19.8%	9.3%	17.0%	16.9%	12.5%	15.8%

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ADVERSE CHILDHOOD EXPERIENCES AND ADULTHOOD MENTAL HEALTH 30

Living with household								
members who were	24.7%	21.6%	31.4%	8.5%	22.2%	37.1%	26.3%	23.4%
mentally ill or suicidal								
<hr/>								
Living with household								
members who were	11.3%	4.6%	6.4%	2.1%	5.0%	2.2%	3.1%	7.8%
imprisoned								
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One or no parents, parental								
separation, or divorce	35.2%	22.9%	39.1%	21.9%	38.7%	43.0%	33.1%	32.4%
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Bullying	54.5%	58.0%	64.0%	40.1%	65.8%	71.9%	54.2%	56.0%
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Community violence	56.8%	64.1%	70.5%	62.7%	80.5%	79.5%	53.3%	62.0%
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Table 2

Endorsement of ACE-IQ categories for frequency total score across countries and total sample

	United States (<i>n</i> = 2197)	Canada (<i>n</i> = 1156)	South Africa (<i>n</i> = 472)	Spain (<i>n</i> = 471)	Argentina (<i>n</i> = 520)	Uruguay (<i>n</i> = 90)	England (<i>n</i> = 319)	Total Sample (<i>n</i> = 5945)
<i>Frequency Score (M, SD)</i>	2.11 (2.24)	1.87 (2.09)	2.30 (2.09)	1.12 (1.55)	2.34 (2.25)	2.48 (2.19)	1.84 (1.99)	2.01 (2.16)
<i>Category (% endorsed)</i>								
Physical abuse	8.3%	7.1%	7.7%	2.6%	8.5%	9.0%	3.8%	7.4%
Physical neglect	8.8%	7.7%	7.0%	4.7%	4.2%	2.2%	6.9%	7.5%
Emotional abuse	17.1%	18.1%	14.7%	7.4%	18.8%	20.2%	15.0%	16.4%
Emotional neglect	26.5%	29.4%	30.8%	19.3%	27.5%	23.3%	27.7%	26.9%
Sexual abuse ^a	16.7%	16.3%	21.9%	16.2%	32.8%	32.6%	14.8%	18.5%
Violence against household members	28.1%	29.8%	34.0%	12.8%	34.0%	36.0%	25.7%	28.2%
Living with household members who were substance abusers ^a	17.9%	11.6%	19.8%	9.3%	17.0%	16.9%	12.5%	15.8%

Living with household								
members who were	24.7%	21.6%	31.4%	8.5%	22.2%	37.1%	26.3%	23.4%
mentally ill or suicidal ^a								
Living with household								
members who were	11.3%	4.6%	6.4%	2.1%	5.0%	2.2%	3.1%	7.8%
imprisoned ^a								
One or no parents, parental								
separation, or divorce ^a	35.2%	22.9%	39.1%	21.9%	38.7%	43.0%	33.1%	32.4%
Bullying								
	11.1%	12.1%	11.4%	5.5%	18.3%	23.6%	10.7%	11.7%
Community violence								
	7.7%	7.5%	10.0%	2.8%	10.7%	5.7%	5.3%	7.5%

Note. ^a= items are scored the same as the binary score.

Table 3.

Correlations and regression results between ACE-IQ binary and frequency scores and mental health outcomes

	Bivariate Correlations				Regression Model			
	ACE-IQ Binary Score		ACE-IQ Frequency Score		ACE-IQ Binary Score		ACE-IQ Frequency Score	
	<i>r</i>	99% CI	<i>R</i>	99% CI	β	99% CI	β	99% CI
General Depression	.332	0.30, 0.36	.325	0.29, 0.36	.201	0.15, 0.26	.164	0.11, 0.22
Insomnia	.262	0.23, 0.30	.247	0.21, 0.28	.179	0.12, 0.23	.103	0.05, 0.16
Suicidality	.212	0.18, 0.25	.256	0.22, 0.29	.023	-0.03, 0.08	.252	0.19, 0.31
Ill Temper	.225	0.19, 0.26	.229	0.19, 0.27	.116	0.06, 0.17	.139	0.08, 0.20
Social Anxiety	.259	0.23, 0.29	.250	0.22, 0.28	.172	0.12, 0.22	.126	0.07, 0.18
Panic	.256	0.22, 0.29	.263	0.23, 0.30	.130	0.07, 0.19	.165	0.11, 0.22
Traumatic Intrusions	.310	0.28, 0.34	.319	0.29, 0.35	.157	0.10, 0.21	.209	0.15, 0.27

Note. For both models, significant associations are bolded for emphasis and were determined by a 99% bias-corrected standardized bootstrapped confidence interval (based on 10,000 bootstrapped samples) that does not contain zero. Within the regression model, effects of covariates (gender, age, subjective socioeconomic status) are available upon request. ACE-IQ binary and ACE-IQ frequency were highly correlated ($r = .80$) within the correlation model.

Availability of data and material. Data and analytic outputs are available at DOI 10.17605/OSF.IO/UX8RK

Code availability. Not applicable.

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Compliance with ethical standards:

Conflicts of interest. The authors declare no conflicts of interest.

Ethics approval. Institutional ethical approval for data collection was sought and formally granted at each site.

Consent to participate. All participants provided informed consent to participate.