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ACEs are not equal: Examining the relative impact of household dysfunction versus childhood maltreatment on mental health in adolescence

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Introduction

The accumulating evidence demonstrates that Adverse Childhood Experiences (ACEs) have both acute and long-term effects on physical and mental health (Hughes et al., 2017; Kalmakis & Chandler, 2015; Mersky et al., 2018). While most studies show many of these effects in adulthood, there are far fewer studies that have examined the more proximal effects in adolescence, a time when mental health problems are still emerging (Kwong et al., 2019). Given that early detection and treatment are the best means for preventing persistent problems, more research is needed to delineate the effects of ACEs on mental health in this critical developmental period.

ACEs encompass various aspects of family dysfunction such as parental incarceration, witnessing parental intimate partner violence (IPV), and parental substance use; they also include maltreatment experiences of sexual abuse, physical abuse, emotional abuse, and physical neglect (Felitti et al., 1998). Importantly, although the effects of early experiences on mental health are well documented, the specific effects of different types of adversities on various mental health symptoms is inconclusive. For example, some studies point to maltreatment as a risk for internalizing symptoms, whereas household dysfunction variables are more predictive of externalizing problems (Higgins & McCab, 2003; Ryan et al., 2000). In part, because many of these experiences co-occur, it becomes difficult to tease apart the individual contribution of each stressor.

To address this issue, the ACEs questionnaire is often used as a sum score to indicate a dose-response effect of each additional adversity (Balistreri & Alvira-Hammond, 2016; Greeson et al., 2014; Mersky et al., 2013). Studies using an ACEs cumulative score approach often find dose-response effects of each additional ACE on mental illness diagnoses (Bright et al., 2016; Elkins et al., 2018). The disadvantage of this approach is that it treats each of the individual items as having an equivalent effect on the outcome, whereas the evidence

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indicates that higher cumulative adversity has stronger impact on mental health because those with more ACEs have more severe events occurring (e.g., sexual abuse, co-occurring abuse) as opposed to a linear cumulative effect (Schilling et al., 2008). In addition, studies that have "unpacked" the household dysfunction versus maltreatment items of ACEs overwhelmingly show that maltreatment experiences have stronger effects on mental health (Atzl et al., 2019; Narayan et al., 2017; Ryan et al., 2000). In work using an expanded ACEs questionnaire, Finkelhor et al. (2015) found that most of the original household dysfunction items do not make a significant contribution to explaining variance in symptoms of distress.

Although a cumulative score approach yields more complete information about the impact of an increase of one additional ACE, the implementation of ACEs screening in clinical care necessitates a recommendation for cut-off scores for referral. Unfortunately, the extant evidence does not support a universal cut-off score, as the cut-off may be different based on the outcome. In some studies, a cut-off of two or more ACEs showed significant effects on depression and externalizing problems (Karatekin, 2018; Schilling et al., 2007), whereas in others, a cut-off of two or more showed the strongest effects on health-related worry (Melville, 2017) and mood disorders (Green et al., 2010; McLaughlin et al., 2010). Further, some studies showed a score of three or more was significant for behavior problems (Marie-Mitchell & O'Connor, 2013), while other findings demonstrated that a score of four or more ACEs was the best predictor of post-traumatic stress disorder (Schalinski et al., 2016). Overall, the inconsistencies in use of the ACEs scale perpetuates the supposition that all ACEs are equivalent in their impact on mental health and contributes to a lack of consensus of a clinically meaningful cut-off for ACEs among adolescents. There is a need for research to compare different cut-off categories in order to determine which cut-off score may most effectively differentiate those at risk for mental health symptoms.

Adolescence is a critical juncture for the development of mental health symptoms (Kwong et al., 2019), and as such, it is important to identify risks that may increase vulnerability. The majority of ACEs studies have been conducted with adults, though the evidence using adolescent samples indicates that ACEs are also highly prevalent in this age group, particularly in high-risk samples (Fagan & Novak, 2018; Ryan et al., 2000). In addition, the studies with adolescent samples show that ACEs predict poor mental health outcomes (Luby et al., 2017; McLaughlin et al., 2012), as in adults (McLaughlin et al., 2010). For example, a study using the National Survey of Child health found that adolescents (12 to 17 years) with higher ACEs scores reported more emotional problems than those with lower ACE scores (Balistreri & Alvira- Hammond, 2016), but did not examine the contribution of individual ACEs. In the National Comorbidity Survey Replication among adolescents 13 to 17 years old, most of the individual ACEs significantly increased the odds of being diagnosed with a psychiatric disorder (McLaughlin et al., 2012) whereas in a study of 1,949 10 to 17 year olds, some of the original household dysfunction items (divorce, witnessing IPV, family substance use, and parental incarceration) did not predict symptoms of psychological distress (Finkelhor et al., 2015). This leaves uncertainty as to which ACE(s) may have the most utility for identifying adolescents at risk for mental health symptoms.

