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Screening for childhood adversity: the what and when of identifying individuals at risk for lifespan health disparities

Kate Ryan Kuhlman[1,2] · Theodore F. Robles[3] · Julienne E. Bower[2,3] · Judith E. Carroll[2]

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Abstract Existing research on childhood adversity and health risk across the lifespan lacks specificity regarding which types of exposures to assess and when. The purpose of this study was to contribute to an empirically-supported framework to guide practitioners interested in identifying youth who may be at greatest risk for a lifelong trajectory of health disparities. We also sought to identify the point in childhood at which screening for adversity exposure would capture the largest group of at risk individuals for triage to prevention and intervention services. Participants (n = 4036) collected as part of the Midlife in the United States study reported their medical status and history including physical (cardiovascular disease, hypertension, obesity, diabetes, cancer) and mental health (depression, substance use problems, sleep problems). Participants indicated whether they were exposed to 7 adversities at any point in childhood and their age of exposure to 19 additional lifetime adversities before the age of 18. Parent drug abuse, dropping out or failing out of school, being fired from a job, and sexual assault during childhood exhibited the largest effect sizes on health in adulthood, which were comparable to the effects of childhood maltreatment. Childhood adversity screening in early adolescence may identify the largest proportion of youth at risk for negative health trajectories. The results of this descriptive analysis provide an empirical framework to guide screening for childhood adversity in pediatric populations. We discuss the implications of these observations in the context of prevention science and practice.

Keywords Child adversity · Integrated primary care · Health disparities · Adolescence · Academic problems · Parent substance abuse · Prevention science

Introduction

Exposure to childhood adversity is a robust predictor of mental and physical illness across the lifespan (Dube et al., 2003; Felitti et al., 1998), is associated with greater annual healthcare costs in adulthood (Bonomi et al., 2008; Fang et al., 2012), and has even been linked to earlier all-cause mortality (Chen et al., 2016). Childhood adversity most commonly includes abuse at the hands of a caregiver, parent substance use problems, family psychiatric problems, parent separation or divorce, witnessing domestic violence, and family member incarceration (Felitti et al., 1998). In addition, living in poverty, serious academic or occupational disruptions, bereavement, exposure to warfare, and serious illness occurring during childhood have been consider adversities because they are linked to the emergence of health disparities (Chung et al., 2016; Pearlin et al., 2005). Pediatricians are the first line of defense against the lifelong negative health sequelae of childhood adversity; for this reason the American Academy of Pedi-

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✉ Kate Ryan Kuhlman
krkuhl@uci.edu

[1] Department of Psychology and Social Behavior, School of Social Ecology, University of California Irvine, 4201 Social and Behavioral Sciences Gateway, Irvine, CA 92697-7085, USA

[2] Cousins Center for Psychoneuroimmunology, Semel Institute for Neuroscience and Human Behavior, University of California Los Angeles, Los Angeles, CA, USA

[3] Department of Psychology, University of California Los Angeles, Los Angeles, CA 90095, USA

atrics recommends that pediatricians identify toxic stress in the lives of children and provide recommendations for interventions (Flaherty & Stirling, 2010; Garner et al., 2012; Johnson et al., 2013). Yet, there are several barriers to adversity screening, among them decisions about what adversities to assess and when. The purpose of this paper is to begin to address barriers to adversity screening by providing an empirically-supported framework to guide practitioners, policy-makers, and fellow researchers interested in implementation of childhood adversity screening that serve the goal of identifying youth who may disproportionately benefit from preventive programs. To do this we examined the types of childhood adversity that were most closely associated with adult health problems and the optimal timing of these assessments.

Exposure to adversities during childhood is associated with at least a two-fold increase in risk of comorbidities in both physical and mental health outcomes in adulthood (Basu et al., 2017; Kessler et al., 2010; Norman et al., 2012), as well as underlying biological processes that presage disease (Jonker et al., 2017; Kuhlman et al., 2015, 2017; Miller et al., 2011; Miller & Chen, 2010; Shonkoff et al., 2009). That being said, several psychosocial interventions foster resilience in adversity exposed youth (Brody et al., 2017; Traub & Boynton-Jarrett, 2017) and even mitigate the effects of adversity on underlying biological processes (Jankowski et al., 2017; Slopen et al., 2014). Further, several interventions within pediatric primary care settings have shown favorable results on psychosocial functioning following traumatic events (Flynn et al., 2015). The first step to mitigating the lifelong trajectory of health disparities associated with childhood adversity exposure is to effectively identify at-risk individuals for referral to prevention programs. However, there are several barriers to adoption of universal screening for childhood adversity.

An important barrier to regular, universal screening for childhood adversity is the risk of harm to the physician–patient relationship in the event of mandated reporting of child abuse and neglect to local authorities (Flaherty & Stirling, 2010). One feasible strategy for screening would be to assess only the minimally necessary adversities to identify youth at risk for lifelong negative health trajectories. In addition, an empirically-guided framework for when to assess for childhood adversity exposure is needed. There is strong evidence to suggest that adversity may have the most robust effects on long-term health during phases of rapid neurobiological development (e.g., early childhood and adolescence) (Kuhlman et al., 2017; Tottenham & Sheridan, 2009), and that early childhood interventions are the most effective in remediating these associations (Dozier et al., 2006, 2008; McLaughlin et al., 2015). However, early childhood screening for adversities are reliant upon disclosure of parents or members of the community, and may fail to identify a large proportion of individuals at risk for lifespan health disparities. Essential to identifying this window of opportunity is understanding when notable adversities commonly occur and when individuals are capable of reporting them. Screening during adolescence may identify more individuals who are at-risk for these health disparities. This study aims to inform effective screening procedures by characterizing the associations between different types of adversity, their age of onset during childhood, and mental and physical health outcomes in adulthood.

To do this, we examined the strength of the association between 26 adverse childhood events and 9 individual health problems that comprise the majority of healthcare costs in the United States today: cardiovascular disease, hypertension, obesity, diabetes, cancer, depression, substance abuse, and sleep problems. We then examined the effect of these adverse events on global health, or the sum of an individual's identified health problems. We also provided data on age of adversity onset to inform decisions about the optimal age of adversity screening and intervention in the context of lifespan health disparities.

