



Adverse childhood experiences and coping strategies: identifying pathways to resiliency in adulthood

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ABSTRACT

Objective: The current study examined whether coping strategies mediate the link between adverse childhood experiences (ACEs) and adult psychiatric and physical health outcomes.

Methods: Data were drawn from wave I ($N = 7108$), wave II ($N = 4963$), and wave III ($N = 3294$) of the Midlife Development in the United States (MIDUS) Survey. An ACE count was created using seven aspects of early adversity based on prior literature. Coping variables were created using subscales of the COPE inventory. Psychiatric and health outcomes were assessed at baseline and at the 20-year follow-up. Bootstrapping mediation analyses were conducted using MPLUS to examine the link between ACEs and health outcomes and to determine if coping strategies mediate these relationships.

Results: Results of path analyses in Mplus showed that ACEs, reported at Wave I, were associated with worse psychiatric and physical health outcomes at Wave III. ACEs at Wave I were associated with greater use of avoidant emotion-focused coping and lower use of problem-focused strategies at Wave II. Avoidant emotion-focused coping at Wave II partially mediated the relationship between ACEs, reported at Wave I, and psychiatric and physical health outcomes reported at Wave III. No significant mediation was detected for problem-focused coping.

Conclusions: Coping strategies may be an important point target for prevention or intervention for individuals who have experienced ACEs.

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Adverse childhood experiences (ACEs) have emerged over the past two decades as an important developmental factor that negatively alters life course trajectories for a broad range of psychiatric and physical health outcomes (Evans & Kim, 2013; Felitti et al., 1998; Miller, Chen, & Parker, 2011; Taylor & Stanton, 2007). Beginning early in life, ACEs negatively affect the development of biological regulatory systems (e.g., HPA and inflammation; Danese & McEwen, 2012; Miller et al., 2011) and may increase a person's physiological and affective reactivity to stressors (Nusslock & Miller, 2016; Taylor, Karlamangla, Friedman, & Seeman, 2011). ACEs may also influence how people cope with stressful situations, and coping strategies could, in turn, heighten, prolong, or ameliorate the stress response. For example, engaging in strategies aimed at resolving a stressor could result in elimination of the stressor and thus a termination of the stress response. In contrast, focusing on affective response modulation, with little attempt at stressor resolution, could leave the stressor unresolved and thus perpetuate the stress response (Wadsworth, 2015). Research indicates that children living in stressful

family environments are more likely to employ avoidant emotion-focused strategies and are less likely to engage in problem-focused coping strategies (Evans & Kim, 2013). Thus, these individuals not only experience more stressors than those not exposed to ACEs, but may also develop less effective strategies to cope with stressors in adulthood. Combined, these factors may work in tandem to explain some of the physical and mental health disparities experienced by individuals with a history of ACEs. To this aim, the current investigation uses longitudinal data to examine whether coping strategies are one pathway through which ACEs are associated with mental and physical health outcomes across adulthood.

Defining ACEs

ACEs, which refer to stressful or traumatic experiences occurring during early life, have historically focused on the negative effects of childhood abuse (e.g., sexual, physical, emotional/verbal abuse and neglect; Helitzer, Graeber, LaNoue, & Newbill, 2015), but have grown to include additional measures of family dysfunction, such as parental psychopathology, parental divorce, substance misuse, parental loss, and low socioeconomic status (SES, Green et al., 2010). One reason for this more comprehensive assessment is that childhood sexual, physical, and verbal abuse tends not to occur in isolation, but often co-occurs with other ACEs (Dong et al., 2004). Thus, a summed ACE score may better represent the severity of an individual's overall exposure to early adversity. Indeed, substantial research has demonstrated a positive linear relationship between the number of ACEs and negative outcomes across multiple domains of health functioning (Gilbert et al., 2015; Widom, Czaja, Bentley, & Johnson, 2012). For the current study, a cumulative indicator of ACEs was derived based on previous literature, including studies that utilized the same data set (i.e., MIDUS data; see Friedman, Karlamangla, Gruenewald, Koretz, & Seeman, 2015).

ACEs and physical health

Summary ACE scores have been repeatedly associated with poorer health functioning across studies (e.g., Hughes et al., 2017; Sachs-Ericsson, Rushing, Stanley, & Sheffler, 2016; Wegman & Stetler, 2009). For example, Felitti et al. (1998) found that the number of different categories of ACEs was positively associated with a range of medical conditions, including ischemic heart disease, cancer, chronic lung disease, skeletal fractures, and liver disease. Similarly, Dong et al. (2004) used a cross-sectional design to examine the relation between ACEs and the risk of ischemic heart disease. They found that there was a 20% increase in ischemic heart disease for each additional ACE reported, although this increase was reduced to 10% after controlling for other traditional health and psychiatric risk factors. Moreover, research by Friedman et al. (2015) demonstrated that every three ACEs experienced is comparable to subtracting nine years of life. Thus, it appears that childhood adversity accumulates to influence the functioning of multiple systems, thereby broadly increasing the risk for physical health problems.

