



# Character Strengths as Moderators of the Relationship Between Adverse Childhood Experiences and Negative Health Outcomes

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Accepted: 24 March 2023

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## Abstract

Adverse childhood experiences (ACEs) refer to negative events of childhood. Research has demonstrated relationships between ACEs and adult mental and physical difficulties. Fewer studies have examined potential moderators of these relationships. This study assessed the role of character strengths in the relationship between ACEs and negative physical and mental health outcomes in adulthood. An online sample of 1,491 adults completed questionnaires measuring character strengths, exposure to ACEs, and aspects of physical/mental health. Results replicated previous findings that ACEs and character strengths are each meaningfully related to health outcomes. Gratitude and self-regulation were generally indicative of better health outcomes, kindness and appreciation of beauty of poorer outcomes. Character strengths remained meaningful correlates of adult behavioral and emotional health even when controlling for ACEs. Character strengths did not moderate the relationship between ACEs and health, suggesting that character strengths do not mitigate the effects of ACEs, but do make an independent contribution to physical and mental health.

**Keywords** Character strengths · Adverse childhood experiences · Negative health outcomes · Mental health

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## 1 Character Strengths as Moderators of the Relationship Between Adverse Childhood Experiences and Negative Health Outcomes

Adverse childhood experiences (ACEs) is a term commonly used to refer to a range of negative experiences of childhood that research has suggested have important implications for functioning into adulthood (Felitti et al., 1998). Though researchers have varied in the number and set of childhood events they survey, perhaps the most common formulation focuses on nine types of adverse experiences (Ford et al., 2014): household mental illness, household alcohol abuse, household substance abuse, incarceration of a family member, parental separation or divorce, household physical violence, physical abuse, emotional abuse, and sexual abuse.

ACEs are thought to have deleterious impacts on health and well-being in adulthood. The inaugural investigation into ACEs was published by Felitti et al. in 1998. In their sample, almost two thirds of participants reported at least one of seven ACEs. The study also found that those who experienced four or more ACEs were more likely to report ten indicators of or risk factors for poor health in adulthood. These included physical inactivity, a history of active suicidality, infection with a sexually transmitted disease and high lifetime number of sexual partners, alcoholism, drug abuse, smoking, severe obesity, and depressed mood. Research on ACEs consistently suggests that the larger the number of ACEs reported, the more likely an individual is to experience negative mental and physical health outcomes later in life (Liming & Grube, 2018; Merrick et al., 2018).

ACEs have been measured using a variety of instruments and scoring strategies (Ford et al., 2014; Teicher & Parigger, 2015). One of the most inconsistent aspects of these studies has been the number of ACEs examined and their scoring. As noted above, the original ACEs study considered seven categories (Felitti et al., 1998), but even the research team involved in that original study changed their set of ACEs in subsequent studies. Anda et al. (1999) added parental separation or divorce as an eighth ACE. They also replaced emotional abuse from the 1998 study with verbal abuse, without explanation. They continued the practice of coding ACEs as present or absent (Anda et al., 2002), so that variability was based exclusively on the number of ACEs experienced. This measurement model has been criticized for ignoring the severity or frequency of adverse events (Teicher & Parigger, 2015).

Currently, a number of ACEs measures are available. Bethell et al. (2017) identified 14 measures just for use with children and families. Newer measures have been developed with the intention of addressing several problems with the original instrument. Teicher and Parigger (2015) argued that a comprehensive assessment of maltreatment would require gathering temporal information. They also argued that several of the original items could reflect a single childhood experience. For example, the items concerning the presence of family members in the household with substance abuse issues, chronic mental illness, or criminal behaviors leading to incarceration could represent overlapping events rather than discrete experiences. These sorts of concerns have resulted in very different measures of ACEs.

Despite these variations, subsequent research has consistently replicated the finding that individuals who experienced more ACEs as a child were more likely to report negative mental and physical health outcomes later in life (Dube et al., 2003;

Liming & Grube, 2018; Merrick et al., 2018), with several reviews of the literature appearing in recent years. A meta-analysis by Hughes et al. (2017) established relationships between number of ACEs and various risk factors for poor health outcomes in adults such as substance use and abuse, violence, and poor sexual health. Another meta-analysis published in 2019 also assessed health outcomes associated with ACEs (Petruccelli et al., 2019), and found that odds ratios for psychosocial and behavioral outcomes were higher than those for medical outcomes. Jakubowski et al. (2018) focused on studies that indicated a significant relationship between cumulative number of childhood ACEs and adult cardiometabolic disease. Varese et al. (2012) conducted a meta-analysis that found a significant association between ACEs and psychosis.

The relationship between ACEs and adult outcomes is often thought to be mediated by the experience of stress. Allostasis refers to the active processes by which the human body responds to daily stressors with the goal of maintaining stability or homeostasis. This process is carried out through broad shifts in hormonal, behavioral, and autonomic pathways to match a perceived or anticipated challenge. Stress causes a cascade of neurological, adrenal, and physiological activity (Selye, 1936; McEwen, 2006). Repeated stressors challenge these homeostatic systems, resulting in what has been called allostatic load, with more extreme variants referred to as allostatic overload (McEwen, 2004). Allostatic overload has been linked to various psychological conditions, including posttraumatic stress disorder and borderline personality disorder, as well as physical health problems such as hypertension and metabolic syndromes (Dwyer & Ross, 2017; McEwen, 2006; Shonkoff et al., 2012; Thompson et al., 2014).

Variables related to emotional functioning and personality characteristics have also been identified as possible mediators of the relationship between ACEs and health outcomes. A study by Perez et al. (2016) found the relationship of ACE scores to suicide attempts was partially mediated by maladaptive personality traits such as aggression and impulsivity. A systematic review of ACEs, family functioning, and mental health problems among children and adolescents found that family functioning mediated the relationship between specific ACEs and child and adolescent mental health problems (Scully et al., 2019).

There is also evidence to suggest that positive psychological or emotional factors may moderate the relationship between ACEs and health outcomes. Logan-Greene et al. (2017) found that social support significantly attenuated the relationship between child maltreatment and mental health problems, including suicidal ideation. These authors also found that positive aspirations for the future were inversely related to mental health issues for those who had experienced ACEs. Nurius et al. (2012) found that socioemotional support moderated the effects of ACEs on adult mental health, while individuals without protective resources such as socioemotional support may be at a disproportionately higher risk for the impact of ACEs.

These studies suggest there is promising evidence that moderators exist capable of weakening or protecting against the effects of ACEs on adult functioning. The present study explored the effect of a large set of potential moderators, called character strengths, that has emerged out of the field of positive psychology. Character strengths are defined as socially valued personality traits that characterize positive

functioning because they contribute both to personal benefit and to the benefit of those around the individual. The VIA Classification of Strengths and Virtues consists of 24 character strengths that are thought to encompass the positive and socially valued functioning of an individual (see Table 1; Peterson & Seligman, 2004).

