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Assessing the relationship between adverse childhood experiences and life satisfaction, psychological well-being, and social well-being: United States Longitudinal Cohort 1995–2014

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Abstract

Background More than half of the U.S. population has experienced adverse childhood experiences (ACE), which are linked to physical and mental health issues. This study examines the relationship between ACEs and life satisfaction, psychological well-being, and social well-being.

Methods Data of 6323 participants from three waves of the Midlife Development in the United States (1995–1996, 2004–2006, and 2011–2014) were used. Repeated measures models were used to test the associations between ACEs and all three psychosocial scales. Generalized estimating equations (GEE) were used to account for multiple survey measures. Adjusting for demographics and survey wave, GEE models were run for each ACE construct.

Results After controlling for demographic covariables, those reporting an ACE had significantly lower levels of life satisfaction ($\beta = -0.20$, 95% CI −0.26 to −0.15) compared to those without an ACE. Those reporting higher ACE counts were associated with lower life satisfaction compared to those with no ACE ($\beta = -0.38$, 95% CI −0.56 to −0.20; $\beta = -0.36$, 95% CI −0.46 to −0.27; and $\beta = -0.13$, 95% CI −0.19 to −0.08 for ACE counts of 3, 2, and 1, respectively). Abuse ($\beta = -0.41$, 95% CI −0.48 to −0.33) and household dysfunction ($\beta = -0.18$, 95% CI −0.25 to −0.10) were associated with significantly lower life satisfaction. Overall, those exposed to ACEs had significantly lower sense of social well-being.

Conclusion In this sample of adults, ACEs were significantly associated with lower life satisfaction, lower psychological well-being, and lower social well-being, especially for those who report abuse and household dysfunction during childhood.

Keywords Adverse childhood experiences · Life satisfaction · Psychological well-being · Social well-being

Introduction

Over the past few decades, researchers have produced a large and growing body of evidence indicating that people who experienced adverse childhood experiences (ACEs) encounter more physical and mental health problems later in life and have a greater risk of premature mortality compared to those who have not experienced ACEs [1–5]. As an umbrella term, ACE captures various types of abuse and neglect as well as aspects of a child's living environment that may have caused trauma or chronic stress within the first 18 years of life [5]. Among the U.S. population, the prevalence of childhood adversity is high, with more than 50% of adults reporting at least one ACE [5–7]. Minority groups and those who are low-income have been found to experience ACEs at higher rates relative to the general population and, thus, may require tailored interventions to mitigate the effects of childhood adversity in adulthood [8–10]. Prior studies have linked experiencing severe, chronic stress and/or trauma as a child or adolescent with higher rates of morbidity and mortality from chronic diseases of aging, including coronary heart disease, type 2 diabetes, and some forms of cancer [3, 11–15].

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In addition to affecting physical health, childhood adversity is linked to developing psychological disorders as people age [6, 7, 16]. Studies have provided evidence that experiencing ACEs puts an individual at increased risk for depression, anxiety, behavior disorders, personality disorders, substance abuse, high-risk behaviors, and suicide [17–22]. ACEs are associated with increased anxiety or worry related to physical health, poorer self-rated health and life satisfaction, and higher self-reported disability in adulthood [21, 23–25]. ACEs can also interfere with employability, housing stability, and social support later in life, which may impact well-being and life satisfaction overall [26–29].

Recent analyses of ACEs have specifically focused on perceived well-being, psychological distress, and impairment of daily activities to understand how ACEs impact mental health. Additional studies have examined the cumulative and additive effects of childhood stress on adult mental health, as well as the moderating effects that psychosocial resources, social support and integration, and socioeconomic status provide [27, 30–33]. ACEs have been correlated with lower perceived well-being overall, with higher ACE counts additively contributing to the risk of lower well-being later in life [32, 34]. Higher ACE counts are also correlated with poorer rated life satisfaction [21]. Alternatively, life satisfaction has been identified as a significant moderator and "resilience resource" for adults who have experienced ACEs [23, 35]. Resilience resources, such as emotional and social support, having a sense of community, and social integration have been identified as having important moderating effects on adults who have experienced ACEs [30, 33, 34]. Social integration is one of the constructs included in the concept of social well-being; however, additional research is needed to examine the relationship between ACEs and social well-being.

Overall, there is an abundance of evidence linking ACEs to poor mental health and chronic disease. What is less understood is the impact of ACEs on specific constructs that include psychological well-being, social well-being, and life satisfaction. Therefore, the aim of this study is to assess the relationship between ACEs and life satisfaction, psychological well-being, and social well-being among adults.