The Current Study

ACEs have shown substantial effects on health across the lifespan, though few studies have examined the effects on mental health in late adolescence. Although there have been several studies showing that maltreatment has stronger effects on mental health than household dysfunction, most studies examining ACEs only used a sum score to indicate cumulative risk. This approach discounts the individual characteristics of the items as well as the overall distinction between household dysfunction and maltreatment experiences. The current study sought to examine individual ACE items as well as the relative contribution of the household dysfunction scale versus the childhood maltreatment scale to mental health outcomes. We hypothesized that the maltreatment items would have stronger effects on all mental health outcomes than the household dysfunction items. In addition, we examined self-reported ACEs within a cohort of youth referred to child welfare and a comparison group, contributing to knowledge of screening for adversities among both at-risk and community populations. Lastly, we examined the utility of a cut-off score for ACEs in predicting mental health outcomes. We hypothesized that the higher score categorizations (e.g., 0 to 2 versus 3+) would yield better discrimination between those with low and high mental health symptoms than lower score categorizations (e.g. 0 versus 1+). Yet, given the equivocal nature of the literature, we could not make definitive predictions about all the categorizations tested. We attempted to replicate the original ACEs items as closely as possible in order to draw parallels with ACEs screening tools being implemented in clinical practice. Many studies use slightly different items to create their own ACEs scale, which likely contributes to inconsistencies. For the outcomes, we focused on internalizing symptoms of depression and anxiety, trauma symptoms, and externalizing behavior problems. We chose these mental health outcomes due to the substantive differences between the types of symptoms for each of these scales as well implications for different treatment strategies.

Method

Participants

Data were from the fourth assessment (M = 7.2 years after baseline) of an ongoing longitudinal study examining the effects of maltreatment on adolescent development. The enrolled sample at baseline was 454 adolescents aged 9 to 13 years (152 males and 151 females). Of the baseline sample, 78% completed the Time 4 assessment (N = 352), but for the current analyses, we selected only those participants with complete data on the adversity items (n = 347) because these are not amenable to missing data methods such as multiple imputation. At Time 4, the participants were a mean age of 18.49 years (SD = 1.41), approximately evenly split between males and females, and primarily African American (43%) or Latino (34%). Attrition analyses indicated participants not seen at Time 4 were more likely to be male (OR = 1.86, p < .01).

Recruitment—The maltreatment group (n = 303 at baseline; n = 219 at T4) were recruited from active cases in the Children and Family Services (CFS) agency of a large West Coast city. The inclusion criteria were: (1) a new referral to CFS during the preceding month for any type of maltreatment (e.g., physical neglect, physical abuse, sexual abuse, emotional abuse); (2) age of 9 to 12 years (some turned 13 between scheduling and actual study visit);

(3) identified as Latino, African American, or Caucasian (non-Latino); and (4) residing in one of 10 zip codes in a designated county at the time of referral to CFS. With the approval of CFS and the University of Southern California Institutional Review Board, caregivers of potential participants were contacted and asked to indicate their willingness to participate.

The comparison group (n = 151 at baseline; n = 128 at T4) was recruited using names from school lists of children aged 9 to 12 years residing in the same 10 zip codes as the maltreated sample. Caregivers of potential participants were contacted and asked to indicate their interest in participating. To ensure the fidelity of the comparison sample, caregivers were asked about involvement with CFS, and none indicated prior or current contact with CFS.

Procedure

Assessments were conducted at an urban research university. After assent and consent were obtained from the adolescent and caregiver, respectively, the adolescent completed questionnaires and tasks during a four-hour protocol. The measures used in the analyses represent a subset of the questionnaires administered during the protocol. Both children and caregivers were paid for their participation according to the guidelines of the National Institutes of Health standard compensation for healthy volunteers.