Method

Participants and procedures

The data for our analysis was collected as part of the second wave of the National Survey of Midlife Development in the United States study (MIDUS II). MIDUS was initiated in 1995 to determine how social, psychological, and behavioral factors interrelate to influence mental and physical health. The first wave collected socio-demographic and psychosocial data on 7108 Americans, ages 25–74 years, from a representative sample of English-speaking, non-institutionalized adults residing in the contiguous 48 states, with oversampling of five metropolitan areas, twin pairs, and siblings. Of the original 7108 MIDUS participants, 4963 were successfully re-contacted 9–10 years later and completed the MIDUS II 30-min phone interview and two self-assessment questionnaires using the original MIDUS protocols. The second wave of data also included an additional supplemental sample of 592 African Americans from Milwaukee to enhance the racial diversity of the sample. Detailed information on recruitment, procedures, and sample characteristics have been published elsewhere (Brim et al., 2004; Friedman et al., 2015). Participants completed a self-administered questionnaire including information on sociodemographic characteristics, childhood adversity exposure, medical history, and current health. Of the 4963 individuals who participated in the

MIDUS II study, 927 individuals were excluded from this analysis due to missing information on either childhood adversity or health. Therefore the remaining analyses were conducted using a sample of 4036 participants from MIDUS II.

A subsample of participants in the MIDUS II study (n = 1255) also participated in a supplemental study that involved travel to one of the MIDUS research sites including University of California Los Angeles, University of Wisconsin–Madison, and Georgetown University. During this study, additional information was collected on participants related to childhood maltreatment and health. Data provided from participants during this supplemental study were also used to determine the participant's health status, and additional childhood maltreatment data is presented for this subset of participants.

Measures

Childhood adversity

Participant exposure to childhood adversity was assessed using three surveys: 2 in the MIDUS II assessment and 1 in the biomarker study. In the MIDUS II assessment, participants indicated whether they had experienced any of 7 events at any point before age 18 years with either *yes* or *no*. In a second set of questions, participants indicated whether they had ever experienced another 14 events and at what age (see Table S1 for childhood adversity events). Responses to these events were coded as yes if the participant indicated that the event occurred before the age of 18. Unless otherwise noted, adversity items refer to the participant's experiences and life events, not the experiences of their parents or family members. Finally, participants in the biomarker study completed the Childhood Trauma Questionnaire (CTQ-SF), which is a 25-item, retrospective measure of childhood maltreatment that includes subscales for emotional abuse, emotional neglect, physical abuse, physical neglect, and sexual abuse (Bernstein et al., 2003). Scores on each of these scales are continuous and can range from 5 to 25. These continuous scores were converted to dichotomous variables using previously validated clinical cut-off scores (emotional abuse $\geq$ 10, emotional neglect $\geq$ 15, physical abuse $\geq$ 8, physical neglect $\geq$ 8, or sexual abuse $\geq$ 8) to match the other adversity items (Walker et al., 1999). Sensitivity and specificity of these thresholds were $\geq$ 0.85 for all 5 subscales when compared to clinical interviews (Bernstein & Fink, 1998). Internal reliability of the CTQ was excellent within this sample, $\alpha = 0.92$, and reliability of each subscale within the CTQ was good, all $\alpha > 0.79$.

Childhood adversity onset

For 19 of the adversities assessed, participants indicated the age they experienced this event/adversity. To compute adversity onset, we identified the earliest reported adversity across these 19 items. Individuals were then categorized into three dichotomous variables: adversity onset before age 5, adversity onset before age 13, and adversity onset before age 18 where 0 = *no* and 1 = *yes*. These variables were not mutually exclusive; individuals who reported exposure to an adversity at age 3, would have a 1 in all three of these dichotomous variables. This approach to computing an indicator of adversity onset places less importance on the accuracy of a participant's memory for their age at the time of an event, while also acknowledging that individuals exposed to adversity during early childhood are often exposed to more adversities throughout childhood rather than exclusively within early childhood.

Physical and mental health outcomes

To determine whether a participant has ever suffered from one of our physical health (i.e., cardiovascular disease, hypertension, diabetes, obesity, or cancer) or mental health outcomes (i.e., depression, substance use, sleep problems) we created dichotomous variables for each health outcome (e.g., no cardiovascular disease = 0 and cardiovascular disease = 1) based upon either affirmative responses on any of disease-specific self-reported items or scores exceeding the clinical threshold on well-established questionnaires (Bernstein et al., 2003; Buysse et al., 1989; Radloff, 1977; Walker et al., 1999) (see Table S1 for these items and criteria). A sum of these conditions in adulthood was also computed as an indicator of "global health" (Charlson et al., 1994).

Data analysis

To provide an empirical basis for the prevalence of adversity, we report the frequency of individuals indicating exposure to each adversity by their health status for each examined outcome. We then conducted χ^2 analyses to determine whether a positive indication on an adversity item was associated with each health outcome, and computed directional Somer's *d* effect sizes to estimate the magnitude of each association; 95% confidence intervals were used to determine statistical reliability of these effects. Confidence intervals that do not encompass 0 are considered significant. Effect sizes < 0.20 are considered very small, between 0.20 and 0.49 are considered small, between 0.50 and 0.79 are considered medium, and effect sizes $\geq$ 0.80 are considered large (Cohen, 1988). We

provided a descriptive analysis of adversity exposure age for each adversity and by health comorbidity in adulthood, and used χ^2 analyses to determine utility of hypothetical adversity screening at different ages to identify individuals with comorbid health-problems in adulthood. Finally, we tested whether significant associations observed between adversity exposure and health outcomes varied meaningfully by sex or ethnicity.

Results

The majority (58.3%) of participants in this study reported exposure to at least one adverse event in childhood, and 10.8% were exposed to more than 4 different types of adversity. The average participant had at least 2 of the health problems examined. See Table 1 for sample characteristics including the distribution of childhood adversities and frequencies of each health outcome. Notably, there were significant differences between male and female participants in childhood adversity exposure. See Table 2 for adversity exposure type and timing by sex.

Individual health outcomes

Several adverse events were associated with significant effects on mental health outcomes, although the magnitude of these individual effects were mostly very small. Table 3 depicts the effect size for the sum of adversities and each childhood adversity item on global health and individual adult health outcomes. In this table, darker cell background indicates larger effect sizes while bold-faced type indicates statistical significance. Maltreatment, having a parent with drug use problems, flunking out of school, and being sexually assaulted all exerted at least a small effect on depression ($d > 0.20$). Several adversity types were associated with significant effects on substance use problems in adulthood, however the magnitude of these effects were uniformly very small. Emotional abuse, neglect, and sexual assault were the most strongly related to adult sleep problems.

Fewer individual adverse events were associated with the physical health outcomes examined, and again the magnitude of these individual outcomes ranged from very small to small. Notably, childhood maltreatment was not significantly associated with incidence of cardiovascular disease in adulthood. Only entering the armed forces before adulthood was associated with a small effect; all other individual-level effects were very small in magnitude. No subtypes of adversity were associated with notable effects on hypertension, diabetes, obesity, or cancer. Taken together, the association between individual adversity items and specific adulthood health problems were very small to small in magnitude, with the most consistent associations (significant associations with 4 or more health outcomes) emerging for emotional abuse, physical neglect, repeating a school year, dropping out of school, fired from a job, and sexual assault.