Methods

Sample and study population

Midlife Development in the United States (MIDUS) is a national longitudinal study of health and well-being, which was initially funded by the MacArthur Foundation Research Network on Successful Midlife Development, and subsequently, by the National Institute on Aging. MIDUS was first conducted in 1995–1996 and was comprised of 7108 adults who initially participated in a phone interview and then were invited to complete a self-administered questionnaire. Of the MIDUS 1 participants, 4963 adults were successfully contacted to participate in MIDUS 2, which consisted of a phone interview conducted between 2004 and 2006. 3294 of those who participated in the MIDUS 2 phone interview were successfully contacted to participate in the MIDUS 3 phone interview in 2013–2014. For this study, we included participants who answered both telephone and mail questionnaires, for a total of 6325 people. Two people without age information were excluded from the analyses resulting in the analysis cohort size of 6323 respondents.

Adverse childhood experiences (ACEs)

Measures of adverse events experienced during childhood were constructed by using all the related childhood background and childhood family background information during the MIDUS 1 phone interview and self-administered questionnaire. The MIDUS surveys collected information on abuse (emotional abuse; physical abuse), household dysfunction (did not live with biological parents, including parental divorce or never lived together, death of a parent, adopted; lack of male head in the household; parental alcohol or drug use; parental mental illness), and financial strain (receipt of welfare; reported being 'worse off' than other families; less than a high school education for father or mother where father was not present).

ACEs were analyzed in three ways. First, they were grouped as a single dichotomous variable indicating any ACE. Second, as a continuous count of up to three ACE situations, they were grouped as 0, 1, 2, and 3. Third, three dichotomous ACE categories were constructed based on the ACE situations: abuse, household dysfunction, and financial strain.

Covariates

Covariates included gender (male, female), age (grouped as 20–39 years; 40–54 years; 55–75 years for baseline, > 75 years for MIDUS 2 and 3), race/ethnicity (grouped as White; Black; and other Minority), education (dichotomized as high school diploma or less; and higher education), marital status (dichotomized as married and not married), and household total income (grouped as less than 25 k; 25 k–<75 k; and 75k+). All the demographic variables were collected from MIDUS wave 1 to wave 3 when outcomes were measured.

Outcome variables: life satisfaction, psychological well-being, social well-being

All outcome variables were measured in MIDUS 1 to MIDUS 3 in the self-administered questionnaires.

Life satisfaction included 5 items from the self-administered questionnaire. Participants were asked to rate their (1) life overall, (2) work, (3) health, (4) relationship with their spouse/partner, and (5) relationship with their children. The overall mean score constructed the life satisfaction score (scale range 0–10), with higher scores reflecting a higher level of overall life satisfaction.

Psychological well-being is based on the Ryff scales of psychological well-being [36], which included (1) self-acceptance, (2) the establishment of quality ties to others, (3) a sense of autonomy in thought and action, (4) the ability to manage complex environments to suit personal needs and values, (5) the pursuit of meaningful goals and sense of purpose in life, and (6) continued growth and development as a person. Each category (construct) included a set of items; the score was calculated by the sum of each set of items. The scale ranged from 3 to 21 for each construct. Higher scores reflect greater levels of well-being.

Social well-being is based on the scales of social well-being [37] which included constructs such as (1) meaningfulness of society, (2) social integration, (3) acceptance of others, (4) social contribution, and (5) social actualization. Each construct was formed by calculating the sum across each set of responses. The scale range for the meaningfulness of society was from 2 to 14; the scale of all other constructs ranged from 3 to 21. The higher scores imply a higher sense of social well-being.

Statistical analysis

First, we examined baseline Life Satisfaction, Psychological Well-being, Social Well-being Scales in comparison to ACE approach. We then conducted repeated measures models to test the unadjusted and adjusted associations for ACEs and the three psychosocial scale groups. Generalized linear model with the generalized estimating equation (GEE) approach was used to account for the multiple survey measures for the participants. Unadjusted GEE models with each ACE approach were run separately, then adjusted GEE models with each ACE approach, controlling for demographic covariables (reported according to survey wave) and survey wave were developed. All analyses were performed using SAS version 9.4 (SAS institute, Cary NC).

Results

Baseline demographics for all participants and those who completed three survey waves in this longitudinal study are displayed in Table 1. The median age of the cohort was 46 years (inter quartile range (IQR): 36–57), 52.51% were female, and 55.92% reported adverse childhood events. Participants who were women, of middle age (age 40–54 years), white, of higher educational level, married, and with a higher income were more likely to complete all three survey waves.