Measures

Self-Reported ACEs—The Comprehensive Trauma Interview (CTI; Noll et al., 2003) was used at Time 4 to assess self-reported lifetime ACEs. The CTI assesses 19 different adverse experiences, including parental divorce, parental incarceration, household substance use, witnessing parental IPV, sexual abuse, physical abuse, emotional abuse, emotional neglect, and physical neglect. The definitions are primarily based on extant research but incorporate definitional standards from child welfare agencies. The CTI was administered via interview by a trained research assistant. To map the items from the CTI onto the original ACEs items, several questions on the household dysfunction scale required manual coding. To ascertain divorce and parental incarceration, text answers to the question, “Has anyone ever moved away from you?” were reviewed and coded as outlined in Table 1. The first author coded all interviews, and no ambiguous responses were found (all responses stated jail/prison or divorce); therefore, double coding was deemed unnecessary. No item on the CTI closely approximated the parental mental illness item on the original ACEs, thus it was dropped, resulting in total of nine items. The household dysfunction subscale was the sum of divorce, household member incarceration, witnessing IPV, and household member substance use (range 0–4). The maltreatment subscale was the sum of sexual abuse, physical abuse, physical neglect, emotional abuse, and emotional neglect (range 0–5).

Depressive symptoms—Adolescents completed the 27-item Children’s Depression Inventory about their feelings in the past two weeks (Kovacs, 1981, 1992). They rated statements such as “I am sad all the time” and “I feel like crying every day” on a three-point scale (range of possible scores = 0–54). The Cronbach’s α for T4 was .89.

Trauma Symptoms—Post-traumatic stress disorder (PTSD) symptoms at Time 4 were assessed using the Youth Symptom Survey Checklist (Margolin, 2000). This checklist is a

17-item self-report measure of PTSD symptoms such as hyperarousal, avoidance/numbness, and re-experiencing in the past few months. The total score was used for this analysis (17 items; α=.88) and can range from 17 to 68.

Anxiety—The 39-item Multidimensional Anxiety Scale for Children (March et al., 1997) was used to measure anxiety. The separation anxiety subscale (nine items) was removed at T4 due to developmental inappropriateness of the domain. Adolescents were asked to rate how they had been feeling recently for items such as "I feel tense or uptight" on a scale from 0 to 3 ("never true about me" to "often true about me"); Cronbach's α was .89 at T4.

Externalizing problems—The Youth Self Report was used to measure externalizing behavior (Achenbach & Rescorla, 2001). The externalizing subscale is composed of aggression (17 items) and rule-breaking/delinquency (12 items). Each item is rated from 0 to 2 ("not at all" to "a lot") with a possible range of 0–58. Cronbach's α was .89 at T4.

Data Analyses

Descriptives were examined for the individual ACEs items, the household dysfunction subscale (four items), child maltreatment (five items) subscale, and ACEs total scale. To examine the mean differences in mental health symptoms for those endorsing versus not endorsing each ACEs item, MANCOVA was used to account for correlations between outcome variables. The main effect of each ACE (coded yes/no) was tested for all four mental health outcomes in the same model controlling for T4 age, sex, race/ethnicity, household income, and maltreatment group status (maltreated versus comparison). The Sidak correction was used to account for multiple comparisons. Next, we used linear regression in Mplus to estimate the independent main effects of household dysfunction, child maltreatment, and ACEs total score separately on the four mental health outcomes. We then tested a model including both the household dysfunction and maltreatment subscales in the same model to determine the relative importance of each for predicting the outcomes after controlling for the other. In addition, we tested multiple group models to determine if maltreatment group status (maltreated versus comparison) moderated the effect of ACEs on the outcomes. Interaction effects were tested using the nested χ^2 difference test comparing each parameter set to equality versus freely estimated across groups. Lastly, to examine the support for an ACEs cut-off score, we created four different categorical groupings based on prior research with ACEs scores: a) 0 versus 1 or more, b) 0–1 versus 2 or more, c) 0–2 versus 3 or more, and d) 0–3 versus 4 or more (Green et al., 2010; Marie-Mitchell & O'Connor, 2013; McLaughlin et al., 2010; Melville, 2017; Schalinski et al., 2016; Schilling et al., 2007). Again, we used MANCOVA to examine the group differences on the four mental health outcomes, including the same set of covariates.

Results

Missing Data

As stated previously, only those with complete data on the CTI were selected for the current analyses based on the decision that the trauma interview items are not appropriate for multiple imputation methods. This decision removed only five participants from the

analyses. For the outcome measures, rates of missing data were low (YSSC: four cases were missing one item; MASC: one case was missing one item; CDI: one case was missing three items; YSR: three cases were missing one item, two cases were missing all items). Multiple imputation was used to address item-level missingness. Specifically, 50 datasets were imputed and combined to create the final imputed scores for symptoms of depression, anxiety, trauma, and externalizing behavior for participants with missing values. Due to the low percent of missingness there were few differences in the results. Any differences are noted in the relevant section below.