ACEs and psychiatric disorders

In addition to the damaging effect ACEs have on physical health, epidemiological studies have documented that ACEs substantially increase the risk for most psychiatric disorders (e.g., Edwards, Holden, Anda, & Felitti, 2003; Green et al., 2010). Afifi et al. (2008) estimated that the attributable fractions (i.e., the percentage of a disorder attributable to exposure to ACEs) for psychiatric disorders related to having experienced any single ACE (e.g., childhood physical or sexual abuse, domestic violence) ranged from 22% to 32% among women and 20% to 24% among men. These numbers would suggest that approximately one fifth of the risk for psychiatric disorders can be attributed to ACEs.

Of all psychiatric disorders, studies have shown a particularly strong link between ACEs (i.e., childhood abuse) and internalizing disorders (e.g., Lindert et al., 2014; Liu, Jager-Hyman, Wagner, Alloy, &

Gibb, 2012; Maniglio, 2013). For example, in a systematic meta-analysis, Li, D'Arcy, and Meng (2016) found the pooled odds ratio (OR) across studies for any type of maltreatment was 2.03 (95% confidence interval [CI] 1.37–3.01) for depression and 2.70 (95% CI 2.10–3.47) for anxiety. The authors concluded that a 10–25% reduction in maltreatment could potentially prevent 31.4–80.3 million depression and anxiety cases worldwide. Given the prevalence of these disorders and the debilitating effects they can have, the current study focuses on internalizing disorders, including major depressive disorder, generalized anxiety disorder, and panic disorder.

Early adversity and coping strategies

Researchers have identified several pathways linking ACEs with worse mental and physical health outcomes. For example, ACEs may lead to excessive threat vigilance, problematic social relationships, and mistrust, each of which contribute to the development of mental health problems (Miller et al., 2011; Nusslock & Miller, 2016). ACEs have also been implicated in the development of heightened pro-inflammatory responses and hormonal dysregulation, which can increase health problems in adulthood (Nusslock & Miller, 2016). Coping strategies are another mechanism through which ACEs may exert an effect on later life mental and physical health outcomes. Although definitions of coping vary across studies, it is most commonly viewed as a purposeful response to a stressful or challenging life event (for review, see Compas et al., 2017). Across the literature, several coping strategies have been identified and studied in relation to health outcomes, with some strategies conferring risk and others conferring resilience (for review, see Hager & Runtz, 2012; Penley, Tomaka, & Wiebe, 2002). Two strategies frequently examined in conjunction with ACEs are problem-focused (PF) and avoidant emotion-focused (AEF) coping. Whereas PF coping focuses on resolving the problem and building a sense of self-efficacy, AEF coping is characterized by strategies that serve to diminish one's negative affective in response to the stressor but do little to resolve the actual stressor (Lazarus & Folkman, 1984; Suls & Fletcher, 1985).

Research indicates that early life adversity is associated with less frequent use of PF coping (Gipple, Lee, & Puig, 2006) and greater use of AEF coping (Leitenberg, Gibson, & Novy, 2004; Shapiro & Levendosky, 1999). The rationale for this association is that maltreated children tend to perceive their environment as threatening and unpredictable, with little opportunity to effect change. Further, ACEs disrupt biological and psychological development of healthy emotion regulation processes (Nusslock & Miller, 2016). Thus, the focus is on modulating immediate affective response to stressors rather than resolving or reappraising the situation (Danese & McEwen, 2012). Although AEF strategies may be functional in childhood (Briere, 2002; Wadsworth, 2015), they may become less optimal when used in adulthood. For example, extreme emotional expression in childhood (e.g., temper tantrums) may be the primary pathway to obtain attention from disengaged parents, but in adulthood, excessive venting of negative emotions may drive others away without resolving the stressor. Further, individuals who have experienced ACEs are less likely to use PF strategies, such as acting on the environment or oneself (Lazarus, 1993). Although most children, regardless of ACE status, develop some PF strategies, those who experienced a higher level of ACEs more frequently use AEF strategies (Ullman, Peter-Hagene, & Relyea, 2014), and these strategies may become habitual.

Importantly, different coping styles are associated with different profiles of physiological and affective reactivity, which has implications for health outcomes later in life (O'Donnell, Badrick, Kumari, & Steptoe, 2008). Reviews of the literature demonstrate that PF coping is a particularly effective strategy for managing stress in adulthood and reducing risk of physical health problems (Aschbacher et al., 2005; Stowell, Kiecolt-Glaser, & Glaser, 2001; Taylor & Stanton, 2007). In contrast, AEF coping is associated with a broad range of negative physical and mental health outcomes (Taylor & Stanton, 2007). For example, maladaptive coping, including avoidance, is associated with greater levels of psychopathology, whereas adaptive approach-oriented strategies, including PF coping, is associated with lower levels of psychopathology (Compas et al., 2017; Taylor & Stanton,

2007). Moreover, the presence of maladaptive coping strategies appears to be more harmful than the absence of adaptive coping strategies (Aldao, Nolen-Hoeksema, & Schweizer, 2010).