Cumulative effect estimates of childhood adversity on specific health outcomes in adulthood varied by sex, as can be seen in Fig. 1. For men, childhood adversity was more strongly related to obesity, hypertension, and cardiovascular disease, while in women childhood adversity was more strongly related to insomnia and cancer. Although slight differences in effect estimates for depression can be

Table 1 Childhood adversity exposure and mental and physical health outcomes in MIDUS II sample (N = 4036)

	%	M (SD)	Range
Age		56.23 (12.4)	30–84
Total adverse events		1.22 (1.6)	0–13
Adversity onset		12.71 (5.1)	0–18
Female	53.3		
Race/ethnicity[a]			
Hispanic/Latino	3.1		
White	91.5		
Black/African American	3.7		
Asian	0.5		
Currently married	71.0		
Education			
< High school	6.1		
High school	27.0		
Some college	28.7		
Bachelor's degree	19.4		
Graduate degree	18.8		
Currently employed	51.7		
Childhood adversities			
0	41.7		
1	27.0		
2	13.7		
3	6.8		
4+	10.8		
Syndromes		2.00 (1.72)	0–9
Depression	27.7		
Substance abuse	8.6		
Sleep problems	13.8		
Cardiovascular Disease	14.8		
Hypertension	23.9		
Cancer	5.5		
Obesity	22.2		
Diabetes	4.2		

[a]Groups are not mutually exclusive

Table 2 Sex differences in childhood adversity exposure

	Total (n = 4041)	Male (n = 1802)	Female (n = 2239)	*F*	*p*
Mean cumulative adversity (SD)	1.21 (1.61)	1.23 (1.54)	1.21 (1.67)	0.17	.68
	Total % (n)	% (n)	% (n)	*d*	*p*
Household challenges					
Parent alcohol use problems	16.4 (662)	22.0 (396)	11.9 (266)	0.029	**.012**
Parent drug use problems	0.8 (32)	0.7 (13)	0.8 (19)	0.001	.647
Parental divorce	9.7 (392)	8.8 (159)	10.4 (233)	0.016	.088
School stressor					
Repeated a school year	13.4 (540)	17.7 (319)	9.9 (221)	− 0.078	**<.001**
Dropped out of school	10.3 (415)	10.4 (188)	10.1 (227)	− 0.003	.76
Flunked out of school	0.9 (36)	1.3 (23)	0.6 (13)	− 0.007	**.025**
Expelled or suspended from school	4.8 (193)	6.9 (125)	3.0 (68)	− 0.039	**<.001**
Financial stressors					
Parent out of a job when they wanted to be working	9.9 (400)	10.7 (192)	9.3 (208)	− 0.014	.15
Fired from a job	2.8 (112)	3.6 (64)	2.1 (48)	− 0.014	**.008**
Lost home to fire, flood, or natural disaster	1.0 (40)	0.8 (14)	1.2 (26)	0.004	.21
Went on welfare	0.6 (23)	0.2 (4)	0.8 (19)	0.006	**.005**
Justice/social welfare					
Sent away from home because they did something wrong	2.4 (99)	2.7 (49)	2.2 (50)	− 0.005	.325
Serious legal difficulties/prison	0.2 (7)	0.3 (6)	0.04 (1)	− 0.003	**.044**
Detention in jail or comparable institution	0.3 (13)	0.5 (9)	0.2 (4)	− 0.003	.089
Bereavement/loss					
Parental death	7.1 (286)	6.4 (116)	7.6 (170)	0.012	.15
Sibling death	2.9 (118)	2.9 (53)	2.9 (65)	0.000	.943
Violence exposure					
Physically assaulted or attacked	2.2 (87)	2.5 (45)	1.9 (42)	− 0.006	.183
Sexually assaulted	5.9 (237)	10.8 (194)	1.9 (43)	0.063	**<.001**
Entered armed forces	2.5 (102)	5.5 (100)	0.1 (2)	− 0.055	**<.001**
Combat	0.2 (8)	0.4 (7)	0.04 (1)	− 0.003	**.025**
Age of exposure					
Exposure before age 5	7.6 (307)	6.3 (114)	8.6 (193)	0.031	**.001**
Exposure before age 13	31.8 (1285)	33.0 (594)	30.9 (691)	− 0.006	.737
Exposure before age 18	48.3 (1950)	51.6 (930)	45.6 (1020)	− 0.042	**.014**

Bold values indicate statistical significance ($p < .05$)

seen, both men and women had significant effects of childhood adversity on this mental health outcome.

Global health

Next, to look at the effect of adversities on global health, we examined the effect of each adversity item on the total number of health problems an individual reported. These effects on global health are shown in the second column of Table 3. The first five rows show the effects of the sum of adversities and childhood maltreatment exposures on global health, which all demonstrated significant effects on global health. Of note, the effect size of parent drug use problems on global health was greater than the effects of any type of childhood maltreatment. Exposure to parent drug use problems did not differ in prevalence for male and female participants, $p = .65$. The effect size of dropping out of school, flunking out of school, being fired from a job, physical assault, and sexual assault during childhood on global health were also robust and comparable to that of childhood maltreatment.

Overall, adverse events were more consistently associated with the mental health outcomes than the physical health outcomes examined. As expected, childhood maltreatment was associated with significant effects on global health, $d = 0.22$–0.32, with small and significant effects on