Descriptives

Item-level frequencies (Table 2) show that the most common ACE reported was emotional neglect (40% of the total sample), followed by witnessing IPV (38%), and emotional abuse (37%). As expected, the maltreated group reported higher prevalence of all the ACEs (except for parental incarceration). For the ACEs total score, 26% of the total sample reported no ACEs, 45% reported 0 or 1, and 43% reported 3 or more ACEs. For those reporting 1 ACE, the most prevalent item was emotional neglect (18%), and for those reporting 2 ACEs, the most prevalent was witnessing IPV (37%), followed by emotional neglect (35%). The Phi-coefficient test was used to assess the associations between ACEs. There were significant associations between divorce and a) witnessing IPV ($\Phi = .22$, $p < .01$), b) household substance use ($\Phi = .12$, $p < .05$), c) physical neglect ($\Phi = .17$, $p < .01$), d) emotional neglect ($\Phi = .17$, $p < .01$), and e) emotional abuse ($\Phi = .18$, $p < .01$); between witnessing IPV and a) household substance use ($\Phi = .34$, $p < .01$) and b) all five maltreatment items (Φs = .27–.48, ps < .01); and between household substance use and all five maltreatment items (Φs = .20–.37, ps < .01). All maltreatment items were significantly associated (Φs = .24–.53, ps < .01). The household dysfunction and maltreatment subscale scores were also significantly associated ($\Phi = .60$, $p < .01$). Correlations between all study variables are shown in Table 3.

Item-level Mean Differences

Household dysfunction—The MANCOVA showed that for the household dysfunction items, there were few mean differences in mental health outcomes between those endorsing the item versus not (Table 4). Specifically, those who indicated their parents were divorced reported higher trauma symptoms ($F(1, 346) = 5.81$, $p < .01$) and anxiety ($F(1, 346) = 4.08$, $p < .05$). Additionally, those who reported witnessing IPV reported higher symptoms of depression ($F(1, 346) = 5.06$, $p < .05$), trauma ($F(1, 346) = 22.30$, $p < .01$), and anxiety ($F(1, 346) = 5.11$, $p < .05$). In the original (unimputed) data, there was also a main effect of witnessing IPV on externalizing behavior but not on anxiety symptoms.

Child maltreatment—The results showed that all the maltreatment items had significant main effects on three or more of the outcomes (Table 5). Specifically, those reporting sexual abuse or physical abuse had significantly higher scores on depressive symptoms, trauma symptoms, and externalizing behavior. Those reporting physical neglect had higher symptoms of depression, trauma, and anxiety. Lastly, those endorsing emotional abuse or emotional neglect showed higher scores on all four mental health outcomes ($p < .01$ for all).

Total scores for subscales and total ACEs

Using three separate models, the regression analyses showed that household dysfunction was significantly associated with trauma symptoms (β = .21, $p < .01$) and anxiety symptoms (β = .13, $p < .05$). In the second model, maltreatment was a significant predictor of all four outcomes: depressive symptoms (β = .33, $p < .01$), trauma symptoms (β = .34, $p < .01$), anxiety symptoms (β = .18, $p < .01$), and externalizing problems (β = .19, $p < .01$). In the third model, the total ACEs score was associated with all four outcomes: depressive symptoms (β = .28, $p < .01$), trauma symptoms (β = .33, $p < .01$), anxiety symptoms (β = .19, $p < .01$), and externalizing problems (β = .16, $p < .01$). Lastly, when the two subscales were entered into the model together the household dysfunction score did not predict any of the outcomes, whereas the maltreatment subscale predicted all outcomes: depressive symptoms (β = .39, $p < .01$), trauma symptoms (β = .31, $p < .01$), anxiety symptoms (β = .16, $p < .01$), and externalizing problems (β = .21, $p < .01$).

Multiple Group Models—The model including both household dysfunction and maltreatment subscales was tested for the moderating effect of maltreatment group (maltreatment versus comparison). The results showed no significant interaction effects for any of the parameters when they were required to be equal across groups, which indicates that that the regression coefficients were not significantly different for adolescents in the maltreatment versus comparison group.