In sum, ACEs may directly influence emotion regulation and the types of coping strategies people utilize, thereby leading to even greater physiological and emotional stress vulnerability. Although a small number of studies have examined coping as a mediator between ACEs and health outcomes, most are cross-sectional (Hager & Runtz, 2012) or focus on one age group (e.g., adolescents; Nurius, Fleming, & Brindle, 2019). The goal of the current study is to expand upon this literature by using longitudinal data to determine the extent to which PF and AEF coping mediate the relationship between a cumulative assessment of ACEs and later life mental and physical health outcomes. For psychiatric disorders and symptoms, we focused on internalizing disorders, including major depressive disorder (MDD), generalized anxiety disorders (GAD), and panic disorder (PD). For physical health outcomes, we focused on chronic health conditions (e.g., cardiovascular disorders, lung disorders, bone/joint disorders, etc.). We hypothesize that ACEs reported at baseline (Wave I) will be associated with mental and physical health outcomes 20 years later (Wave III), even after statistically adjusting for baseline mental and physical health. We also predict that coping strategies (assessed at Wave II) will mediate the relationship between Wave I ACEs and Wave III health outcomes. Specifically, we hypothesize that AEF coping will be related to increased psychiatric and physical problems, whereas PF coping will be associated with decreased psychiatric and physical problems.

Method

Participants

Data were drawn from Waves I through III of the Midlife Development in the United States (MIDUS) surveys. These data sets are publicly accessible through the Inter-university Consortium for Political and Social Research. Data collection for Wave I of MIDUS occurred between 1995 and 1996, with the goal of determining how social, psychological, and behavioral factors influence physical and mental health across adulthood. The first Wave included a sample of 7,108 individuals residing in the contiguous 48 states, aged 25–74 years of age. Participants were recruited through random digit dialing and completed a comprehensive telephone interview and mail survey.

Approximately 10 years later, between 2005 and 2006, 4,963 participants from the original sample completed Wave II of MIDUS. Wave III MIDUS data was collected between 2013 and 2014 from 3,294 of the original participants. The response rate at MIDUS III was 77% (adjusting for mortality). Both at Waves II and III, participants completed the same battery of questionnaires assessed at MIDUS I. The study was approved by the Institutional Review Board at all participating centers, and written informed consent was obtained from all participants.

At MIDUS I, the sample was 51.7% female, with an average age of 46.4 years ($SD = 13.00$). The racial composition of the sample was largely Caucasian (90.7%), with only 5.2% Black and/or African American, .6% Native American, .9%, Asian or Pacific Islander, 1.9% "other," and .7% multi-racial. Participants reported an average household total income of 71,701 dollars ($SD = 61,282$), and, on average, had completed some college education.

Attrition. Contrasting the demographics of the participants at Wave I to Wave III, participants who remained in the study reported higher incomes, higher education levels, and were more likely to be Caucasian (p 's < .05). Health status was especially important for the retention of older participants – healthier individuals were significantly more likely to remain in the study. Notably, ACEs and sex were not significantly associated with attrition in the current sample ($p > .05$).

Measures

Demographics. Covariates assessed at Wave I included sex (Male = 1, Female = 2), age, household income, race (White = 1, Other = 2), self-reported history of smoking, and alcohol or drug problems, as these variables are associated with adult health and psychiatric outcomes.

Adverse childhood experiences (ACEs). An ACE count was created using 7 dichotomous items derived from Wave I of MIDUS that assessed retrospective accounts of childhood adversity in different domains. Items included measures of (1) childhood financial status (i.e., family on welfare and/or family worse off than others); (2) parental education (i.e., less than 12 years); (3) parental divorce; (4) parental death; and (5) childhood emotional, (6) physical, and (7) sexual abuse. Responses to these items were dichotomized and coded such that each ACE was coded as either 0 (No) or 1 (Yes). Scores were then summed to capture the ACE score, with a possible range from 0 to 7. This approach to scoring ACEs is consistent with previous research (e.g., Friedman et al., 2015; Schafer, Ferraro, & Mustillo, 2011; Slopen et al., 2010).

Coping. To assess coping, participants were asked at Wave II to indicate “what you usually do when you experience a stressful event.” Each coping subscale from the COPE inventory, included four items rated on a 4-point scale (i.e., 1 = A lot, 4 = Not at all), modeled after previous research (Carver, Scheier, & Weintraub, 1989; Kling, Seltzer, & Ryff, 1997). The current study examined PF coping and AEF coping. PF coping was comprised of the sum of three subscales, “positive reinterpretation and growth,” “active coping,” and “planning.” For example, an item from “active coping” was, “I take additional action to try to get rid of the problem,” while an item from “planning” was, “I think hard about what steps to take,” and an item from “positive reinterpretation and growth” was “I try to grow as a person as a result of the experience.” Items were reverse coded so that higher scores represent higher levels of PF coping ($\alpha = 0.90$).

AEF coping comprised four items from the following three subscales: “focus on venting of emotion,” “denial,” and “behavioral disengagement” (Carver et al., 1989). For example, an item from “behavioral disengagement” was, “I give up trying to reach my goal,” an item from “venting of emotion” was “I feel a lot of emotional distress and find myself expressing those feelings a lot,” and an item from denial was “I pretend that it hasn’t really happened.” Again, items were coded so that higher scores represent higher levels of AEF coping ($\alpha = 0.83$).