Character strengths have been studied extensively, but never tested as a potential moderator of the relationship between ACEs and health outcomes. Perhaps the most directly relevant research on this topic is that by Martinez-Marti and Ruch (2016), who examined character strengths as predictors of resilience. These authors found that character strengths were associated with resilience over and above other positive factors that were measured, including positive affect, self-efficacy, optimism, social support, self-esteem, and life satisfaction, as well as sociodemographic variables. In their study, the strengths zest, hope, and bravery demonstrated especially strong relationships with resilience. This finding is particularly intriguing in terms of its implications for ACEs given that resilience has been established as a distinct contributor to psychological flourishing in the face of adversity (Munoz et al., 2020).

Character strengths have also been studied as predictors of posttraumatic growth and positive mood states. Peterson et al. (2008) found that the report of at least one potentially traumatic event in the past was associated with higher scores on character strengths. Interventions using character strengths have been studied in a variety of clinical populations, including individuals suffering from anxiety, depression, alcohol dependence, and schizophrenia (Ahmed & Boisvert, 2006; Akhtar & Boniwell, 2010; Fava & Ruini, 2003; Meyer et al., 2012). These studies have consistently found

**Table 1** List of Character Strengths.

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Appreciation of Beauty & Excellence
Bravery/Courage
Creativity
Curiosity
Fairness
Forgiveness/Mercy
Gratitude
Honesty
Hope
Modesty/Humility
Humor
Judgment/Critical Thinking
Kindness
Leadership
Love of Learning
Love
Perseverance
Perspective/Wisdom
Prudence
Self-Regulation
Social Intelligence
Spirituality
Teamwork
Zest

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that character strength interventions enhance positive functioning and reduce negative affective states such as depression.

Given the high prevalence of ACEs in the general population, the well-established negative impact of ACEs on both physical and mental health in adulthood, and the relatively small amount of existing research examining potential moderators of this relationship, the present study was conducted to evaluate the 24 character strengths comprising the VIA Classification of Strengths and Virtues as moderators of the relationship between ACEs and negative health outcomes. Based on the rationale that character strengths may represent methods of achieving resilience, the research questions investigated in this study were as follows. The first two represent replications of questions addressed in prior research on ACEs and health outcomes, as well as character strengths and their relationship to health.

1. Are the number of ACEs a person experiences positively correlated with the presence of a variety of negative physical health outcomes?
2. Are character strengths negatively correlated with these negative physical health outcomes?
3. Do character strengths moderate the relationship between ACEs and negative health outcomes. That is, is the association between ACEs and negative health outcomes weakened as self-reported character strengths increase?

## 2 Method

### 2.1 Participants

The current study was approved by the Fairleigh Dickinson University Institutional Review Board. The sample consisted of individuals who approached the website of the VIA Institute on Character (<https://viacharacter.org>) in March 2020 to complete a measure of the 24 character strengths in return for immediate feedback on their results. Upon completing this measure and receiving their feedback, adults who had completed the English language version of the instrument were asked if they would be willing to complete supplemental questionnaires as part of a research study examining the relationship between character strengths and childhood experiences. A total of 1,982 individuals responded. Of those, 261 did not consent to the study. Individuals who did not complete at least eight of the 11 ACEs items and at least one of the outcome measures were also eliminated, resulting in a final sample consisting of 1,491 individuals. Participants were mostly female (233 males [15.6%], 1,247 females [83.7%]), with an average age of 41.3 years ( $SD=14.3$ ; range 18–87). Most of the participants were White (81.7%) and highly educated (69.0% reported attending graduate school). Full demographic information can be found in Table 2.

### 2.2 Measures

**Adverse Childhood Experiences Module** The Behavioral Risk Factor Surveillance System (BRFSS) ACEs module (Metzler, 2017) is a self-report, 11-item measure that

**Table 2** Demographic Statistics.

	<i>n</i>	%	<i>M (SD)</i>
<b>Gender</b>			
Male	233	15.6	
Female	1247	83.7	
Other	9	0.6	
<b>Marital Status</b>			
Married	677	45.4	
Widowed	27	1.8	
Divorced	163	10.9	
Separated	31	2.1	
Single	592	39.7	
<b>Ethnicity</b>			
White	1208	81.7	
Black/African American	22	1.5	
Asian/Asian Indian	87	5.9	
American Indian	6	0.4	
Mixed	82	5.5	
Other	43	2.9	
<b>Hispanic</b>			
Hispanic	130	8.8	
Non-Hispanic	1354	91.2	
<b>Location</b>			
United States	1112	75.6	
Australia	42	2.9	
New Zealand	13	0.9	
United Kingdom	52	3.5	
Eurozone	77	5.2	
Singapore	9	0.6	
<b>Age</b>			41.26 (14.3)
<b>Income in U.S. Dollars</b>			86,104 (58,536)
≤25,000	165	15.1	
25,001–50,000	231	20.3	
50,001–75,000	206	18.3	
75,001–100,000	219	19.5	
100,001–150,000	171	15.1	
150,001–200,000	67	5.9	
<b>Education (years)</b>			17.8 (3.1)

*Note.* Outliers were removed from income data

assesses exposure to nine types of adverse childhood experiences. The BRFSS module evaluates five childhood experiences as present or absent: living with anyone with mental illness, suicidality, alcoholism, drugs abuse, time served in jail/correctional facility, or divorce. The module also includes six items on which childhood events are rated on a three-point scale of *never*, *once*, or *more than once*: intimate partner violence, physical abuse, emotional abuse, and three items related to sexual abuse. Example items include “Did you live with anyone who was depressed, mentally ill, or suicidal?” and “How often did a parent or adult in your home ever swear at you, insult you, or put you down?” The BRFSS therefore incorporates both categorical and frequency information as deemed appropriate to each childhood experience.

Review of the literature suggests the BRFSS is the most extensively used measure of ACEs. The reliability estimate in the present sample was  $\alpha=0.71$ .

**VIA Inventory of Strengths** Character strengths were measured using the VIA Inventory of Strengths-Positive (VIA-IS-P; McGrath, 2019). The VIA-IS-P consists of 96 positively keyed self-report items, four items per character strength, completed on a scale from 1 (*Very Much Unlike Me*) to 5 (*Very Much Like Me*). Example items include “I always keep my promises” and “My beliefs make my life important.” Cronbach’s alpha reliability estimates for the 24 character strength scales were all in the range  $\alpha=0.66$  to 0.87.

**Beck Anxiety Inventory** The Beck Anxiety Inventory (BAI; Beck & Steer, 1993) is a widely used 21-item self-report measure used to assess anxiety levels in adolescents and adults. Each item is scored on a scale from 0 (*not at all*) to 3 (*severely*) and summed to obtain a total score. Example items include “Feeling hot” and “Fear of losing control.” The reliability estimate was  $\alpha=0.93$ .

**Center for Epidemiological Studies Depression Scale** The Center for Epidemiological Studies–Depression Scale (CESD; Radloff, 1977) was used to assess severity of symptoms of depression over the past six months. The CESD is a 20-item self-report measure using a scale from 0 (*rarely or none of the time*) to 3 (*most or all of the time*). Example items include “I felt hopeful about the future” and “I was bothered by things that usually don’t bother me.” The reliability estimate for the current sample was  $\alpha=0.92$ .