Table 3 Effect sizes for childhood adversity items by adult health outcomes

Item description	Global health	Depression	Substance use	Sleep problems	Cardiovascular disease	Hypertension	Diabetes	Obesity	Cancer
Total adversities (sum)	**0.21**	**0.15**	**0.04**	**0.13**	**0.03**	**0.04**	**0.02**	**0.08**	**0.02**
Childhood maltreatment									
Emotional abuse	**0.32**	**0.33**	**0.06**	**0.24**	−0.03	−0.02	−0.004	**0.07**	0.04
Emotional neglect	**0.29**	**0.32**	**0.06**	**0.21**	−0.01	−0.01	−0.02	0.04	−0.003
Physical abuse	**0.22**	**0.2**	**0.05**	**0.19**	−0.03	−0.03	0.01	**0.10**	−0.02
Physical neglect	**0.25**	**0.21**	**0.04**	**0.18**	0.001	**0.07**	**0.06**	0.01	−0.01
Sexual abuse	**0.25**	**0.23**	0.02	**0.19**	0.01	0.03	−0.02	**0.08**	0.03
Family environment stressors									
Ever parent drank caused problems	**0.14**	**0.16**	**0.06**	**0.07**	−0.02	0.01	−0.02	0.02	0.02
Ever parent drugs caused problems	**0.36**	**0.36**	0.03	0.15	−0.02	0.17	−0.08	0.16	−0.01
Ever parents divorced	0.03	**0.06**	0.03	**0.08**	**−0.05**	**−0.07**	−0.03	0.02	0.01
Ever parent died	**0.10**	**0.07**	−0.01	0.01	**0.04**	**0.06**	0.01	0.03	0.01
Ever sibling died	**0.16**	0.04	0.02	**0.08**	0.04	**0.14**	0.02	0.06	0.01
School/occupational stressors									
Ever repeated school year	**0.11**	0.02	**0.03**	0.03	**0.10**	**0.08**	**0.06**	**0.06**	−0.001
Ever dropped out of school	**0.24**	**0.11**	**0.06**	0.04	**0.08**	**0.14**	**0.08**	**0.10**	**0.07**
Ever suspended/expelled from school	**0.10**	**0.10**	**0.11**	0.04	0.01	**−0.08**	0.03	0.04	−0.004
Ever flunked out of school	**0.28**	**0.21**	0.1	0.08	0.08	0.01	0.05	0.14	0.03
Ever fired from a job	**0.24**	**0.13**	**0.07**	**0.15**	**0.08**	0.08	**0.10**	0.05	0.004
Financial stressors									
Ever had parent out of job	**0.12**	**0.12**	**0.04**	**0.06**	0.01	0.01	−0.02	0.02	0.02
Ever lost home to fire/flood/etc	0.08	0.03	0.08	0.1	0.003	−0.03	**−0.09**	0.04	0.06
Ever welfare	0.15	0.14	0.11	0.06	−0.02	0.05	−0.07	0.04	−0.05
Justice/social welfare stressors									
Ever sent away from home	**0.19**	**0.17**	**0.12**	0.09	−0.01	−0.04	0.04	0.06	0.003
Ever serious legal difficulty/prison	−0.01	0.13	**−0.07**	−0.06	**−0.15**	−0.29	0.03	0.27	0.004
Ever jail detention	−0.02	−0.07	0.09	0.03	−0.07	0.03	−0.04	0	0.02
Other violence exposure									
Ever physically assaulted	**0.19**	**0.17**	**0.12**	**0.17**	0.002	−0.01	0.04	0.02	0.01
Ever sexually assaulted	**0.28**	**0.26**	**0.09**	**0.20**	−0.01	0.01	0.001	**0.07**	0.02
Ever entered armed forces	**0.19**	0.01	0.01	−0.04	**0.20**	**0.18**	0.07	0.08	**0.11**
Ever experienced combat	0.18	−0.05	0.06	**−0.2**	0.23	0.07	0.26	−0.06	0.11

Bold indicates 95% CI does not overlap with 0; darker color indicates larger effect sizes

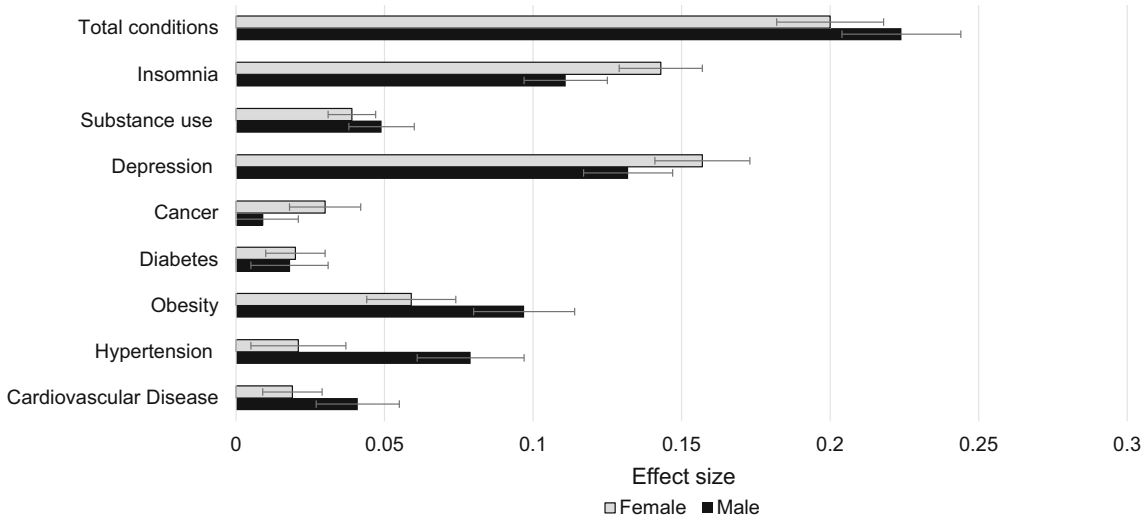

Fig. 1 Effect of cumulative childhood adversity on common health conditions in adulthood for males and females

Table 4 Percent (n) of participants exposed to adversity by ages 5, 13, and 18 by number of health outcomes in adulthood

Number of conditions	n	Mean number of adversities	% Onset before age 5 (n)	% Onset before age 13 (n)	% Onset before age 18 (n)
0	951	0.81 (1.21)	8.0 (59)	32.6 (240)	50.7 (737)
1	934	0.91 (1.26)	7.1 (54)	32.5 (249)	52.0 (398)
2+	2357	1.53 (1.82)	9.8 (194)	40.4 (796)	59.7 (1178)

mental health outcomes but very few physical conditions. In contrast, occupational problems such as dropping out of school and being fired from a job before adulthood were associated with similar, robust effect sizes on global health, but those effects were distributed across physical and mental health outcomes examined in this population.

Age of childhood adversity onset and adult health

Notably, 8.8% of participants reported their first adversity exposure before the age of 5, 37.0% reported adversity exposure by the age of 13, and 56.1% reported adversity exposure by the age of 18. See Table 4 for rates of adversity exposure at ages 5, 13, and 18 by number of adulthood health problems. Again, women were more likely to report adversity exposure before age 5 than men, $p < .001$ (See Table 2). Adversity exposure by any of these ages effectively differentiated between healthy adults in the sample (< 2 adulthood health outcomes) and those with multiple (2 +) health outcomes in adulthood, adversity by age 5 $\chi^2 = 5.67$, $p = .017$, adversity by age 13 $\chi^2 = 22.31$, $p < 0.001$, adversity by age 18 $\chi^2 = 24.07$, $p < .001$. However, the majority of adverse events did not occur until late childhood or early adolescence. In fact, there was a 318% increase in the number of individuals exposed to adversity from age 5 to age 13 and only a 51% increase in exposure from age 13 to 18. In our sample, adversity during early childhood was relatively uncommon, and for that reason screening in early childhood may have only identified 9.8% of this sample with comorbid health outcomes. In contrast, the ubiquity of adversity exposure during adolescence means that the majority of healthy adult individuals would be identified as adversity exposed. Taken together, childhood adversity screening in early adolescence (approximately age 13 years) may yield the largest number of individuals at risk for a trajectory of poor health that can be triaged into prevention and intervention while minimizing the proportion of false positives.