Health conditions. There were 29 different chronic health conditions assessed at MIDUS I (Marmot, Ryff, Bumpass, Shipley, & Marks, 1997) and 39 conditions assessed at MIDUS III. Only those conditions assessed at both time points were included in analyses. At both Waves, participants were asked, “In the past twelve months, have you experienced or been treated for any of the following?” Following this question, a list of conditions was presented to the participants (at MIDUS III), which included: (1) autoimmune disorders, (2) bone-related conditions (arthritis, rheumatism or other bone/joint diseases; sciatica, lumbago or recurring backache), (3) cancer, (4) chronic sleeping problems, (5) diabetes/high blood sugar, (6) digestive conditions (recurring stomach trouble, indigestion, or diarrhea; constipated all/most of time; ulcer; piles/hemorrhoids), (7) foot problems, (8) gallbladder problems, (9) hay fever, (10) heart trouble (suspected or confirmed by doctor), (11) high blood pressure/hypertension, (12) lung conditions (asthma, bronchitis, emphysema; other lung problems; tuberculosis), (13) migraine headaches, (14) neurological conditions, (15) skin trouble, (16) stroke, (17) thyroid disease, (18) trouble with gums, mouth, or teeth, (19) urinary/bladder problems, (20) mood disorders, and (21) substance use disorders. To prevent similar conditions from being counted multiple times, physical conditions were reduced to 21 categories (see Piazza, Charles, Sliwinski, Mogle, & Almeida, 2013). Mood disorders and substance use disorders were removed from these categories, as we separately examined variables representing psychiatric health. Thus, the 21 categories developed by Piazza et al. (2013) were reduced to 19 categories.

“Yes” responses for each chronic condition category were summed for each Wave of data collection. The summed score of conditions from Wave I was used as a covariate, while the Wave III sum score served as our dependent variable. Due to outliers in the summed variables, the dependent variable and baseline health covariates were winsorized so that individuals reporting eight or more conditions were grouped together.

Psychiatric diagnoses and psychiatric symptoms. Two outcome variables related to psychiatric outcomes were derived. First, we determined the presence or absence of any psychiatric disorder (e.g.,

MDD, GAD or PD). Second, we derived a variable representing the sum of psychiatric symptoms endorsed.

Information on participants' symptoms of major depressive disorder (MDD), generalized anxiety disorder (GAD), and panic disorder (PD) were collected at Waves I and III using the Composite International Diagnostic Interview Short Form (CIDI-SF; Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998). This is a self-report measure based on symptoms from the revised third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R; American Psychiatric Association, 1987). Symptoms were labeled "Yes" if the participant reported experiencing symptoms for a minimum of two weeks. We examined both the continuous severity of symptoms based on the DSM criteria, as well as the presence of a potentially diagnosable disorder (i.e., MDD, GAD, or PD). The psychiatric symptom variable was included to ensure that our assessment of psychiatric functioning at follow-up was sensitive to smaller changes in functioning that may not be accounted for by a dichotomous diagnosis. Note that these psychiatric measures were obtained at baseline for use as covariates and reassessed at follow-up for use as the dependent variables. Specifically, a summed score of total symptoms was created for MIDUS I and MIDUS III, with a range of 0–23 symptoms reported at baseline and 0–22 symptoms at MIDUS III. Psychiatric symptom variables at both time points were winsorized at eight to reduce outliers.

We were also interested in whether participants met the criteria for any one of the three disorders (i.e., MDD, GAD, PD) within the past 12 months (1, Yes) or (0, No). These dichotomous variables were summed for MIDUS I (i.e., covariate) and MIDUS III (i.e., outcome) to create a variable ranging from zero to three. At baseline, 15.7% of the sample qualified for a disorder, while 11.7% of the sample qualified at MIDUS III.

Statistical analyses

Path analyses were estimated using Mplus 8.0 with bootstrapping to correct for standard errors and full-information maximum likelihood (FIML) estimation to handle missing data where possible (Muthén & Muthén, 1998–2017). FIML uses all available data for a person *i* to compute the likelihood of an observed data point. The values with the largest likelihoods are used in computing the regression models in Mplus under FIML (Enders & Bandalos, 2001). Mplus drops participants from analyses when they were missing data on covariates or missing on all variables except covariates, resulting in different sample sizes depending on participant deletion (see Table 1 for sample sizes in each analysis). We included age, sex, total household income, smoking, alcohol and drug problems, and race as covariates, which were regressed on to the dependent and mediator variables. Having established temporal precedence of our variables of interest, we tested three separate mediation models: (1) The direct and indirect associations between ACEs and health conditions (coded 0–8) through the mediators of PF and AEF coping, (2) the direct and indirect effects of ACEs on psychiatric symptoms (coded 0–8) through the mediators of PF and AEF coping, and (3) the direct and indirect effects of ACEs on the presence of a psychiatric disorder (coded 0–3) at MIDUS III through the mediators of PF and AEF coping.