**Short Form Health Survey** The Short Form Health Survey (SF-36; Stewart et al., 1988; Ware & Sherbourne, 1992) was used to assess physical health dimensionally. The SF-36 is a widely used self-report measure of health that evaluates a patient’s health status over the past four weeks. The 36 items are used to score eight scales addressing physical functioning, role limitations due to physical health, role limitations due to emotional problems, energy/fatigue, emotional well-being, social functioning, pain, and general health. Response scales differ for different items. Example items include “How much bodily pain have you had during the past 4 weeks?” and “I am as healthy as anybody I know” (the latter answered True or False). The current study used the RAND 36-Item Health Survey 1.0 scoring method ([https://www.rand.org/health-care/surveys\\_tools/mos/36-item-short-form/scoring.html](https://www.rand.org/health-care/surveys_tools/mos/36-item-short-form/scoring.html)). This method involves converting each item to a 0-100 scale, where higher scores are associated with better health. The SF-36 has been well-validated in distinguishing those with health conditions from the general population (Garratt et al., 1993; McHorney et al., 1993). Reliability estimates in the current sample varied between 0.81 and 0.88 across scales.

## 2.3 Procedure

After completing the VIA-IS-P, those who agreed to participate were appropriately consented. Participants then completed a series of demographic questions regarding their age, sex, socioeconomic status, and highest level of education. These were followed by the additional scales listed above. Following Felitti et al. (1998), a general health scale was also administered that asked about the presence or absence of 17 health problems or risk factors (e.g., obesity, history of cancer). In the data analysis, these were evaluated both as discrete dichotomous outcomes and as an aggregated score reflecting the number indicated as present. This total score combined with the BAI score, the CESD score, and the eight SF-36 scores resulted in a total of 11 aggregated outcome variables and 17 discrete health-relevant outcomes.

## 3 Results

### 3.1 Preliminary Statistics

Table 3 is intended to provide information about the general health of the sample by providing frequency data for each of the 17 health conditions/risk factors. The most common condition was depressed mood. The sample's mean of 15.8 ( $SD=12.1$ ) on the BAI is close to the minimum value of 16 considered indicative of clinical anxiety (Beck & Steer, 1997). The mean CESD score of 20.6 ( $SD=12.0$ ) is similarly close to the score of 21 typically used for identifying clinically significant depression (Lewinsohn et al., 1997). The population of individuals who approach the VIA website to complete the questionnaire also report a higher rate of ACEs than is true

**Table 3** Frequency of 17 Discrete Health Outcomes.

Health Condition	<i>n</i>	%
Smoking	140	9.4
Obesity	129	8.7
Physically Inactive	412	27.6
Depressed Mood	693	46.5
Prior Suicide Attempt	193	12.9
Alcoholic	78	5.2
Drug Abuser	54	3.6
User of Intravenous drugs	6	0.4
Lifetime # of Sexual Partners > 50	122	8.2
History of STD	199	13.3
History of Heart Disease	20	1.3
History of Cancer	96	6.4
History of Stroke	20	1.3
History of Chronic Lung Disease	61	4.1
History of Diabetes	58	3.9
History of Hepatitis or Jaundice	45	3.0
History of Skeletal Fractures	185	12.4
<i>M</i>	147.71	9.89

*Note.* STD=sexually transmitted disease



in the general adult population. Merrick et al. (2019) found that 39.0% of adults reported no ACEs, while only 10.6% of the present sample reported none. Where 15.6% reported four or more in the general adult population, that figure was 44.3% in the present sample. Individuals in the current sample reported an average of 3.45 ACEs ( $SD=2.37$ ), with a range of 0–11. These findings suggest the current sample displayed clinically meaningful levels of emotional distress and adverse childhood experiences at a rate that exceeds the norm in the adult population.

### 3.2 Research Question 1: ACEs and Negative Health Outcomes

The first research question asked whether the number of ACEs reported would be associated with negative health outcomes. The correlations relevant to this question can be found in Table 4 (point-biserial correlations for the 17 discrete health outcomes) and 5 (Pearson correlations for the 11 aggregated health variables). Given the large sample size, even relatively trivial correlations were significant. Instead, Cohen's (1988) standard of  $|r|=0.10$  for a small but potentially important correlation was used as the minimum justifying interpretation of the correlation. Though questions have been raised about this standard, several large-scale reviews of correlations in psychological research have suggested similar values (Bosco et al., 2015; Gignac & Szodorai, 2016). Also, as a result of the relative absence of intravenous drug users ( $n=6$ ), findings for this variable are provided in the tables but were excluded from conclusions drawn in the text.

The number of ACEs was meaningfully related to the endorsement of six discrete health outcomes: smoking, obesity, depression, suicide attempts, a higher numbers of sex partners, and a history of sexually transmitted disease. That is, ACEs were meaningfully related to all health-relevant outcomes reflecting emotional and behavioral issues with the exception of substance abuse and physical inactivity, but none of the more medical outcomes such as heart disease. The mean correlation (based on the inverse of the mean Fisher-normalized correlations) across nine behaviorally and emotionally based outcomes was 0.13, but only 0.03 for seven medical outcomes. This is consistent with prior research suggesting stronger relationships with psychological rather than physical outcomes (Petrucci et al., 2019).

Correlations were larger between number of ACEs and the aggregated scores. All 11 correlations were  $\geq 0.13$  in the expected direction, consistently supporting ACE scores as a correlate of current physical and emotional wellness. Again, correlations with emotional measures (anxiety and depression) were particularly high.

### 3.3 Research Question 2: Character Strengths and Negative Health Outcomes

This research question had to do with whether character strengths would also be meaningfully related to adult health outcomes. The correlations associated with this question are provided in Tables S1 and S2 of the Supplementary Materials. Because character strengths tended to be meaningfully related to each other (the mean correlation was 0.22), the premise was evaluated on the basis of simultaneous regressions of outcomes on all 24 strengths. Specifically, Table 4 provides odds ratios from the logistic regression of each discrete outcome onto all 24 strengths simultaneously,