Table 2 shows information on baseline MIDUS Life Satisfaction, Psychological Well-being, and Social Well-being Scales. Average life satisfaction was lower for those with ACE (7.61 ± 1.38 with ACE vs. 7.82 ± 1.19 without ACE, $P < .0001$). Higher ACE count was associated with lower average life satisfaction (7.25 ± 1.44 for 3 ACEs vs. 7.44 ± 1.44 for 2 ACEs vs. 7.70 ± 1.35 for 1 ACE vs. 7.82 ± 1.19 for no ACEs, $P < .0001$). Average psychological well-being and social well-being were significantly lower for those with an ACE and higher ACE count except for autonomy. Abuse in childhood was significantly associated with lower life satisfaction, psychological well-being (autonomy and personal growth not being significant), and social well-being. Household dysfunction in childhood was also significantly related to lower life satisfaction, psychological well-being (autonomy and personal growth not being significant), and social well-being (meaningfulness of society not being

Table 1 MIDUS cohort baseline descriptions

	Baseline (MIDUS 1)	Completed 3 waves (MIDUS 1, 2, 3)
Count	6323	2511
Gender		
Male	47.49%	44.05%
Female	52.51%	55.95%
Age in years at interview [median (IQR)]	36–57	38–55
Age group (years)		
20–39	33.26%	28.75%
40–54	37.09%	44.88%
55–75	29.65%	26.36%
Race		
Missing	1.11%	
White	89.37%	94.23%
Black	5.31%	3.19%
Other	4.21%	2.59%
Education level		
Missing	0.21%	0.16%
High school diploma or less	37.75%	30.90%
Higher education	62.04%	68.94%
Marital status		
Missing	0.02%	
Married	67.56%	73.28%
Not married	32.42%	26.72%
Household total income category		
Missing	3.40%	1.87%
Less than $25 k	19.39%	14.46%
$25k–<$75 k	43.90%	43.65%
$75k+	33.31%	40.02%

Table 2 Baseline life satisfaction, psychological well-being, social well-being scales [mean (SD)]