Results

ACEs and physical health

Consistent with our predictions, ACEs were significantly associated with more health problems at follow-up (standardized $\beta = .054$, $p = .002$). ACEs were also significantly associated with higher levels of AEF ($\beta = .048$, $p = .007$) and lower levels of PF coping ($\beta = -.051$, $p = .003$). Age, sex, self-reported smoking, and baseline health conditions were also each significantly associated with number of physical health conditions at MIDUS III; race, self-reported alcohol and drug problems, and income were not independently predictive of health outcomes. The full model accounted for 32.4% of the variance in later health outcomes. See Table 1 for path estimates.

Table 1. Multiple mediation model results.

Outcome variable	Exogenous variables	Direct effects (SE)	Total indirect effects (SE)	Total effects	R ²
Physical Health 3 (<i>n</i> = 3869)					
	AEF Coping	.068 (.020)**		.078	32.40%
	PF Coping	-.037 (.018)*		.003	9.00%
	ACEs	.054 (.018)**	.005 (.002)**	.059	3.00%
	Health 1	.465 (.018)***	.011 (.003)***	.476	
	Sex	.054 (.018)**	.011 (.004)**	.065	
	Age	.181 (.018)***	-.003 (.002)	.178	
	Income	-.016 (.017)	-.011 (.003)***	-.027	
	Smoking	-.055 (.018)**	-.005 (.002)*	-.060	
	Alcohol/Drugs	.029 (.018)	-.003 (.002)	.026	
	Race	.013 (.017)	.000 (.002)	.013	
Psych Diagnosis 3 (<i>n</i> = 4053)					
	AEF Coping	.110 (.034)***		.110	18.60%
	PF Coping	.008 (.028)		.008	9.90%
	ACEs	.088 (.030)**	.005 (.003)	.093	3.00%
	Psych Diagnosis 1	.272 (.053)***	.016 (.005)**	.288	
	Sex	.130 (.035)***	.022 (.007)**	.152	
	Age	-.152 (.040)***	.004 (.003)	-.148	
	Income	-.061 (.047)	-.012 (.022)	-.073	
	Smoking	-.077 (.029)**	-.005 (.002)*	-.082	
	Alcohol/Drugs	-.036 (.023)	-.005 (.003)	-.041	
	Race	.023 (.025)	.005 (.003)	.028	
Psych Symptoms 3 (<i>n</i> = 4053)					
	AEF Coping	.078 (.025)**		.078	16.90%
	PF Coping	.000 (.021)		.000	10.40%
	ACEs	.039 (.019)*	.004 (.002)	.043	3.10%
	Psych Symptoms 1	.333 (.035)***	.013 (.004)**	.346	
	Sex	.065 (.017)***	.015 (.005)**	.080	
	Age	-.078 (.015)***	.003 (.002)	-.075	
	Income	-.046 (.015)**	-.009 (.004)*	-.054	
	Smoking	-.050 (.017)**	-.004 (.002)*	-.054	
	Alcohol/Drugs	-.029 (.026)	-.003 (.002)	-.032	
	Race	.020 (.019)	.003 (.003)	.023	

Note. *** = $p < .001$; ** = $p < .01$; * = $p < .05$. Values reported are standardized betas and their standard errors. *P*-values reported are based on the unstandardized parameters.

AEF coping partially mediated the relation between ACEs and health ($\beta = .003$, $p = .036$, 95% CI = .001–.010). ACEs were associated with greater use of AEF coping ($\beta = .048$, $p = .002$), and greater use of AEF coping was associated with more chronic health conditions ($\beta = .068$, $p = .001$). Although increased ACEs were associated with less use of PF coping ($\beta = -.051$, $p = .003$), and less PF coping was associated with more chronic health conditions ($\beta = -.037$, $p = .047$), the specific indirect path from ACEs to health conditions through PF coping was not significant ($\beta = .002$, $p = .105$, 95% CI = .000–.005) Table 2.

Notably, these effects remained even when accounting for the shared variance between these two forms of coping in the same model, suggesting that each exerts independent indirect effects on later health. See Table 1 for full multiple mediation regression results.

ACEs, psychiatric symptoms and disorders

Consistent with our hypotheses, ACEs were directly associated with increased psychiatric symptoms ($\beta = .039$, $p = .039$) and the presence of a psychiatric disorder at MIDUS III ($\beta = .088$, $p = .002$), even after accounting for baseline symptoms and disorders, as well as age, sex and income. The two models accounted for 16.9% and 18.6% of the variance in psychiatric symptoms and presence of a disorder, respectively.

There was a significant, specific indirect effect of ACEs on psychiatric symptoms through AEF coping ($\beta = .004$, $p = .044$, 95% CI = .002–.013). ACEs were associated with more frequent use of

Table 2. Means, standard deviations, and correlation matrix.