ACEs Cut-Off Scores

As shown in Table 6, all ACEs score categorizations resulted in significant group differences for all of the mental health outcomes except for the 0 versus 1 plus ACEs group for externalizing (this effect was significant in the original dataset prior to imputation). To further examine the effect sizes, we calculated Cohen's *d* and found that across the four categorizations, the '0–2 versus 3+' had the largest effect sizes for all the outcomes. Yet, for depressive symptoms, the difference in effect size for the 3+ group (Cohen's $d = 0.63$) was the same as the 0 versus 1+ group (Cohen's $d = 0.63$).

Discussion

Adverse childhood experiences have shown consistent effects on adult health. Yet, fewer studies have focused on mental health related to early adversities in adolescence or attempted to tease apart the effects of household dysfunction versus child maltreatment. Consistent with other studies that unpacked the individual effects of maltreatment versus household dysfunction ACEs (Atzl et al., 2019; Narayan et al., 2017; Ryan et al., 2000), the results of the present study demonstrate that the maltreatment subscale of the ACEs questionnaire drives the effect of ACEs on mental health outcomes. While we do not discount evidence that experiences in the home and neighborhood may affect mental health, our results point to maltreatment experiences as a better predictor of poor mental health among older adolescents.

Item-level prevalence of ACEs showed that emotional neglect was the most frequently endorsed ACE (40% of total sample), followed by witnessing IPV and emotional abuse. This

finding differs somewhat from a study of 6 to 18 years olds where domestic violence was the most prevalent ACE (48.6%), followed by emotional abuse (38.4%) (Greeson et al., 2014). In the National Study of Child and Adolescent Well-Being, the most prevalent ACE among child welfare involved youth was physical neglect (20.3%), followed by domestic violence (26.7%) (Garcia et al., 2017).

Household dysfunction was rather low in this high-risk sample, indicating that these variables may be even less relevant in higher income samples. We found that witnessing IPV was the primary item on the household dysfunction scale to show main effects on mental health outcomes. Importantly, witnessing violence between parents may be more well suited on the maltreatment scale as results of factor analyses of the ACEs scale in several different populations have shown that witnessing IPV loads primarily or cross-loads with maltreatment items rather than household dysfunction (Ford et al., 2014; Green et al., 2010; Mersky et al., 2017). Further work should be done to clarify the salience of household dysfunction items for specific populations. Although most items were not significant predictors of mental health in the current sample, we should not infer that household dysfunction does not affect physical and mental health in other samples. It is important to note that our findings showed that alone, the household dysfunction sum score was a significant predictor of trauma symptoms and anxiety.

The child maltreatment items all showed significant main effects on most of the outcomes. Most notably, emotional abuse and emotional neglect were the only two maltreatment types that had significant effects on all four outcomes. Emotional abuse also had the strongest effect on depressive disorders in the original Kaiser-CDC ACEs study (Chapman et al., 2004). There is considerable support for other maltreatment types, (i.e., sexual abuse, physical abuse, and physical neglect) as predictors of mental health problems (Hillberg et al., 2011; Leeb et al., 2011), but our findings add to the accumulating literature demonstrating the detrimental effects of emotional neglect and emotional abuse (Burns et al., 2010; Christ et al., 2019; Trickett et al., 2011). Not surprisingly, the total maltreatment score was also significantly associated with all four outcomes, indicating the co-occurrence of multiple maltreatment types portends poorer outcomes, as found in other studies (Atzl et al., 2019; Schalinski et al., 2016).

After controlling for maltreatment, household dysfunction no longer had significant effects on any of the outcomes. On the other hand, after controlling for household dysfunction, maltreatment still had significant main effects on all four outcomes. This is similar to other studies showing that while parental criminality or drug problems increases PTSD symptoms in adulthood, maltreatment has stronger effects (Widom, 1999). One possible explanation for this absence of effects for the household dysfunction items is that they are highly correlated with child maltreatment. That is, household dysfunction may actually be a proxy for conditions that lead to child maltreatment or involvement with child welfare. It is also possible that some of the household dysfunction experiences are recent or ongoing, and effects may not be immediately apparent. Although household dysfunction has been found to affect mental health in other studies (Higgins & McCab, 2003; Ryan et al., 2000), the findings from this study point to maltreatment ACEs as the more salient and significant

predictors of mental health outcomes. Yet, these results do not discount the importance of family dysfunction for mental health nor the co-occurrence with more severe adversities.