**Table 4** Effect Sizes for Discrete Health Outcomes.

<b>Health Outcome</b>	<b>ACEs</b>	<b>Beauty</b>	<b>Bravery</b>	<b>Creativity</b>	<b>Curiosity</b>
Smoker	0.10*	1.19	1.34	1.13	1.01
Obese	0.12*	0.94	0.89	1.18	1.10
Physically Inactive	0.09	0.96	1.18	1.16	0.87
Depressed Mood	0.20*	1.32	1.17	1.17	0.87
Suicide Attempt	0.21*	0.97	1.31	1.15	0.95
Alcoholic	0.09	1.23	0.95	1.08	0.73
Drug Abuser	0.07	0.99	1.54*	0.82	1.37
Intravenous Drugs	-0.01	0.26*	2.48*	0.20*	46.93*
Sex Partners > 50	0.13*	0.95	1.51*	1.05	1.25
STDs	0.12*	1.45*	1.23	0.76	0.98
Heart Disease	0.01	0.71	1.13	0.84	0.87
Cancer	0.04	1.00	1.16	0.83	0.88
Stroke	0.05	0.93	1.08	0.83	0.66*
Lung Disease	-0.01	1.07	0.93	1.05	1.06
Diabetes	0.02	1.08	1.04	1.24	0.70
Hepatitis/Jaundice	0.02	0.83	1.13	1.23	1.07
Skeletal Fractures	0.06	1.04	0.94	0.85	1.42
	<b>Fairness</b>	<b>Forgiveness</b>	<b>Gratitude</b>	<b>Honesty</b>	<b>Hope</b>
Smoker	1.09	1.04	0.58*	0.87	1.26
Obese	0.98	0.82	1.70*	1.11	0.78
Physically Inactive	0.95	1.00	0.85	0.97	1.06
Depressed Mood	1.13	0.92	0.86	0.98	0.47*
Suicide Attempt	0.97	0.94	0.73	0.90	0.77
Alcoholic	0.74	1.14	0.91	1.22	0.99
Drug Abuser	0.74	1.32	0.59*	0.90	1.38
Intravenous Drugs	0.67*	2.08*	3.19*	0.45*	0.20*
Sexual Partners > 50	0.88	1.05	1.22	0.98	1.23
STDs	1.10	0.98	0.82	0.93	1.09
Heart Disease	0.68*	1.00	0.61*	1.56*	1.23
Cancer	1.03	1.23	1.00	1.28	1.02
Stroke	0.63*	1.24	1.30	1.12	0.45*
Lung Disease	1.28	0.91	0.98	1.02	0.78
Diabetes	1.02	0.96	1.20	0.92	1.10
Hepatitis or Jaundice	0.91	0.82	0.99	1.37	0.70
Skeletal Fractures	1.04	1.16	0.91	0.98	0.88
	<b>Humility</b>	<b>Humor</b>	<b>Judgment</b>	<b>Kindness</b>	<b>Leadership</b>
Smoker	1.13	1.02	1.17	1.15	0.72
Obese	0.92	1.18	0.93	0.95	1.33
Physically Inactive	1.06	1.06	1.08	0.95	0.83
Depressed Mood	1.07	0.83	1.19	1.08	1.11
Suicide Attempt	0.91	0.86	1.05	1.11	0.87
Alcoholic	0.81	1.22	0.89	0.82	0.74
Drug Abuser	1.07	1.06	1.09	0.73	0.88
Intravenous Drugs	1.96*	1.14	2.35	0.80	10.15*
Sexual Partners > 50	0.96	0.89	1.06	0.73	1.07
STDs	0.93	0.91	1.02	0.88	1.06

**Table 4** (continued)

<b>Health Outcome</b>	<b>ACEs</b>	<b>Beauty</b>	<b>Bravery</b>	<b>Creativity</b>	<b>Curiosity</b>
Heart Disease	1.09	1.29	1.21	1.56*	1.18
Cancer	0.97	1.10	1.16	1.16	0.94
Stroke	1.61*	0.96	0.87	0.95	1.04
Lung Disease	1.19	1.11	1.00	0.88	1.23
Diabetes	1.13	1.05	1.11	0.73	0.87
Hepatitis or Jaundice	1.18	0.81	1.29	1.12	1.32
Skeletal Fractures	0.85	0.87	0.91	0.97	1.24
	<b>Learning</b>	<b>Love</b>	<b>Perseverance</b>	<b>Perspective</b>	<b>Prudence</b>
Smoker	0.71	1.05	0.81	1.64*	0.87
Obese	1.12	0.92	1.31	0.99	0.92
Physically Inactive	1.16	1.05	0.99	0.89	1.11
Depressed Mood	1.12	0.89	0.86	0.85	0.96
Suicide Attempt	1.08	1.16	1.23	1.05	0.92
Alcoholic	0.99	1.11	1.41	0.98	0.97
Drug Abuser	0.71	0.94	0.78	1.20	0.92
Intravenous Drugs	0.37*	0.67*	1.38	0.84	1.22
Sexual Partners > 50	0.95	0.83	0.94	0.87	0.61*
STDs	0.94	1.02	1.08	1.21	0.97
Heart Disease	1.47*	1.08	0.67*	0.83	0.96
Cancer	1.24	0.83	0.91	0.85	0.97
Stroke	1.55*	1.66*	0.94	1.08	1.20
Lung Disease	1.18	0.93	0.89	1.08	0.86
Diabetes	1.03	1.07	1.40	1.01	0.76
Hepatitis or Jaundice	0.96	0.85	0.78	0.76	0.66*
Skeletal Fractures	0.90	0.98	1.08	1.02	0.92
	<b>Self-Regulation</b>	<b>Social Intelligence</b>	<b>Spirituality</b>	<b>Teamwork</b>	<b>Zest</b>
Smoker	0.65*	0.96	1.15	1.29	0.88
Obese	0.49*	0.92	1.07	0.86	0.52*
Physically Inactive	0.65*	1.06	1.27	1.09	0.73
Depressed Mood	0.81	1.33	1.14	0.96	0.48*
Suicide Attempt	0.78	1.16	0.98	1.08	0.98
Alcoholic	0.59*	1.30	1.12	0.87	1.01
Drug Abuser	0.72	1.13	0.91	1.06	1.11
Intravenous Drugs	0.30*	0.81	0.88	0.84	0.76
Sexual Partners > 50	0.79	1.48*	0.94	1.05	0.96
STDs	0.82	1.10	1.01	1.01	0.93
Heart Disease	0.80	0.82	2.10*	1.06	1.10
Cancer	0.92	0.97	1.12	0.74	1.35
Stroke	0.88	1.70*	0.89	1.05	1.26
Lung Disease	1.21	0.83	1.20	0.84	1.14
Diabetes	0.92	0.84	0.99	1.25	0.86

**Table 4** (continued)

<b>Health Outcome</b>	<b>ACEs</b>	<b>Beauty</b>	<b>Bravery</b>	<b>Creativity</b>	<b>Curiosity</b>
Hepatitis or Jaundice	0.97	0.99	1.80*	1.05	1.16
Skeletal Fractures	1.11	0.89	1.09	0.89	0.92

\*Considered a meaningful value:  $\geq 0.10$  for absolute value of correlations,  $> 1.44$  or  $< 0.69$  for odds ratios.

*Note.* STD=sexually transmitted disease; ACEs=adverse childhood experience. Values for ACEs are zero-order correlations. Values for character strengths are logistic regression odds ratios.

while Table 5 indicates partial correlations from simultaneous linear regression of each aggregated outcome onto the 24 predictors. All predictor variables were standardized before computation of regression results. A value of 0.10 was again used as the minimum standard for a meaningful partial correlation. It has been suggested that an odds ratio of 1.44 can be used as a standard for a small but potentially important relationship (Sánchez-Meca et al., 2003). This would suggest an odds ratio  $< 0.69$  could be used to indicate a meaningful negative relationship.