	Mean (SD)	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	46.38 (13)	1													
2. Race	1.09 (0.29)	-.096**	1												
3. Sex	1.52 (0.5)	.018	.030*	1											
4. Income	888.19 (751.64)	-.203**	-.085**	-.122**	1										
5. Smoking	1.48 (0.51)	-.093**	.050**	.088**	.085**	1									
6. Alcohol/Drug Usage	1.97 (0.16)	.046**	-.002	.070**	.038**	.096**	1								
7. Emotion Focused Coping	22.45 (5.64)	.037*	.062**	.205**	-.165**	-.063**	-.072**	1							
8. Problem Focused Coping	37.88 (6.12)	.039*	.062**	.037*	.092**	.053**	.042**	-.239**	1						
9. Health Wave 1	2.33 (2.22)	.187**	.007	.129**	-.159**	-.125**	-.184**	.184**	-.078**	1					
10. Health Wave 3	3.01 (2.2)	.299**	.024	.132**	-.150**	-.110**	-.072**	.188**	-.073**	.505**	1				
11. Psychiatric Diagnosis Wave 1	0.24 (0.54)	-.106**	.009	.106**	-.063**	-.109**	-.095**	.179**	-.086**	.302**	.171**	1			
12. Psychiatric Diagnosis Wave 3	0.17 (0.47)	-.121**	.024	.119**	-.083**	-.076**	-.079**	.164**	-.049**	.233**	.214**	.365**	1		
13. Psychiatric Symptoms Wave 1	1.31 (2.94)	-.111**	.018	.110**	-.065**	-.113**	-.099**	.195**	-.094**	.315**	.175**	.954**	.378**	1	
14. Psychiatric Symptoms Wave 3	1.01 (2.63)	-.123**	.028	.121**	-.087**	-.082**	-.078**	.172**	-.053**	.245**	.231**	.373**	.950**	.393**	1

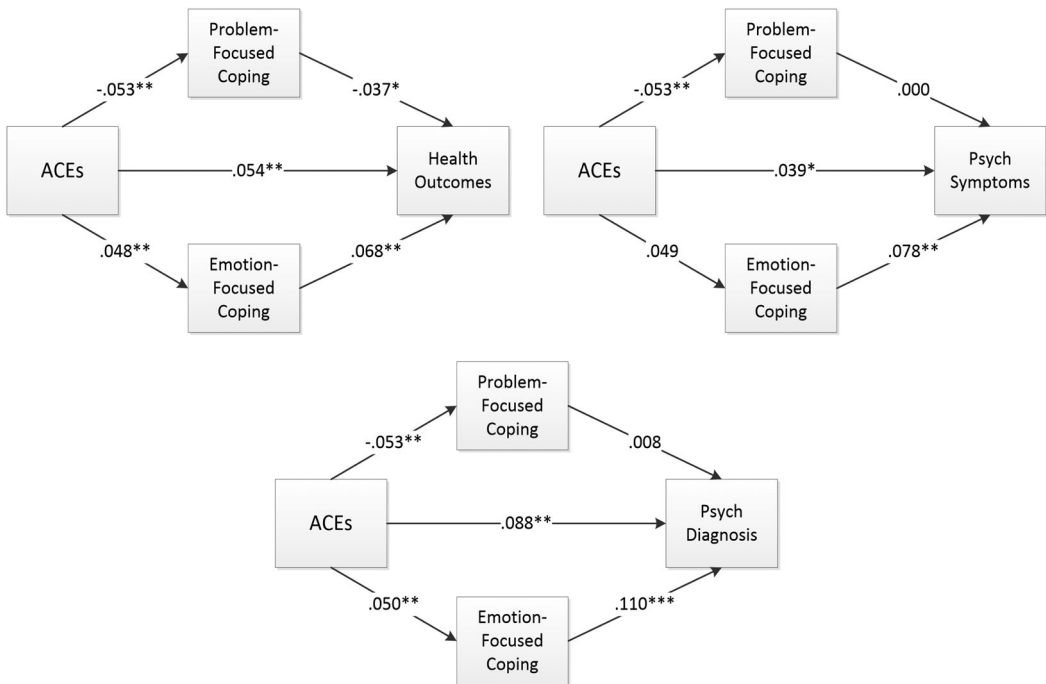


Figure 1. Mediation models. Note. *** = $p < .001$; ** = $p < .01$; * = $p < .05$. Covariates were modeled but not included for figure brevity.

AEF coping ($\beta = .049$, $p = .005$), which in turn was associated with increased psychiatric symptoms at MIDUS III ($\beta = .078$, $p = .002$). In contrast, PF coping did not significantly mediate the relationship between ACEs and later psychiatric symptoms ($p = .990$); therefore, the total indirect effect of ACEs was not significant ($p = .076$).

Lastly, we examined this same multiple mediation model to predict the presence of a psychiatric disorder diagnosis (i.e., MDD, GAD, or PD) at follow-up on a zero to three scale, after statistically adjusting for baseline psychiatric disorder diagnosis. Whereas AEF coping was associated with a psychiatric disorder at MIDUS III ($\beta = .110$, $p < .001$), PF did not predict psychiatric disorders ($\beta = .008$, $p = .792$). Moreover, AEF coping partially mediated the relationship between ACEs and the presence of a MIDUS III psychiatric disorder ($\beta = .006$, $p = .030$, 95% CI = .001–.008). PF coping did not mediate the relation between ACEs and the presence of a MIDUS III psychiatric disorder ($p = .805$), resulting in a non-significant total indirect effect ($p = .081$). Again, these effects remained even when accounting for the shared variance between these two forms of coping in the same model. See Figure 1 for a depiction of all mediation models.