Racial/ethnic differences in childhood adversity exposure and health

We then explored the role of race in the link between childhood adversity and health in this sample. Latino participants reported more cumulative adversity exposure than non-Latino participants, $p < .001$, and any other minority group, $p < .001$, but no differences in global health, $p = .20$. Black participants reported no differences in cumulative adversity exposure, $p = .63$, and no differences in global health, $p = .28$, than non-Black participants, but

reported fewer childhood adversities than Latino participants, $p < .001$. Overall, maltreatment, having a parent with drug use problems, flunking out of school, and being sexually assaulted were associated with mental health outcomes and that emotional abuse, physical neglect, repeating a school year, dropping out of school, being fired from a job, and sexual assault were associated with physical health outcomes. We then tested whether the strength of these associations differed among the Latino and black minority groups within the sample. Among Latino participants, far fewer significant associations between childhood adversity and health were observed. Specifically, only the sum of cumulative adversities, emotional abuse, physical abuse, and sexual assault were associated with any health outcomes in this sample, and these associations were limited to global health and depression. Among black participants, only being fired or physically assaulted were associated with a higher incidence of substance use problems, while sexual assault was linked to a higher incidence of depression and worse global health.

Discussion

Overall, individual adverse events demonstrated small, but reliable effects on individual and global health outcomes in adulthood. Prevalence of specific adverse events did vary by gender, such that men were more likely to repeat a school year and be fired from a job, while women were more likely to report living in poverty and be exposed to their first adversity before age 5. Parent drug abuse, dropping out of school, failing out of school, being fired from a job, and sexual assault were all associated with small but significant effects on global health, effects that were similar for both men and women. Notably, the effects on health observed for these adverse events were comparable or larger than those observed for childhood maltreatment or cumulative childhood adversity in our sample.

The results presented in this study make three important contributions, they (1) provide an empirical guide to the development of time- and cost-effective screening procedures for use in pediatric populations, (2) guide further investigation into specific childhood adversity experiences as risk factors for mental and physical illness across the lifespan, and (3) inform policy development that benefits specific groups that may be at risk for life-long health disparities. Screening for childhood adversity can serve two purposes in a community. The first is to protect children who are currently living in unsafe or neglectful conditions; the second is to identify youth who may disproportionately benefit from programs aimed at mitigating health disparities. These goals are not necessarily mutually exclusive, but the purpose of this study was to inform the latter goal. In particular, our findings suggest that screening for serious occupational problems and targeting the children of adults with substance use problems may be an effective way to identify at-risk youth when more traditional adversity screening is not feasible. Importantly, parent substance use problems in this sample were more strongly associated with cumulative health problems than childhood maltreatment or the sum of childhood adversity exposures (See Table 3). Thus, screening families for parent substance use may be a more sensitive measure of risk for health disparities despite being less invasive.

Moreover, the predominant childhood adversity questionnaires used in research and clinical settings focus on the family environment, child abuse, and neglect and but seldom include occupational problems such as problems in school or being fired from a job (Felitti et al., 1998; Purewal et al., 2016). Unfortunately, adversity exposure during childhood is the norm rather than the exception. In the current study, over half of the sample reported at least one childhood adversity. Estimates of any exposure to childhood adversity range from 39 to 60% (Gilbert et al., 2015; Green et al., 2010; Kessler et al., 2010) depending on the measure used to assess for adversity and the population. Our adverse event questionnaire assessed a broader range of potential adversities including school and occupational problems and had more items than are commonly found in other measures. We identified parent drug abuse, dropping or failing out of school, being fired from a job, and sexual assault as having reliable effect sizes on global adult health. Identifying individuals exposed to each of these adverse events and involving them in effective psychosocial services may have comparable effects on health disparities as effectively identifying youth exposed to maltreatment. For example, ongoing assessment for serious problems in school by individual practitioners may be an effective way to identify at-risk youth that may benefit from preventive services such as multifaceted positive youth development programs (Guerra & Bradshaw, 2008). Some of these adversities are also easily identified through existing systems. Students who fail to graduate from public school or children of individuals with drug use problems could be identified for psychosocial prevention programs that may mitigate the cumulative effect of these adversities on lifelong health. Furthermore, occupational problems may also be indicative of emerging adjustment problems related to adversity exposure that will help us to better understand and treat the pleiotropic effects they have on health and development.

Efforts to mitigate the impact of childhood adversity on development during early childhood have been promising (e.g., Graham-Bermann et al., 2007; Nelson et al., 2007; Reynolds et al., 2007). However, our data suggest that

screening for childhood adversity during early childhood also misses up to 90% of individuals at risk for comorbid health problems in adulthood. Qualitatively, some adversities identified in this study as most robustly associated with health in adulthood are unlikely to occur or difficult to identify before adolescence. These include dropping out of school, being fired from a job, and sexual assault. Although, it is important to note that physical and sexual violence assessment in our study did not include information about the participant's relationship to the perpetrator which may be an important moderator to examine in future studies. Nonetheless, our results suggest that assessment in early adolescence (ages 12–13) may capture adversity-exposed youth on a trajectory for the greatest health risks in adulthood. Within the broader developmental literature, adolescence is a critical period for social and emotional development (Arnett, 1999; Dahl, 2004), which may be an optimal time for prevention (e.g., Rohde et al., 2012; Stice et al., 2009; Werner-Seidler et al., 2017), and may mitigate the lifelong trajectory of disadvantage seen in adversity exposed youth. In fact, select interventions in specific, high-risk populations have already shown promise. For example, random selection between the ages of 12–14 into foster care programs enhanced with higher staff-to-child ratios, tailored mental health services, tutoring, and summer camps lead to better mental and physical health in adulthood compared to usual foster care (Kessler et al., 2008). Indeed, implementation of brief behavioral therapy within pediatric primary care is feasible and can be effective in reducing depression and anxiety symptoms (Weersing et al., 2017). Interventions in adolescence and adulthood can also positively impact the neural circuits disrupted by childhood adversity (Davidson & McEwen, 2012). Before implementing integrated primary care screening, more research to determine the effectiveness of these and other interventions on long-term health-related outcomes in adversity-exposed youth is needed.