The best independent predictors of discrete health outcomes were gratitude and self-regulation, both of which were meaningfully associated with five outcomes. Higher scores on gratitude were associated with a higher risk for obesity but lower rates of smoking, drug abuse, and heart disease. More self-regulated people were less likely to report smoking, obesity, physical activity, or alcoholism. Several others were only associated with two outcomes. Only in two cases did the associated outcomes suggest a clear connection to the strength. Bravery was associated with higher levels on two outcomes reflecting risky behaviors, drug abuse and more than 50 sex partners, while prudence was associated with fewer partners and fewer cases of hepatitis or jaundice. Riskier behavior may be a downside of higher levels of bravery, while prudence may have a protective value.

As in the case of ACEs, relationships with aggregated health outcomes were consistently stronger. The most consistent results emerged for zest, which proved to be meaningfully related to nine of 11 outcomes in the direction suggesting better health and well-being. Similar results emerged for hope, though in this case only five relationships were of meaningful size. This is not completely unexpected given that the relationship between zest and hope often appears to be the strongest among the strengths (McGrath, 2014). Gratitude and self-regulation were associated with three outcomes in a positive direction, with correlates of gratitude reflecting better emotional health and self-regulation better physical health. Two other strengths, appreciation of beauty and kindness, were predictive of poorer results on three outcomes reflecting emotional difficulties. All four of these patterns are consistent with findings from a recent large-scale evaluation of character strengths as predictors of health-related quality of life (Weziak-Bialowolska et al., 2023).

### 3.4 Research Question 3: Character Strengths as Moderators

This represents the key research question of the study. It was again tested using regressions involving all 24 strengths (see Tables 6 and 7). Specifically, 24 moderator terms representing the interaction between each character strength and the number of ACEs were entered simultaneously after entering number of ACEs and character

**Table 5** Effect Sizes for Aggregated Health Outcomes.

	<b>ACEs</b>	<b>Beauty</b>	<b>Bravery</b>	<b>Creativity</b>	<b>Curiosity</b>
BAI	0.26*	0.07	0.03	0.03	0.00
CESD	0.24*	0.15*	0.06	0.07	-0.04
# Conds	0.29*	0.05	0.11*	0.02	0.00
Phys Funct	-0.13*	0.00	0.01	-0.10*	0.03
PhysHealth	-0.16*	-0.07	-0.03	-0.05	0.01
EmoProbs	-0.18*	-0.06	-0.06	-0.03	-0.02
Energy	-0.19*	-0.10*	-0.02	-0.06	0.01
Emo WB	-0.20*	-0.12*	-0.04	-0.07	0.03
Social Funct	-0.25*	-0.09	-0.08	-0.08	0.02
Pain	-0.20*	-0.05	-0.01	-0.01	-0.04
Gen Health	-0.15*	0.00	-0.01	-0.02	0.02
	<b>Fairness</b>	<b>Forgiveness</b>	<b>Gratitude</b>	<b>Honesty</b>	<b>Hope</b>
BAI	0.03	-0.05	-0.05	-0.01	-0.15*
CESD	0.08	-0.06	-0.13*	-0.03	-0.19*
# Conds	-0.01	0.00	-0.08	0.01	-0.07
Phys Funct	-0.02	0.03	-0.07	-0.01	0.04
PhysHealth	-0.02	0.07	-0.01	0.01	0.06
EmoProbs	-0.03	0.03	0.10*	0.09	0.08
Energy	-0.05	0.06	0.07	0.02	0.08
Emo WB	-0.04	0.05	0.14*	0.06	0.26*
Social Funct	-0.06	0.07	0.08	0.08	0.11*
Pain	0.00	0.06	0.00	-0.01	0.02
Gen Health	-0.02	0.10*	-0.03	0.04	0.12*
	<b>Humility</b>	<b>Humor</b>	<b>Judgment</b>	<b>Kindness</b>	<b>Leadership</b>
BAI	-0.01	-0.04	0.06	0.10*	-0.02
CESD	0.03	-0.05	0.05	0.12*	0.02
# Conds	-0.01	-0.03	0.05	-0.03	-0.02
Phys Funct	-0.02	0.01	-0.05	0.02	-0.03
PhysHealth	-0.04	0.06	0.00	-0.01	-0.02
EmoProbs	-0.02	0.06	-0.05	-0.07	-0.01
Energy	-0.02	0.05	-0.09	-0.05	-0.05
Emo WB	-0.01	0.12	-0.09	-0.12*	-0.01
Social Funct	-0.05	0.12*	-0.06	-0.04	-0.01
Pain	-0.01	0.03	-0.01	-0.04	-0.01
Gen Health	0.03	-0.03	-0.08	-0.05	-0.04
	<b>Learning</b>	<b>Love</b>	<b>Perseverance</b>	<b>Perspective</b>	<b>Prudence</b>
BAI	-0.02	0.03	-0.04	0.03	-0.01
CESD	0.02	-0.05	-0.09	-0.07	-0.03
# Conds	0.01	0.00	0.01	0.00	-0.06
Phys Funct	-0.03	-0.07	-0.06	0.06	0.02
PhysHealth	0.04	-0.06	0.01	-0.01	0.00
EmoProbs	-0.03	-0.03	0.12*	0.00	0.01
Energy	-0.04	0.00	0.07	0.03	0.03
Emo WB	-0.01	0.03	0.02	0.08	0.01
Social Funct	-0.03	0.00	0.03	0.04	0.04

**Table 5** (continued)

	<b>ACEs</b>	<b>Beauty</b>	<b>Bravery</b>	<b>Creativity</b>	<b>Curiosity</b>
Pain	0.00	-0.06	-0.03	0.01	0.01
Gen Health	-0.03	-0.02	0.00	0.03	0.02
	<b>Self-Regulation</b>	<b>Social Intelligence</b>	<b>Spirituality</b>	<b>Teamwork</b>	<b>Zest</b>
BAI	-0.04	0.05	0.06	0.01	-0.09
CESD	-0.02	0.07	0.06	-0.01	-0.20*
# Conds	-0.15*	0.06	0.09	0.00	-0.11*
Phys Funct	0.11*	0.01	-0.09	0.07	0.14*
PhysHealth	0.06	0.02	-0.05	0.01	0.05
EmoProbs	0.04	-0.03	-0.02	0.03	0.11*
Energy	0.06	-0.08	-0.06	0.04	0.44*
Emo WB	0.00	-0.10*	-0.04	0.03	0.21*
Social Funct	0.03	-0.10*	-0.08	0.02	0.19*
Pain	0.06	0.02	-0.07	0.04	0.13*
Gen Health	0.14*	-0.03	-0.08	0.02	0.18*

\* $|r| \geq 0.10$

*Note:* BAI=Beck Anxiety Inventory; CESD=Center for Epidemiological Studies Depression Scale; # Conds = # of 17 health conditions endorsed; Physical Funct=Short form health survey (SF-36) physical functioning; PhysHealth=SF-36 Role limitations due to physical health; EmoProbs=SF-36 role limitations due to emotional problems; Energy=SF-36 energy fatigue; Emo WB=SF-36 emotional well-being; Social Funct=SF-36 social functioning; Pain=SF-36 pain; Gen Health=SF-36 General health; ACEs=Adverse Childhood Experiences. Values for ACEs are zero-order correlations. Values for character strengths are multiple regression partial correlations.

strengths scores into the equation. Odds ratios for the discrete outcomes (Table 6) resulted in a confusing picture. Lower odds ratios were expected, since this would mean that the relationship between ACEs and outcomes was weaker as character strength scores increased. In fact, higher and lower values emerged in a pattern that appeared random. For example, strengths that were expected to be particularly effective at reducing the effect of ACEs such as self-regulation or perseverance were just as likely to be associated with higher as with lower odds ratios. Similarly, not one partial correlation in Table 7 was of a meaningful level. It is noteworthy that the mean odds ratio value in Table 6 was 1.02, and that in Table 7 was zero to three decimal places. What this suggests is that there was no reliable evidence that character strengths interact with ACEs to alleviate their effects.