Results from the cut-off score analysis indicated that all categorizations showed significant differences in mental health symptoms. Importantly, although the effect sizes were largest for the '0–2 versus 3+' category, there were moderate to large effects even for the those with any one ACE (except for externalizing behavior). This finding aligns with other studies that find an important distinction for those with any ACEs, versus none (Bright et al., 2016; Mersky et al., 2013; Schilling et al., 2007). Of note, the findings of the current study do not definitively support the use of a particular cut-off score in terms of predicting appreciable differences in mental health symptoms but do support that a cut-off of 1 ACE may be a useful proxy for risk in this population.

Limitations

The current findings cannot be extrapolated beyond the sample; nevertheless, given that we recruited from low-income urban neighborhoods, our conclusions may be applicable to similar populations. Unfortunately, we did not have an item on the trauma interview that we could code as parental mental illness—a potent predictor of offspring mental illness—and thus had to exclude this item from our analyses. There may be concerns of under-reporting of ACEs, due to the interview-style questionnaire. There may also be the issue of shared method variance as both the ACEs and mental health symptoms were self-reported. In addition, youth still living with caregivers may have been more reluctant to give information that puts their family situation at risk. We only examined four mental health domains; it is possible that the importance of particular ACEs may vary based on the outcome, and further work should be done to replicate the relative importance of ACEs subscales for health outcomes. While this study attempted to replicate the items on the original ACEs scale, several of our items were not equivalent. The emotional neglect question in particular was broader than the original ACEs, which may have led to higher prevalence rates than the other maltreatment types. The impact of the broad definition of emotional neglect in this study would likely increase the reporting rate and potentially decrease the likelihood of significant findings, as there would be a wider distribution of mental health symptoms. Yet, our results show that emotional neglect as defined in our study was a strong predictor of all four mental health outcomes, and thus the broad definition seems to be an important adverse experience. Lastly, other researchers have reported expanded ACEs scales that incorporate other potential childhood stressors (Cronholm et al., 2015) and found that these additional items are important predictors of mental health (Finkelhor et al., 2015). We agree with this approach as the original ACEs questionnaire does not encompass all early adversities that may be detrimental to mental health. Yet, evidence should guide the incorporation of ACEs items in clinical practice, as the utility of screening should be weighed against patient and provider burden as well as the ability to address these adversities in systems of care.

Conclusions

The findings from this study identify the importance of maltreatment items in assessing risk for mental health symptoms and indicate that more effort should be placed on identifying

abuse and neglect experiences and the inclusion of witnessing IPV as a maltreatment item. Our results do not support a particular cut-off score for clinical decision-making and referral to mental health treatment. Although a cut-off score is a feasible and straight-forward approach to using the ACEs screening in primary care, we suggest providers only use this method augmented with further inquiry as to the types of ACEs being endorsed. Future research should continue to delve into the specific effects that each of the ACEs has on the various domains of outcomes. In the current study, we only examined mental health, but the importance of certain ACEs may depend on the outcomes begin assessed (e.g., physical health, substance abuse, sexual risk-taking). Gathering more complete evidence about the salience of each ACE and its impact on health will be integral to both moving our knowledge forward about the effects of early adversity as well as clinical providers making evidence-based decisions about referrals to mental health treatment.

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Research Highlights

- All maltreatment items were associated with mental health symptoms.
- Only two household dysfunction items had main effects on some outcomes.
- All cut-off scores showed significant main effects on mental health.

Table 1.

Original ACEs items versus current study items from the Comprehensive Trauma Interview (CTI).

	Original ACEs items	CTI items
Household Dysfunction		
Divorce	Were your parents were ever separated or divorced?	Did anyone close to you ever move away from you? (only coded if notes indicated that it was parental divorce or separation)
Incarceration	Did a household member go to prison?	Did anyone close to you ever move away from you? (only coded if notes indicated that parent was incarcerated)
Intimate partner violence	Was your mother or stepmother: Often or very often pushed, grabbed, slapped, or had something thrown at her? Or Sometimes, often, or very often kicked, bitten, hit with a fist, or hit with something hard? Or Ever repeatedly hit at least a few minutes or threatened with a gun or knife?	Have there been times when you have seen or heard adults that take care of you say mean, insulting or threatening things to each other, hit each other or hurt each other physically?
Household member substance use	Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?	Have the people who take/took care of you had problems with drugs or alcohol?
Maltreatment		
Sexual abuse	Did an adult or person at least 5 years older than you ever... Touch or fondle you or have you touch their body in a sexual way? Or Attempt or actually have oral, anal, or vaginal intercourse with you?	Has anyone ever done something, or tried to do something sexual to you that you didn't want?
Physical abuse	Did a parent or other adult in the household often or very often... Push, grab, slap, or throw something at you? Or Ever hit you so hard that you had marks or were injured?	Have you ever been hit or beaten, or physically mistreated by any adults?
Physical Neglect	Did you often or very often feel that ...You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you? Or ...Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?	Have there been times when you did not have enough to eat, did not have clothes, medicine or medical attention, or didn't have a place to sleep? Have there been times when the person(s) who was supposed to be taking care of you couldn't do it very well because of the problems they were having?
Emotional neglect	Did you often or very often feel that ... No one in your family loved you or thought you were important or special? Or Your family didn't look out for each other, feel close to each other, or support each other?	Have there been times when you felt rejected by your family?
Emotional abuse	Did a parent or other adult in the household often or very often... Swear at you, insult you, put you down, or humiliate you? Or Act in a way that made you afraid that you might be physically hurt?	Have there been times in your life when the adults that take care of you said mean or insulting things to you, put you down, or told you that you were no good?