Importantly, the effect sizes between individual childhood adversity experiences and health outcomes were small. This is not surprising given the growing evidence that *cumulative* adversity exposure or poly-victimization has most consistently been linked with greater risk for morbidity and mortality (Chartier et al., 2010; Dube et al., 2003; Finkelhor et al., 2007; Friedman et al., 2015). Time- and cost-effective screening for the childhood adversity exposures that are reliably linked with lifespan health disparities can be deployed on a larger scale, with the potential to identify millions of people who would disproportionately benefit from targeted prevention. To this point, these small effect sizes likely indicate that there are robust, potentially modifiable, factors that determine whether an exposed individual will be at risk for these health outcomes. Indeed the association between childhood adversity and biological precursors to disease (e.g., inflammatory markers, DNA methylation in key stress-regulation genes) occurs largely through behavioral pathways (Baldwin et al., 2018; Raposa et al., 2014). Taken together, the development and evaluation of interventions targeting secondary outcomes that have been repeatedly linked to adversity exposure may have major preventive value for lifelong health, such as inflammation and functioning of the HPA-axis. Indeed, the NIH sponsored Research Domain Criteria (RDoC) has already inspired prevention and intervention efforts that will target risk factors for diseases that tend to manifest as chronic conditions (Zalta & Shankman, 2016). In particular, efforts to mitigate biological responses to stress would be lucrative targets for further investigation.

The results of this study should be interpreted in the context of several limitations. First, childhood adversity in this sample was assessed via retrospective self-report during adulthood which is susceptible to the limitations of retrospectively measured life events (Hardt & Rutter, 2004; Monroe, 2008). This limitation is mitigated by findings in previous studies showing that individuals can reliably answer whether an event did or did not happen (Brewin et al., 1993; Hardt & Rutter, 2004), and adversities were mostly queried in a binary format. Further, queries about sexual and physical assault during childhood did not include information on the perpetrator, thus we have no way of accounting for whether this violence was committed by a caregiver, peer, or a stranger. Non-binary adversity exposure was assessed using the CTQ, which is limited to the measurement of an individual's subjective report of the frequency of different forms of maltreatment within their childhood family environment. Replication of our findings within a prospective, longitudinal study are warranted.

We also limited our investigation to the association between childhood adversities and health problems. There are well-documented social, financial, and occupational consequences to childhood adversity exposure. Our intent was to inform screening for individuals who may disproportionately benefit from health disparities prevention programs, and the magnitude of associations with other important outcomes is needed. Health problems in this study were determined based upon subjective reports of past and current diagnoses which is estimated to have acceptable sensitivity and specificity for the diseases captured here compared with medical records (Martin et al., 2000). Our observations on when to screen for adversity were based upon reported ages of exposure for only 19 items. Thus, average age of adversity exposure in this sample may be earlier for adversity items where age of exposure was not assessed. Future investigations should take extra steps to ascertain the average ages of adversity exposures across development to better inform decisions

about when adversity occurs and when interventions may be most effective. The analytic approach in the present study was descriptive and focused on bivariate associations within subgroups. This approach prioritized simplicity and transparency over providing estimates of associations after covarying for multiple sociodemographic factors and accounting for the clustering of many adversities and health conditions. Thus, generalizability of these results to various community samples may vary. Using data from this same study, Friedman et al. (2015) conducted models predicting the association between childhood adversity and cardiometabolic health outcomes that returned similar conclusions after adjusting for age, ethnic minority status, and sex. Childhood adversity exposure varies by race and ethnicity (Lee & Chen, 2017). A limitation of the current dataset is the under-representation of ethnic minority groups. We have attempted to test the strength of the associations between childhood adversity and adulthood health in this sample by ethnic/racial subgroups, however it is likely that we were underpowered to detect these small effects in the smaller Latino and black subgroups. Replication within more diverse, community samples is necessary.

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Compliance with ethical standards

Conflict of interest Kate Ryan Kuhlman, Theodore F. Robles, Julienne E. Bower, and Judith E. Carroll declare that they have no conflict of interest.

Human and animal rights and Informed consent All procedures followed were in accordance with ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all individual participants included in the study.

References

Arnett, J. J. (1999). Adolescent storm and stress, reconsidered. *American Psychologist, 54,* 317–326. https://doi.org/10.1037/0003-066X.54.5.317

Baldwin, J. R., Arseneault, L., Caspi, A., Fisher, H. L., Moffitt, T. E., Odgers, C. L., et al. (2018). Childhood victimization and inflammation in young adulthood: A genetically sensitive cohort study. *Brain, Behavior, and Immunity, 67,* 211–217. https://doi.org/10.1016/j.bbi.2017.08.025

Basu, A., McLaughlin, K. A., Misra, S., & Koenen, K. C. (2017). Childhood maltreatment and health impact: The examples of cardiovascular disease and type 2 diabetes mellitus in adults. *Clinical Psychology: Science and Practice, 24,* 125–139. https://doi.org/10.1111/cpsp.12191

Bernstein, D. P., & Fink, L. A. (1998). *CTQ: Childhood Trauma Questionnaire: A retrospective self-report*. San Antonio, TX: Psychological Corp.

Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., et al. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse and Neglect, 27,* 169–190. https://doi.org/10.1016/S0145-2134(02)00541-0

Bonomi, A. E., Anderson, M. L., Rivara, F. P., Cannon, E. A., Fishman, P. A., Carrell, D., et al. (2008). Health care utilization and costs associated with childhood abuse. *Journal of General Internal Medicine, 23,* 294–299. https://doi.org/10.1007/s11606-008-0516-1

Brewin, C. R., Andrews, B., & Gotlib, I. H. (1993). Psychopathology and early experience: A reappraisal of retrospective reports. *Psychological Bulletin, 113,* 82–98. https://doi.org/10.1037/0033-2909.113.1.82

Brim, O. G. E., Ryff, C. D., & Kessler, R. C. (2004). *How healthy are we? A national study of well-being at midlife.* Chicago: University of Chicago Press. http://psycnet.apa.org/psycinfo/2004-00121-000. Accessed November 23, 2016

Brody, G. H., Yu, T., Chen, E., & Miller, G. E. (2017). Family-centered prevention ameliorates the association between adverse childhood experiences and prediabetes status in young black adults. *Preventive Medicine, 100,* 117–122. https://doi.org/10.1016/j.ypmed.2017.04.017

Buysse, D. J., Reynolds, C. F., III, Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research. *Psychiatry Research, 28,* 193–213. https://doi.org/10.1016/0165-1781(89)90047-4

Charlson, M., Szatrowski, T. P., Peterson, J., & Gold, J. (1994). Validation of a combined comorbidity index. *Journal of Clinical Epidemiology, 47*(11), 1245–1251. https://doi.org/10.1016/0895-4356(94)90129-5

Chartier, M. J., Walker, J. R., & Naimark, B. (2010). Separate and cumulative effects of adverse childhood experiences in predicting adult health and health care utilization. *Child Abuse and Neglect, 34,* 454–464. https://doi.org/10.1016/j.chiabu.2009.09.020

Chen, E., Turiano, N. A., Mroczek, D. K., & Miller, G. E. (2016). Association of reports of childhood abuse and all-cause mortality rates in women. *JAMA Psychiatry, 73,* 920–927. https://doi.org/10.1001/jamapsychiatry.2016.1786

Chung, E. K., Siegel, B. S., Garg, A., Conroy, K., Gross, R. S., Long, D. A., et al. (2016). Screening for social determinants of health among children and families living in poverty: A guide for clinicians. *Current Problems in Pediatric and Adolescent Health Care, 46,* 135–153. https://doi.org/10.1016/j.cppeds.2016.02.004

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale: Lawrence Erlbaum.