### 3.5 Exploratory Analyses

The finding that the mean correlation with health outcomes was higher for some of the character strengths than for ACEs led us to conduct a final set of exploratory analyses examining the incremental validity of ACEs over the 24 character strengths for the outcome variables (see Table 8). For every aggregated outcome, ACEs remained a meaningful correlate. The results were somewhat different for the discrete health outcomes. The correlations in Table 4 portrayed ACEs as a meaningful correlate of both behavioral and emotional difficulties. Once character strengths were accounted for, though, ACEs no longer were meaningfully associated with the more common

**Table 6** Odds Ratios for Moderation of Discrete Health Outcomes.

<b>Health Outcome</b>	<b>Beauty</b>	<b>Bravery</b>	<b>Creativity</b>	<b>Curiosity</b>	<b>Fairness</b>	<b>Forgiveness</b>
Smoker	1.32	1.17	1.12	0.70	1.05	0.77
Obese	0.86	0.95	0.92	1.12	0.88	0.88
Physically Inactive	1.02	1.01	1.18	0.99	0.83	1.09
Depressed Mood	1.11	0.97	1.05	0.87	1.07	0.86
Suicide Attempt	1.04	0.89	1.00	0.94	0.83	0.91
Alcoholic	1.18	0.83	0.93	1.13	1.10	1.09
Drug Abuser	0.93	0.91	1.05	1.29	1.11	0.86
Sex Partners > 50	1.23	0.98	0.97	1.00	1.01	1.19
STDs	1.33	1.01	0.78	1.11	1.02	1.03
Heart Disease	0.82	1.16	1.53*	0.92	0.79	0.90
Cancer	1.00	1.25	0.93	1.06	1.23	0.91
Stroke	0.65*	1.03	0.68*	1.48*	1.25	0.85
Lung Disease	0.94	0.96	0.89	1.05	1.34	0.76
Diabetes	0.80	1.39	1.04	0.91	0.75	1.15
Hepatitis/Jaundice	0.97	0.90	1.25	1.02	0.89	1.10
Skeletal Fractures	0.88	1.04	0.93	1.09	1.16	1.00
	<b>Gratitude</b>	<b>Honesty</b>	<b>Hope</b>	<b>Humility</b>	<b>Humor</b>	<b>Judgment</b>
Smoker	1.10	1.00	1.00	1.06	1.19	0.95
Obese	1.06	0.97	1.28	1.04	0.89	1.36
Physically Inactive	0.96	1.05	0.97	1.09	1.06	0.99
Depressed Mood	1.00	1.17	0.96	0.91	0.99	1.02
Suicide Attempt	1.00	0.91	0.95	1.02	1.12	1.23
Alcoholic	1.09	0.90	0.78	0.95	1.28	0.97
Drug Abuser	0.99	1.14	0.85	0.87	0.89	0.97
Sexual Partners > 50	0.92	1.22	0.82	1.08	0.92	0.99
STDs	0.90	0.87	0.88	1.12	1.19	1.22
Heart Disease	1.76*	1.25	0.58*	0.91	1.60*	1.22
Cancer	0.81	0.88	0.74	0.80	0.80	1.05
Stroke	1.64*	1.21	0.77	1.27	0.64*	0.58*
Lung Disease	1.05	0.89	0.94	1.01	0.83	1.15
Diabetes	0.83	0.95	1.09	1.23	0.95	1.10
Hepatitis/Jaundice	0.72	1.07	0.58*	1.43	0.83	0.99
Skeletal Fractures	0.91	0.87	1.25	1.01	0.89	1.01
	<b>Kindness</b>	<b>Leadership</b>	<b>Learning</b>	<b>Love</b>	<b>Perseverance</b>	<b>Perspective</b>
Smoker	0.89	0.70	0.96	1.23	0.71	1.48*
Obese	1.18	1.03	0.90	1.21	0.86	0.79
Physically Inactive	1.09	0.99	0.95	1.01	1.06	0.88
Depressed Mood	1.00	1.03	0.94	1.07	0.98	1.03
Prior Suicide Attempt	0.90	1.27	0.94	1.13	0.92	0.91
Alcoholic	1.19	1.28	1.07	0.80	0.88	1.04
Drug Abuser	1.03	0.93	0.83	1.31	0.72	1.42
Sexual Partners > 50	0.89	0.99	0.83	1.04	1.36	0.85
STDs	1.09	0.99	0.87	0.99	0.85	1.06
Heart Disease	0.56*	0.60*	1.07	1.04	0.63*	1.38
Cancer	1.00	0.87	0.86	1.01	0.90	0.95
Stroke	1.07	0.65*	1.00	1.56*	0.50*	1.50*

**Table 6** (continued)

<b>Health Outcome</b>	<b>Beauty</b>	<b>Bravery</b>	<b>Creativity</b>	<b>Curiosity</b>	<b>Fairness</b>	<b>Forgiveness</b>
Lung Disease	0.90	0.98	1.20	1.20	1.52*	0.96
Diabetes	1.51*	0.87	1.17	1.12	0.57*	0.87
Hepatitis/Jaundice	1.06	1.07	1.02	0.95	1.46*	0.85
Skeletal Fractures	1.27	1.07	0.96	1.06	1.06	0.85
	<b>Prudence</b>	<b>Self-Regulation</b>	<b>Social Intelligence</b>	<b>Spirituality</b>	<b>Teamwork</b>	<b>Zest</b>
Smoker	1.17	1.43	0.73	1.06	1.12	0.92
Obese	0.99	1.19	1.01	0.86	0.90	1.02
Physically Inactive	1.06	0.99	1.06	0.89	0.79	1.10
Depressed Mood	0.99	1.01	0.86	1.18	0.89	1.08
Suicide Attempt	0.84	1.19	1.34	0.98	1.09	1.00
Alcoholic	0.89	1.10	0.82	0.99	0.84	1.17
Drug Abuser	0.87	1.65*	1.00	1.04	0.99	1.04
Sexual Partners > 50	1.10	0.79	1.17	1.32	0.84	1.16
STDs	0.87	1.19	0.96	1.24	0.93	1.02
Heart Disease	0.81	0.64*	0.83	1.35	2.13	1.24
Cancer	1.18	1.20	1.34	0.92	0.98	1.29
Stroke	1.81	1.68*	1.09	0.81	1.32	0.76
Lung Disease	1.19	0.69	0.85	1.08	1.14	1.05
Diabetes	1.39	1.15	0.84	0.91	0.89	1.18
Hepatitis/Jaundice	1.55*	0.78	1.07	1.44*	0.82	1.55*
Skeletal Fractures	1.14	1.04	0.87	0.88	0.87	0.97

\*odds ratio  $\geq 1.44$  or  $\leq 0.69$

*Note:* STD=sexually transmitted disease. Effects are for each character strengths in a simultaneous regression moderated by number of adverse childhood experiences. The number of intravenous drug users was too small for regression results to converge.

behavioral difficulties (smoking and obesity), but meaningful relationships emerged for alcoholism and stroke. The basis for these additional effects is uncertain. It is possible that controlling for strengths, which are more directly related to current behavior than are ACEs, may have allowed smaller effects to emerge.