Discussion

There is strong evidence that ACEs are associated with greater risk for the development of health conditions (Felitti et al., 1998; Miller et al., 2011), as well as psychiatric problems in adulthood (Edwards et al., 2003; Green et al., 2010). The current study reveals that coping styles may be one important and modifiable pathway between early adverse experiences and the development of later life health and psychiatric problems.

Consistent with our first hypothesis, a cumulative measure of ACEs (i.e., childhood financial status, parental education, parental divorce, parental death, and childhood abuse experiences) was associated with more chronic health conditions at the 20-year follow-up. Results also revealed that AEF

coping contributed to the deleterious pathway between ACEs and physical health problems in adulthood. Specifically, ACEs were associated with greater AEF coping and, in turn, AEF coping was associated with more health problems. Further, as predicted, more ACEs were associated with less PF coping, and less PF coping was associated with more health problems. PF coping, however, did not act as a significant pathway between ACEs and later health. Thus, our findings revealed that, although PF coping is associated with better health, an AEF coping style may be an especially important pathway from ACEs to physical health problems across adulthood. These findings are consistent with previous research demonstrating that AEF types of coping are associated with poorer health and higher mortality (Aldwin & Park, 2004). Further, a cross-sectional study found that AEF coping partially mediates the relationship between childhood maltreatment and physical health concerns, while PF coping does not (Hager & Runtz, 2012).

We also found a direct association between ACEs and increased psychiatric symptoms and disorders at the 20-year follow-up (MIDUS III). As predicted, in the mediation model, ACEs were associated with increased psychiatric symptoms indirectly through AEF coping strategies. Specifically, ACEs were associated with greater use of AEF coping strategies, and these strategies were in turn associated with greater risk for a psychiatric diagnosis at follow-up. Notably, however, PF coping did not mediate the relationship between ACEs and later psychiatric health. These findings are consistent with Taylor and Stanton's (2007) review suggesting that the damaging effects of AEF coping may outweigh the benefits of PF coping.

Coping and health outcomes: The mechanisms. Theoretical models proposed by Nusslock and Miller (2016) as well as Danese and McEwen (2012) incorporate the biological and psychosocial changes that result from ACEs into predictors of numerous negative outcomes in adulthood (e.g., health conditions, substance abuse, psychological conditions). These biopsychosocial models suggest that AEF coping strategies, in particular, work in parallel and interactively with other biological (e.g., impaired immune functioning) and psychosocial (e.g., problematic health behaviors) pathways to influence disease in adulthood. One explanation for this is that ACEs may sensitize brain areas involved in the stress response, inhibitory control, and reward responses (Nusslock & Miller, 2016). These neurobiological and psychological changes, in turn, can influence cognitive appraisals of threat as well as coping response enacted in response to the perceived threat. Thus, individuals exposed to ACEs are not only more likely to experience a situation as stressful compared to others, but also may be more likely to develop and enact less effective coping styles. Combined, these complex biopsychosocial processes lead the individual to experience more stressors, react more intensely to stressors, and cope less effectively with such stressors.

Notably, AEF coping mechanisms acted only as partial mediators in the relationship between ACEs and later physical health conditions, and the effect was small. This finding indicates that, while coping may be an important mechanism linking ACEs with health, it appears to be only one piece of a complex puzzle.

Is avoidant coping always negative?

Research has repeatedly demonstrated that children who develop more PF coping skills benefit from positive health outcomes, including slower progression of illness (Temoshok, Wald, Synowski, & Garzino-Demo, 2008), fewer physical symptoms (Newth & DeLongis, 2004), and better survival rates from cancer (Petticrew, Bell, & Hunter, 2002). While a focus on specific coping skills can be useful for intervention purposes, it is important to remember that most individuals employ a wide range of coping skills across different stressful experiences, and these different strategies may be adaptive for different situations (e.g., coping flexibility). For example, a person may initially avoid thinking about a stressor if they are in a situation where they cannot address it, then problem-solve later when feasible. Thus, some individuals may use both PF and AEF coping strategies and may be skillful in matching the appropriate coping strategies to the stressor. This type of coping flexibility may be most beneficial for the quality of life (Leonidou, Panayiotou, Bati, & Karekla, 2019).

Effectiveness of coping methods may also depend on the nature of a stressor (Coyne & Racioppo, 2000). For example, it is likely not feasible to use only PF coping to manage the difficult emotions surrounding the loss of a loved one. Yet, in this same regard, some coping strategies for grief are more effective than others. In one study, for example, individuals using AEF coping were more likely to develop PTSD and complicated grief following a traumatic loss (Schneider, Elhai, & Gray, 2007). This same study, however, noted that there were high inter-correlations across coping types, indicating that most participants employed multiple forms of coping. Thus, even individuals who did not develop PTSD or complicated grief likely appear to have used both PF and AEF strategies. For these scenarios, it may be essential to use PF strategies to process, reframe, and reinterpret the meaning of a loss during personal time, while occasionally enacting AEF strategies to remain focused in a work setting. Thus, strategic use of both types of strategies may be most effective.