Dahl, R. E. (2004). Adolescent brain development: A period of vulnerabilities and opportunities. Keynote Address. *Annals of the New York Academy of Sciences, 1021,* 1–22. https://doi.org/10.1196/annals.1308.001

Davidson, R. J., & McEwen, B. S. (2012). Social influences on neuroplasticity: Stress and interventions to promote well-being. *Nature Neuroscience, 15,* 689–695. https://doi.org/10.1038/nn.3093

Dozier, M., Peloso, E., Lewis, E., Laurenceau, J. P., & Levine, S. (2008). Effects of an attachment-based intervention on the cortisol production of infants and toddlers in foster care. *Development and Psychopathology, 20,* 845–859. https://doi.org/10.1017/S0954579408000400

Dozier, M., Peloso, E., Lindhiem, O., Gordon, M. K., Manni, M., Sepulveda, S., et al. (2006). Developing evidence-based interventions for foster children: An example of a randomized clinical trial with infants and toddlers. *Journal of Social Issues, 62,* 767–785. https://doi.org/10.1111/j.1540-4560.2006.00486.x

Dube, S. R., Felitti, V. J., Dong, M., Giles, W. H., & Anda, R. F. (2003). The impact of adverse childhood experiences on health problems: Evidence from four birth cohorts dating back to 1900. *Preventive Medicine, 37,* 268–277. https://doi.org/10.1016/S0091-7435(03)00123-3

Fang, X., Brown, D. S., Florence, C. S., & Mercy, J. A. (2012). The economic burden of child maltreatment in the United States and implications for prevention. *Child Abuse and Neglect, 36,* 156–165. https://doi.org/10.1016/j.chiabu.2011.10.006

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., et al. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine, 14,* 245–258. https://doi.org/10.1016/S0749-3797(98)00017-8

Finkelhor, D., Ormrod, R. K., & Turner, H. A. (2007). Polyvictimization: A neglected component in child victimization. *Child Abuse and Neglect, 31,* 7–26. https://doi.org/10.1016/j.chiabu.2006.06.008

Flaherty, E. G., & Stirling, J. (2010). The pediatrician's role in child maltreatment prevention. *Pediatrics, 126,* 833–841. https://doi.org/10.1542/peds.2010-2087

Flynn, A. B., Fothergill, K. E., Wilcox, H. C., Coleclough, E., Horwitz, R., Ruble, A., et al. (2015). Primary care interventions to prevent or treat traumatic stress in childhood: A systematic review. *Academic Pediatrics, 15,* 480–492. https://doi.org/10.1016/j.acap.2015.06.012

Friedman, E. M., Montez, J. K., Sheehan, C. M., Guenewald, T. L., & Seeman, T. E. (2015). Childhood adversities and adult cardiometabolic health: Does the quantity, timing, and type of adversity matter? *Journal of Aging and Health, 27,* 1311–1338. https://doi.org/10.1177/0898264315580122

Garner, A. S., Shonkoff, J. P., Siegel, B. S., Dobbins, M. I., Earls, M. F., Garner, A. S., et al. (2012). Early childhood adversity, toxic stress, and the role of the pediatrician: Translating developmental science into lifelong health. *Pediatrics, 129,* e224–e231. https://doi.org/10.1542/peds.2011-2662

Gilbert, L. K., Breiding, M. J., Merrick, M. T., Thompson, W. W., Ford, D. C., Dhingra, S. S., et al. (2015). Childhood adversity and adult chronic disease: An update from ten states and the District of Columbia, 2010. *American Journal of Preventive Medicine, 48,* 345.

Graham-Bermann, S. A., Lynch, S., Banyard, V., DeVoe, E. R., & Halabu, H. (2007). Community-based intervention for children exposed to intimate partner violence: An efficacy trial. *Journal of Consulting and Clinical Psychology, 75,* 199–209.

Green, J. G., McLaughlin, K. A., Berglund, P. A., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M., et al. (2010). Childhood adversities and adult psychiatric disorders in the National Comorbidity Survey Replication I: Associations with first onset of DSM-IV disorders. *Archives of General Psychiatry, 67,* 113–123. https://doi.org/10.1001/archgenpsychiatry.2009.186

Guerra, N. G., & Bradshaw, C. P. (2008). Linking the prevention of problem behaviors and positive youth development: Core competencies for positive youth development and risk prevention. *New Directions for Child and Adolescent Development, 2008*(122), 1–17. https://doi.org/10.1002/cd.225

Hardt, J., & Rutter, M. (2004). Validity of adult retrospective reports of adverse childhood experiences: Review of the evidence. *Journal of Child Psychology and Psychiatry, 45,* 260–273. https://doi.org/10.1111/j.1469-7610.2004.00218.x

Jankowski, K. F., Bruce, J., Beauchamp, K. G., Roos, L. E., Moore, W. E., & Fisher, P. A. (2017). Preliminary evidence of the impact of early childhood maltreatment and a preventive intervention on neural patterns of response inhibition in early adolescence. *Developmental Science, 20,* e12413. https://doi.org/10.1111/desc.12413

Johnson, S. B., Riley, A. W., Granger, D. A., & Riis, J. (2013). The science of early life toxic stress for pediatric practice and advocacy. *Pediatrics, 131,* 319–327. https://doi.org/10.1542/peds.2012-0469

Jonker, I., Rosmalen, J. G. M., & Schoevers, R. A. (2017). Childhood life events, immune activation and the development of mood and anxiety disorders: The TRAILS study. *Translational Psychiatry, 7,* e1112. https://doi.org/10.1038/tp.2017.62

Kessler, R. C., McLaughlin, K. A., Green, J. G., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M., et al. (2010). Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys. *The British Journal of Psychiatry, 197,* 378–385. https://doi.org/10.1192/bjp.bp.110.080499

Kessler, R. C., Pecora, P. J., Williams, J., Hiripi, E., O'Brien, K., English, D., et al. (2008). Effects of enhanced foster care on the long-term physical and mental health of foster care alumni. *Archives of General Psychiatry, 65,* 625–633. https://doi.org/10.1001/archpsyc.65.6.625

Kuhlman, K. R., Chiang, J. J., Horn, S., & Bower, J. E. (2017). Developmental psychoneuroendocrine and psychoneuroimmune pathways from childhood adversity to disease. *Neuroscience and Biobehavioral Reviews, 80,* 166–184. https://doi.org/10.1016/j.neubiorev.2017.05.020

Kuhlman, K. R., Geiss, E. G., Vargas, I., & Lopez-Duran, N. L. (2015). Differential associations between childhood trauma subtypes and adolescent HPA-axis functioning. *Psychoneuroendocrinology, 54,* 103–114. https://doi.org/10.1016/j.psyneuen.2015.01.020

Lee, R. D., & Chen, J. (2017). Adverse childhood experiences, mental health, and excessive alcohol use: Examination of race/ethnicity and sex differences. *Child Abuse and Neglect, 69,* 40.