## 4 Discussion

### 4.1 Review of Findings

The results of this study are consistent with prior evidence that adverse childhood experiences occur frequently in the general population of adults and can therefore be considered a public health concern. Adverse childhood experiences are extremely common, and seem to be particularly common among adults who approach the website of the VIA Institute on Character. The results also demonstrate a relationship between the number of adverse childhood experiences a person reported and a variety of negative mental and physical health outcomes was also supported. Adverse childhood experiences were meaningfully related to all 11 scores reflecting health outcomes as well as six health conditions suggesting psychological difficulties.



**Table 7** Partial Correlations for Character Strengths over ACEs.

	<b>Beauty</b>	<b>Bravery</b>	<b>Creativity</b>	<b>Curiosity</b>	<b>Fairness</b>	<b>Forgiveness</b>
BAI	0.03	-0.01	0.01	-0.03	0.00	-0.05
CESD	0.02	0.00	0.04	-0.02	0.02	-0.02
# Conds	0.04	0.04	0.00	0.00	-0.02	-0.03
Phys Funct	-0.02	-0.01	0.01	0.01	0.07	0.00
PhysHealth	-0.01	0.02	-0.02	0.00	0.00	0.00
EmoProbs	0.00	0.02	-0.03	-0.02	-0.02	0.00
Energy	-0.04	0.02	-0.02	0.04	0.01	-0.01
Emo WB	-0.06	0.00	-0.01	0.03	-0.03	0.01
Social Funct	-0.08	0.00	-0.02	0.03	-0.03	0.00
Pain	-0.01	0.00	0.00	-0.03	0.05	-0.04
Gen Health	0.00	-0.01	-0.01	0.02	0.04	-0.02
	<b>Gratitude</b>	<b>Honesty</b>	<b>Hope</b>	<b>Humility</b>	<b>Humor</b>	<b>Judgment</b>
BAI	0.03	-0.01	0.00	-0.02	-0.02	0.04
CESD	0.02	-0.02	0.00	-0.03	-0.01	0.07
# Conds	-0.02	0.01	-0.04	0.02	0.00	0.05
Phys Funct	-0.04	0.03	-0.01	-0.08	0.02	-0.01
PhysHealth	-0.02	0.03	0.00	-0.05	0.03	0.05
EmoProbs	-0.01	-0.03	-0.03	0.00	0.02	0.02
Energy	-0.02	-0.07	0.00	0.05	0.03	-0.02
Emo WB	-0.01	-0.01	0.00	0.01	0.02	-0.02
Social Funct	0.03	-0.02	-0.04	-0.03	0.03	-0.06
Pain	-0.05	0.00	-0.02	0.01	0.03	-0.01
Gen Health	-0.04	-0.01	0.02	-0.02	0.02	-0.01
	<b>Kindness</b>	<b>Leadership</b>	<b>Learning</b>	<b>Love</b>	<b>Perseverance</b>	<b>Perspective</b>
BAI	0.00	0.02	0.01	0.06	0.01	0.01
CESD	-0.01	0.05	-0.02	0.05	0.01	-0.01
# Conds	0.03	0.01	-0.06	0.05	-0.04	-0.03
Phys Funct	-0.03	-0.07	0.02	-0.02	0.01	0.06
PhysHealth	-0.01	-0.05	0.01	-0.01	-0.04	0.06
EmoProbs	-0.03	-0.01	0.06	0.01	0.01	0.02
Energy	0.03	0.02	-0.02	-0.03	-0.02	0.02
Emo WB	0.02	0.00	0.02	-0.04	-0.03	0.00
Social Funct	0.01	0.02	0.04	0.00	-0.02	0.01
Pain	0.00	-0.04	-0.02	-0.01	0.01	0.04
Gen Health	0.02	-0.04	0.04	-0.03	-0.01	0.01
	<b>Prudence</b>	<b>Self-Regulation</b>	<b>Social Intelligence</b>	<b>Spirituality</b>	<b>Teamwork</b>	<b>Zest</b>
BAI	0.01	0.00	0.00	-0.01	0.02	-0.01
CESD	-0.03	0.03	0.01	0.00	0.01	-0.04
# Conds	0.00	0.00	0.00	0.04	-0.06	0.03
Phys Funct	-0.07	0.03	-0.01	0.04	0.06	0.00
PhysHealth	-0.01	0.00	-0.03	0.02	0.01	0.04
EmoProbs	0.02	-0.01	0.03	0.00	0.00	0.02

**Table 7** (continued)

	<b>Beauty</b>	<b>Bravery</b>	<b>Creativity</b>	<b>Curiosity</b>	<b>Fairness</b>	<b>Forgiveness</b>
Energy	0.01	-0.01	-0.01	0.00	-0.02	0.03
Emo WB	0.02	-0.02	-0.04	-0.02	-0.30	0.06
Social Funct	0.05	0.00	-0.01	-0.02	0.01	0.03
Pain	0.00	-0.02	-0.03	0.06	0.00	0.06
Gen Health	-0.02	0.04	0.00	0.01	-0.01	-0.01

*Note.* BAI=Beck Anxiety Inventory; CESD=Center for Epidemiological Studies Depression Scale; # Conds = # of 17 health conditions endorsed; Physical Funct=Short form health survey (SF-36) physical functioning; PhysHealth=SF-36 Role limitations due to physical health; EmoProbs=SF-36 role limitations due to emotional problems; Energy=SF-36 energy fatigue; Emo WB=SF-36 emotional well-being; Social Funct=SF-36 social functioning; Pain=SF-36 pain; Gen Health=SF-36 General health. Effects are for each character strength moderated by number of adverse childhood experiences. None surpassed the minimum value of 0.10 for a meaningful relationship.

With regards to the second research question, assessing whether character strengths would predict more positive health outcomes, results were more mixed. Gratitude and self-regulation proved the best at predicting better outcomes, although gratitude was associated with higher prevalence of obesity. Kindness and appreciation of beauty in contrast were predictive of more negative outcomes. These findings may help to support existing research that suggests certain character strengths are associated with health outcome.