Note. ACEs original item, 'parental mental illness,' was not available in CTI data and was therefore not included in the table.

Table 2.

Frequency of ACEs items.

ACE item	T4 sample (*N* = 347)		Maltreated (*n* = 219)		Comparison (*n* = 128)		
	N or Mean	% or *SD*	*N* or Mean	% or *SD*	*N* or Mean	% or *SD*	*p* ≤
Household Dysfunction							
Parental divorce	50	14	39	18	11	9	0.02
Parental incarceration	13	4	11	5	2	2	ns
Witnessing IPV	133	38	94	43	39	30	0.02
Household member substance use	99	29	80	36	19	15	0.01
Household dysfunction total[a]	0.85	0.93	1.02	0.97	0.55	0.76	0.01
Maltreatment							
Sexual abuse	68	20	56	26	12	9	0.01
Physical abuse	108	31	83	38	25	20	0.01
Physical Neglect	114	33	99	45	15	12	0.01
Emotional neglect	138	40	99	45	39	30	0.01
Emotional abuse	127	37	92	42	35	27	0.01
Maltreatment total	1.59	1.59	1.95	1.65	0.98	1.26	0.01
ACEs total[a]	2.45	2.23	2.99	2.35	1.54	1.65	0.01

Note. N and percent shown for individual items and mean and standard deviation (*SD*) shown for the total scores. Group differences examined using χ^2 for percentages and independent samples *t*-test for means. *N* = 347 due to 5 missing data on the trauma interview. IPV = Intimate Partner Violence.

[a]missing parental mental illness.

Table 3.

Correlations between study variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Parental divorce	1.00												
2. Parental incarceration	−.08	1.00											
3. Witnessing IPV	.21**	.03	1.00										
4. Household member substance use	.12*	.04	.34**	1.00									
5. Sexual abuse	.05	.06	.27**	.24**	1.00								
6. Physical abuse	.08	.06	.32**	.24**	.36**	1.00							
7. Physical Neglect	.16**	−.01	.32**	.37**	.26**	.26**	1.00						
8. Emotional neglect	.17**	.03	.35**	.20**	.24**	.28**	.31**	1.00					
9. Emotional abuse	.18**	.01	.48**	.29**	.32**	.46**	.40**	.53**	1.00				
10. Depressive symptoms	.05	.10	.15**	.03	.26**	.17**	.12*	.42**	.30**	1.00			
11. Trauma symptoms	.12*	.07	.25**	.05	.21**	.21**	0.09	.35**	.31**	.66**	1.00		
12. Anxiety symptoms	.10	.09	.16**	.05	.2*	.07	.14*	.24**	.21**	.52**	.56**	1.00	
13. Externalizing behavior	.02	−.01	.08	.00	.11*	.11*	.02	.15**	.17**	.36**	.47**	.20**	1.00

Note.

** $p < .01$

* $p < .05$.

IPV = Intimate Partner Violence.

Table 4.

Means (*SE*) for mental health symptoms at Time 4 for each household dysfunction ACE.