Martin, L. M., Leff, M., Calonge, N., Garrett, C., & Nelson, D. E. (2000). Validation of self-reported chronic conditions and health services in a managed care population. *American Journal of Preventive Medicine, 18,* 215–218. https://doi.org/10.1016/S0749-3797(99)00158-0

McLaughlin, K. A., Sheridan, M. A., Tibu, F., Fox, N. A., Zeanah, C. H., & Nelson, C. A. (2015). Causal effects of the early caregiving environment on development of stress response systems in children. *Proceedings of the National Academy of Sciences, 112,* 5637–5642. https://doi.org/10.1073/pnas.1423363112

Miller, G. E., & Chen, E. (2010). Harsh family climate in early life presages the emergence of a proinflammatory phenotype in adolescence. *Psychological Science, 21,* 848–856. https://doi.org/10.1177/0956797610370161

Miller, G. E., Chen, E., & Parker, K. J. (2011). Psychological stress in childhood and susceptibility to the chronic diseases of aging: Moving toward a model of behavioral and biological mechanisms. *Psychological Bulletin, 137,* 959–997. https://doi.org/10.1037/a0024768

Monroe, S. M. (2008). Modern approaches to conceptualizing and measuring human life stress. *Annual Review of Clinical Psychology, 4,* 33. https://doi.org/10.1146/annurev.clinpsy.4.022007.141207

Nelson, C. A., Zeanah, C. H., Fox, N. A., Marshall, P. J., Smyke, A. T., & Guthrie, D. (2007). Cognitive recovery in socially deprived young children: The Bucharest Early Intervention Project. *Science, 318*(5858), 1937–1940. https://doi.org/10.1126/science.1143921

Norman, R. E., Byambaa, M., De, R., Butchart, A., Scott, J., & Vos, T. (2012). The long-term health consequences of child physical abuse, emotional abuse, and neglect: A systematic review and meta-analysis. *PLOS Medicine, 9,* e1001349. https://doi.org/10.1371/journal.pmed.1001349

Pearlin, L. I., Schieman, S., Fazio, E. M., & Meersman, S. C. (2005). Stress, health, and the life course: Some conceptual perspectives. *Journal of Health and Social Behavior, 46,* 205–219. https://doi.org/10.1177/002214650504600206

Purewal, S. K., Bucci, M., Gutiérrez Wang, L., Koita, K., Silvério Marques, S., Oh, D., et al. (2016). Screening for adverse childhood experiences (ACEs) in an integrated pediatric care model. *Zero to Three, 37,* 10–17.

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1,* 385–401. https://doi.org/10.1177/014662167700100306

Raposa, E. B., Bower, J. E., Hammen, C. L., Najman, J. M., & Brennan, P. A. (2014). A developmental pathway from early life stress to inflammation: The role of negative health behaviors. *Psychological Science, 25,* 1268–1274. https://doi.org/10.1177/0956797614530570

Reynolds, A. J., Temple, J. A., Ou, S. R., Robertson, D. L., Mersky, J. P., Topitzes, J. W., et al. (2007). Effects of a school-based, early childhood intervention on adult health and well-being: A 19-year follow-up of low-income families. *Archives of Pediatrics and Adolescent Medicine, 161,* 730.

Rohde, P., Stice, E., & Gau, J. M. (2012). Effects of three depression prevention interventions on risk for depressive disorder onset in the context of depression risk factors. *Prevention Science, 13,* 584–593. https://doi.org/10.1007/s11121-012-0284-3

Shonkoff, J. P., Boyce, W. T., & McEwen, B. S. (2009). Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for health promotion and disease prevention. *JAMA, 301,* 2252–2259.https://doi.org/10.1001/jama.2009.754

Slopen, N., McLaughlin, K. A., & Shonkoff, J. P. (2014). Interventions to improve cortisol regulation in children: A systematic review. *Pediatrics, 133,* 312–326. https://doi.org/10.1542/peds.2013-1632

Stice, E., Shaw, H., Bohon, C., Marti, C. N., & Rohde, P. (2009). A meta-analytic review of depression prevention programs for children and adolescents: Factors that predict magnitude of intervention effects. *Journal of Consulting and Clinical Psychology, 77,* 486–503.

Tottenham, N., & Sheridan, M. A. (2009). A review of adversity, the amygdala and the hippocampus: A consideration of developmental timing. *Frontiers in Human Neuroscience, 3,* 68. https://doi.org/10.3389/neuro.09.068.2009

Traub, F., & Boynton-Jarrett, R. (2017). Modifiable resilience factors to childhood adversity for clinical pediatric practice. *Pediatrics*. https://doi.org/10.1542/peds.2016-2569

Walker, E. A., Unutzer, J., Rutter, C., Gelfand, A., Saunders, K., VonKorff, M., et al. (1999). Costs of health care use by women HMO members with a history of childhood abuse and neglect. *Archives of General Psychiatry, 56,* 609. https://doi.org/10.1001/archpsyc.56.7.609

Weersing, V. R., Brent, D. A., Rozenman, M. S., Gonzalez, A., Jeffreys, M., Dickerson, J. F., et al. (2017). Brief behavioral therapy for pediatric anxiety and depression in primary care: A randomized clinical trial. *JAMA Psychiatry, 74,* 571–578. https://doi.org/10.1001/jamapsychiatry.2017.0429

Werner-Seidler, A., Perry, Y., Calear, A. L., Newby, J. M., & Christensen, H. (2017). School-based depression and anxiety prevention programs for young people: A systematic review and meta-analysis. *Clinical Psychology Review, 51,* 30–47. https://doi.org/10.1016/j.cpr.2016.10.005

Zalta, A. K., & Shankman, S. A. (2016). Conducting psychopathology prevention research in the RDoC era. *Clinical Psychology, 23,* 94. https://doi.org/10.1111/cpsp.12144