The third research question addressed whether the VIA character strengths could serve as protective factors in the relationship between adverse childhood experiences and health outcomes. There was little support for this relationship in the present analyses. There were few meaningful relationships, and results for those were very inconsistent. The results indicate that ACEs and character strengths probably each have an independent influence on health outcomes in adulthood. Character strengths do not seem to influence the effects of adverse childhood experiences, e.g., by reducing allostatic load. This finding is consistent with recent research suggesting an additive relationship between adverse childhood experiences and positive childhood experiences as predictors of adult emotional and social functioning (Bethell et al., 2019), and research finding that character strengths did not interact with experiences of loss to predict depression and recovery (Blanchard et al., 2020).

There are several possible reasons that character strengths did not emerge as moderators of the relationship between ACEs and health. Perhaps the relationship between ACEs and health is too strong for aspects of an individual's character to provide protection from life stressors without some intervention instructing the person to apply their strengths to negative health variables. Future research will be needed to explore these possibilities. Alternatively, perhaps character strengths tap into a different form of resilience than would be necessary to alter the effects of ACEs on health. Seale and colleagues (2022) conducted a pilot study examining a spirituality-based character strengths curriculum to enhance resilience in Zambian youth in lower/middle income countries. The authors found positive influences on school attendance, academic performance, and character and behavior of the students. Finally, given that ACEs occur during childhood, it is possible that the experience of one or more

**Table 8** Incremental Validity of Adverse Childhood Experiences over Character Strengths.

Outcome variable	Odds ratio/Partial <i>r</i>
<b>Discrete Outcomes (odds ratio)</b>	
Smoker	1.35
Obese	1.43
Physically Inactive	1.13
Depressed Mood	1.56*
Prior Suicide Attempt	1.83*
Alcoholic	1.44*
Drug Abuser	1.33
Intravenous Drugs	0.65
Sexual Partners > 50	1.47*
STDs	1.36
Heart Disease	1.02
Cancer	1.17
Stroke	1.62*
Lung Disease	1.02
Diabetes	1.03
Hepatitis or Jaundice	1.08
Skeletal Fractures	1.24
<b>Aggregated Outcomes (partial <i>r</i>)</b>	
BAI	0.24*
CESD	0.23*
# Health Conds	0.25*
Physical Funct	-0.11*
PhysHealth	-0.14*
EmoProbs	-0.15*
Energy Fatigue	-0.18*
Emo Well-Being	-0.20*
Social Funct	-0.22*
Pain	-0.17*
Gen Health	-0.13*

\*Considered a meaningful value:  $\geq 0.10$  for absolute value of correlations,  $> 1.44$  or  $< 0.69$  for odds ratios

Note: STD=sexually transmitted disease. BAI=Beck Anxiety Inventory; CESD=Center for Epidemiological Studies Depression Scale; # Health Conds = # of 17 health conditions endorsed; Physical Funct=Short form health survey (SF-36) physical functioning; PhysHealth=SF-36 Role limitations due to physical health; EmoProbs=SF-36 role limitations due to emotional problems; Energy Fatigue=SF-36 energy fatigue; Emo Well-Being=SF-36 emotional well-being; Social Funct=SF-36 social functioning; Pain=SF-36 pain; Gen Health=SF-36 General health.

ACEs occurs developmentally prior to when a person could learn to utilize character strengths in a way that could be related to resilience.

The results of this study are consistent with research that identifies certain character strengths as strongly associated with a range of positive factors. Park et al. (2004) for example identified curiosity, gratitude, hope, love, and zest as most commonly associated with happiness and well-being, and hope, zest, love and gratitude have frequently been found to be associated with life satisfaction (Buschor et al., 2013; Martínez-Martí & Ruch, 2014; Peterson et al., 2007; Proyer et al., 2011; Shimai et al., 2006). As noted previously, this is the second study to find gratitude, self-regulation, kindness, and appreciation of beauty are particularly useful predictors of health outcomes (Weziak-Bialowolska et al., 2023).

## 4.2 Limitations

There are several limitations to the current study. First, the sample was overwhelmingly white, female, and highly educated. It is reasonable to suspect these individuals

could have better than normal access to preventative and stable mental and physical health care, potentially reducing the moderating effects of character strengths relative to other factors. However, rates of reported health conditions in the current study did not vary markedly from those reported by Felitti et al. (1988). For example, the rate of ischemic heart disease in the earlier study was 3.8% as compared to 1.3% in the current sample; only 1.9% reported a history of cancer as compared to 6.4% in the present study. Differences were similarly small for a history of stroke, respiratory problems or chronic lung disease, diabetes and hepatitis or jaundice. These comparisons suggest the current sample was not particularly healthier than previous samples used in ACEs research. Future research could examine access to health care in the sample. The sample was also distinctive in terms of higher than normal rates of ACEs and emotional distress and recruitment through a website they approached for purposes of self-evaluation, potentially hampering generalizability further.

Second, the results for the moderator analyses were so variable that the inclusion of such a large set of predictors could potentially have generated unreliable results. That said, the complete lack of evidence of consistent pattern suggests that if character strengths have any value as a protection against the impact of ACEs, the effects are likely to be small.

We also believe current practices surrounding the measurement and study of ACEs are problematic. The field lacks a consistent operational and conceptual definition of adversity, as well as consensus on what constitutes an ACE and how ACEs are best measured. Consistent with prior research, discrete health outcomes were reported as present or absent. Future research on ACEs might benefit from gauging the severity of health conditions measured as well.

As with many ACEs studies, this study is retrospective in nature, asking adults to comment on experiences in childhood. There are inherent limitations to such research, and a longitudinal design would likely be more accurate in identifying causal relationships. Finally, the study was cross-sectional, leaving open the possibility that current health can influence the self-perception of character strengths or even how many ACEs were experienced as a child.

### 4.3 Future Directions

With these limitations in mind, the current study adds to the well-supported notion that ACEs are indeed related to negative mental and physical health outcomes. It also adds to the existing literature on relationships between character strengths health. Future research could focus on more disadvantaged populations, to evaluate whether character strengths are more useful buffers in that context. Future research might look at the extension of interventions based on character strengths beyond emotional state to include health outcomes.

It may also be worthwhile for future researchers to focus on how interventions enhancing specific strengths identified in this study as significantly related to health outcomes could influence the occurrence of health problems. For example, a recent study by Gander and Wagner (2022) examined character strengths in relation to prosocial behavior as an instance of growth during the COVID-19 pandemic. The authors studied changes in character strengths pre and post the first wave of COVID-

19 and retrospective perceived changes in oneself or others. They found that perceived changes were found in most but longitudinal changes were only found in prudence and humility. As the COVID crisis can be considered a major life event for many, this is relevant for future research in character strength growth (Gander & Wagner, 2022).

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s41042-023-00097-3>.

**Funding** No funding was received for conducting this study.

## Declarations

**Conflict of interest** The authors have no relevant financial or non-financial interests to disclose.

**Ethics approval and consent to participate** The study was approved by the appropriate institutional ethics committee and performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. The study was approved by Fairleigh Dickinson University's Ethics Committee.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

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