In light of our findings and the extensive coping literature, however, it is necessary to consider that individuals who habitually use more AEF coping are at an elevated risk for health and psychiatric problems. Further, while PF coping is associated with fewer ACEs and better health outcomes, it does not appear to act as an independent pathway between ACEs and health or psychiatric outcomes after accounting for AEF coping. These findings are consistent with research indicating that the reduction of maladaptive coping is at least as important as focusing on increasing PF coping in intervention work (Frydenberg & Lewis, 2002). The negative effect of avoidant coping is especially well-documented in anxiety research, which demonstrates that avoidant and emotion-focused coping are closely related to anxiety disorders (Mennin, McLaughlin, & Flanagan, 2009; Panayiotou, Karekla, & Leonidou, 2017). Further, cognitive-behavioral interventions designed to reduce avoidance are considered the most effective interventions for a range of anxiety and mood disorders (Kendall et al., 2005; McNally, 2007). Our findings are consistent with this research and further demonstrate that these effects may generalize to physical health conditions.

Limitations

Although the current study has several strengths, it also has some limitations. First, the sample was largely Caucasian, with higher than average levels of education and income. Second, there was selective attrition. Similar to previous studies (Mein et al., 2012), the greatest attrition in the current study was found among minorities, individuals with lower SES, and those with more health problems. The loss of the highest risk individuals may have impacted our ability to detect subtler effects and may have reduced the effect sizes and generalizability of our findings.

It is unclear whether more socio-economically disadvantaged people are differently affected by coping strategies. Disadvantaged individuals may have fewer financial resources that in turn affect coping resources (see Gallo, Bogart, Vranceanu, & Matthews, 2005; Taylor & Seeman, 1999), and thus our findings may primarily reflect the outcomes of individuals with greater coping resources. Since individuals from minority and low SES backgrounds are more likely to experience higher rates of ACEs (Cronholm et al., 2015; Taylor & Stanton, 2007), the demographics of our sample may have also reduced our ability to robustly detect the effects of ACEs. Further, there are additional lifestyle factors associated with our outcomes, such as access to and quality of healthcare, which were not included in our models. Many of these lifestyle factors may be influenced by ACEs, and may act as separate pathways of interest.

Another consideration is the retrospective account of early adversity, which may lead to recall bias. Previous research has demonstrated that retrospective reports of ACEs may result in under-reporting (Hardt & Rutter, 2004), while false positives are very rare (e.g., reporting abuse that did not happen). Finally, the use of summed health conditions as a measure of health functioning may not adequately represent overall health functioning, as severity of conditions can vary substantially. Future work should assess severity of health conditions to better measure the overall impact of ACEs on health.

Future directions

Despite the aforementioned limitations, our findings reveal the importance of coping as a link between ACEs and health and psychiatric problems across a 20-year span. Coping strategies are learnable skills (Frydenberg, 2004), and the current study indicates that measurement of these strategies in intervention research may provide important information about the active components of many existing treatments for psychiatric disorders. Further, interventions with a focus on reducing AEF coping may provide an effective pathway to reduce the risk for adult health problems in adults exposed to ACEs.

Researchers have begun to focus on coping in health interventions. For example, in their systematic review of the literature examining coping styles and heart failure outcomes, Graven et al. (2013) found evidence suggesting that PF coping protects against negative heart outcomes, although they additionally noted that more experimental studies are needed. Similarly, coping skills programs (e.g., Best of Coping Program) developed for adolescent populations to increase resilience to stress has shown that relatively brief (12-week) coping interventions reduce the impact of certain health conditions (Frydenberg, 2004).

Regarding psychiatric interventions with strong empirical support, cognitive behavioral therapy and dialectical behavior therapy are both widely used interventions designed to promote the development of healthy coping skills. However, few empirically supported treatments emphasize the importance of measuring changes in AEF and PF coping strategies in response to treatment. The findings from the current study suggest that greater gains in treatment might be obtained by specifically targeting a reduction in AEF strategies as a mechanism of change, especially for individuals who report significant early adversity. It is possible that the most effective interventions would provide guidance on identifying situations most suitable for use of PF strategies, while simultaneously providing psychoeducation of the consequences of habitual use of AEF strategies.

Future research should consider findings from the current study to examine coping interventions for health problems in higher risk populations. First, however, it will be necessary to examine whether these mediation effects are reflected at each stage of the life course, as some research demonstrates that coping processes may change in older age (Charles, 2010), speaking to the importance of specializing interventions at different life stages. Second, the biological mechanisms through which these processes occur should be carefully examined, as these may provide conjunctive pharmacological treatments. Finally, early intervention and prevention programs for ACEs should be further assessed using translational, implementation research. While early intervention programs are inherently difficult to implement (Saxe, Ellis, Fogler, Hansen, & Sorkin, 2005), some programs show promise (Bethell, Gombojav, Solloway, & Wissow, 2016).

Conclusions

Research consistently demonstrates that ACEs have long-term deleterious effects on health and psychological functioning. Results from the current study augment the literature by identifying that a reduction of AEF coping is a potential point of intervention to thwart the trajectory from ACEs to adult health conditions and psychiatric disorders. The finding that AEF coping partially mediated the pathway between ACEs and health conditions is encouraging from public health prevention and clinical intervention perspective, as coping skills are amenable to change. By decreasing AEF coping it may be possible to reduce the recurrence and new onset of physical health conditions and psychiatric disorders over time.

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