	Divorce		Incarceration		Witnessing IPV		Household member substance use	
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
N	**50**	**297**	**13**	**334**	**133**	**214**	**99**	**248**
Depressive symptoms	10.51 (0.91)	9.61 (0.37)	12.53 (1.78)	9.62 (0.35)	**10.74 (0.56)**	**9.11 (0.44)**	9.61 (0.66)	9.78 (0.41)
Trauma symptoms	**33.36 (1.41)**	**29.67 (0.57)**	33.18 (2.79)	30.08 (0.54)	**33.41 (0.85)**	**28.20 (0.67)**	30.85 (1.03)	29.94 (0.64)
Anxiety symptoms	**35.86 (1.91)**	**31.69 (0.78)**	37.46 (3.74)	32.09 (0.73)	**34.41 (1.17)**	**30.97 (0.92)**	32.46 (1.39)	32.22 (0.86)
Externalizing behavior	9.97 (1.26)	9.33 (0.52)	8.80 (2.47)	9.44 (0.48)	10.62 (0.77)	8.67 (0.61)	9.64 (0.91)	9.33 (0.56)

Note. Controlling for T4 age, race, sex, maltreatment group status, and household income. IPV = Intimate Partner Violence; *SE* = standard error. Within a row, means in **boldface** are significantly different at $p < .05$.

Table 5.

Mean (*SE*) mental health symptoms at Time 4 for each maltreatment ACE.

		Sexual abuse		Physical abuse		Emotional abuse		Physical Neglect		Emotional neglect	
		Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Variable	***N*=**	**68**	**279**	**108**	**239**	**127**	**220**	**114**	**233**	**138**	**209**
Depressive symptoms		**12.62 (0.81)**	**9.03 (0.38)**	**11.17 (0.62)**	**9.08 (0.41)**	**12.18 (0.55)**	**8.32 (0.41)**	**11.09 (0.58)**	**8.86 (0.45)**	**12.96 (0.50)**	**7.60 (0.41)**
Trauma symptoms		**34.37 (1.27)**	**29.18 (0.59)**	**33.23 (0.95)**	**28.83 (0.63)**	**34.42 (0.85)**	**27.76 (0.64)**	**32.18 (0.91)**	**28.92 (0.71)**	**34.63 (0.80)**	**27.27 (0.65)**
Anxiety symptoms		33.72 (1.73)	31.94 (0.81)	33.21 (1.31)	31.87 (0.87)	**35.56 (1.19)**	**30.41 (0.85)**	**34.97 (1.21)**	**30.56 (0.95)**	**35.88 (1.13)**	**29.92 (0.91)**
Externalizing behavior		**12.11 (1.13)**	**8.76 (0.53)**	**11.03 (0.85)**	**8.69 (0.57)**	**11.78 (0.78)**	**8.06 (0.59)**	10.69 (0.80)	8.59 (0.63)	**11.23 (0.75)**	**8.22 (0.61)**

Note. Controlling for T4 age, race, sex, maltreatment group status, and household income. *SE* = standard error. Within a row, means in **boldface** are dignificantly different at $p < .05$.

Table 6.

Mean (*SE*) differences in mental health symptoms based on low vs high ACEs score.

		ACEs 0 vs 1+				ACEs 0–1 vs 2+			
		Low	High	$p \leq$	Cohen's *d*	Low	High	$p \leq$	Cohen's *d*
Variable	*N*=	89	258			154	193		
Depressive symptoms		7.50 (.67)	10.51 (.39)	0.001	0.63	7.95 (.50)	11.16 (.45)	0.001	0.61
Trauma symptoms		27.31 (1.05)	31.20 (.61)	0.002	0.45	27.18 (.78)	32.61 (.69)	0.001	0.59
Anxiety symptoms		29.74 (1.44)	33.17 (.83)	0.040	0.36	29.55 (1.08)	34.47 (.96)	0.001	0.46
Externalizing behavior		8.71 (.95)	9.66 (.55)	0.396	0.07	8.26 (.72)	10.34 (.64)	0.035	0.19
		ACEs 0–2 vs 3+				ACEs 0–3 vs 4+			
		Low	High	$p \leq$	Cohen's *d*	Low	High	$p \leq$	Cohen's *d*
	N=	197	150			239	108		
Depressive symptoms		8.21 (.44)	11.73 (.50)	0.001	0.63	8.85 (.41)	11.68 (.61)	0.001	0.52
Trauma symptoms		27.35 (.67)	33.94 (.77)	0.001	0.70	28.47 (.62)	34.02 (.94)	0.001	0.58
Anxiety symptoms		29.59 (.94)	35.84 (1.08)	0.001	0.54	31.22 (.87)	34.67 (1.31)	0.031	0.35
Externalizing behavior		8.15 (.63)	11.08 (.72)	0.003	0.30	8.45 (.57)	11.56 (.86)	0.003	0.31

Note. Mean differences between ACEs groups tested using MANCOVA controlling for T4 age, race, and sex. *SE* = standard error.