	Scale range	Overall	Childhood adversity			Childhood adversity count					Abuse			Household dysfunction			Financial strain		
			no ACE	with ACE	*P* value	0	1	2	3	*P* value	No	Yes	*P* value	No	Yes	*P* value	No	Yes	*P* value
Count		6323	2787	3536		2787	2450	875	211		5004	1245		4961	1361		4095	2227	
Life Satisfaction	0–10	7.70 (1.31)	7.82 (1.19)	7.61 (1.38)	< 0.0001	7.82 (1.19)	7.70 (1.35)	7.44 (1.44)	7.25 (1.44)	< 0.0001	7.81 (1.24)	7.26 (1.47)	< 0.0001	7.76 (1.29)	7.50 (1.36)	< 0.0001	7.68 (1.27)	7.73 (1.36)	0.1576
Psychological well-being																			
Autonomy	3–21	16.42 (3.31)	16.37 (3.27)	16.46 (3.35)	0.3161	16.37 (3.27)	16.47 (3.32)	16.42 (3.45)	16.48 (3.30)	0.7682	16.45 (3.26)	16.30 (3.49)	0.1493	16.39 (3.34)	16.53 (3.22)	0.1600	16.38 (3.28)	16.49 (3.37)	0.2200
Environmental mastery	3–21	16.15 (3.44)	16.34 (3.32)	15.99 (3.53)	< 0.0001	16.34 (3.32)	16.16 (3.45)	15.68 (3.66)	15.33 (3.82)	< 0.0001	16.36 (3.35)	15.28 (3.67)	< 0.0001	16.22 (3.39)	15.87 (3.61)	0.0009	16.11 (3.43)	16.22 (3.48)	0.2261
Personal growth	3–21	17.88 (3.12)	18.07 (3.00)	17.74 (3.21)	< 0.0001	18.07 (3.00)	17.74 (3.17)	17.68 (3.31)	17.94 (3.27)	0.0004	17.90 (3.08)	17.85 (3.30)	0.6598	17.90 (3.11)	17.79 (3.17)	0.2461	18.01 (3.05)	17.65 (3.23)	< 0.0001
Positive relations with others	3–21	16.19 (4.08)	16.68 (3.83)	15.81 (4.22)	< 0.0001	16.68 (3.83)	16.12 (4.12)	15.20 (4.34)	14.65 (4.33)	< 0.0001	16.51 (3.93)	14.93 (4.38)	< 0.0001	16.35 (4.02)	15.60 (4.22)	< 0.0001	16.31 (4.01)	15.96 (4.18)	0.0011
Purpose in life	3–21	16.51 (3.62)	16.92 (3.41)	16.18 (3.74)	< 0.0001	16.92 (3.41)	16.34 (3.71)	15.87 (3.75)	15.70 (4.00)	< 0.0001	16.65 (3.55)	16.01 (3.79)	< 0.0001	16.61 (3.59)	16.16 (3.70)	< 0.0001	16.75 (3.49)	16.07 (3.80)	< 0.0001
Self-acceptance	3–21	16.60 (3.49)	17.03 (3.27)	16.25 (3.62)	< 0.0001	17.03 (3.27)	16.52 (3.51)	15.82 (3.66)	14.95 (4.17)	< 0.0001	16.87 (3.32)	15.47 (3.92)	< 0.0001	16.75 (3.43)	16.03 (3.65)	< 0.0001	16.70 (3.46)	16.41 (3.55)	0.0021
Social well-being																			
Meaningfulness of society	2–14	9.00 (3.25)	9.33 (3.15)	8.75 (3.30)	< 0.0001	9.33 (3.15)	8.84 (3.26)	8.53 (3.39)	8.54 (3.42)	< 0.0001	9.10 (3.21)	8.66 (3.38)	< 0.0001	9.04 (3.25)	8.88 (3.24)	0.1012	9.23 (3.17)	8.59 (3.35)	< 0.0001
Social integration	3–21	14.20 (4.36)	14.51 (4.16)	13.95 (4.50)	< 0.0001	14.51 (4.16)	14.25 (4.41)	13.37 (4.57)	12.89 (4.83)	< 0.0001	14.51 (4.22)	12.89 (4.70)	< 0.0001	14.36 (4.33)	13.61 (4.43)	< 0.0001	14.13 (4.30)	14.32 (4.46)	0.1097
Acceptance of others	3–21	13.29 (3.55)	13.64 (3.38)	13.02 (3.66)	< 0.0001	13.64 (3.38)	13.22 (3.56)	12.49 (3.82)	12.77 (3.90)	< 0.0001	13.52 (3.44)	12.39 (3.83)	< 0.0001	13.42 (3.53)	12.84 (3.60)	< 0.0001	13.33 (3.47)	13.22 (3.69)	0.2528
Social contribution	3–21	15.59 (3.78)	15.93 (3.63)	15.31 (3.88)	< 0.0001	15.93 (3.63)	15.41 (3.83)	15.10 (3.93)	15.04 (4.20)	< 0.0001	15.67 (3.73)	15.29 (3.94)	0.0015	15.67 (3.74)	15.28 (3.89)	0.0010	15.79 (3.69)	15.21 (3.91)	< 0.0001
Social actualization	3–21	12.03 (4.18)	12.45 (4.04)	11.70 (4.26)	< 0.0001	12.45 (4.04)	11.87 (4.22)	11.22 (4.37)	11.78 (4.16)	< 0.0001	12.24 (4.11)	11.23 (4.36)	< 0.0001	12.14 (4.19)	11.66 (4.15)	0.0002	12.15 (4.12)	11.82 (4.29)	0.0035

significant). Financial strain in childhood was associated with significantly lower psychological well-being (autonomy and environmental mastery not being significant) and social well-being (social integration and acceptance of others not being significant).

Table 3 provides the multivariable repeated measure estimates for each life satisfaction, psychological well-being, social well-being construct adjusted by demographic variables and survey wave. Those reporting an ACE had significantly lower levels of life satisfaction ($\beta = -0.20$, 95% CI −0.26 to −0.15) compared to those without an ACE. Similarly, those reporting higher ACE counts were associated with lower life satisfaction compared to those with no ACE ($\beta = -0.38$, 95% CI −0.56 to −0.20; $\beta = -0.36$, 95% CI −0.46 to −0.27; and $\beta = -0.13$, 95% CI −0.19 to −0.08 for ACE counts of 3, 2, and 1, respectively). Abuse ($\beta = -0.41$, 95% CI −0.48 to −0.33) and household dysfunction ($\beta = -0.18$, 95% CI −0.25 to −0.10) were associated with significantly lower life satisfaction. Financial strain was not significant ($\beta = 0.06$, 95% CI −0.00 to 0.12).

Table 3 Multivariable GEE regression model

	Childhood adversity with ACE	Childhood adversity count			Abuse	Household dysfunction	Financial strain
		1	2	3	Yes	Yes	Yes
Life satisfaction	**−0.20 (−0.26 to −0.15)**	**−0.13 (−0.19 to −0.08)**	**−0.36 (−0.46 to −0.27)**	**−0.38 (−0.56 to −0.20)**	**−0.41 (−0.48 to −0.33)**	**−0.18 (−0.25 to −0.10)**	0.06 (−0.00 to 0.12)
Psychological well-being							
Autonomy	0.14 (−0.00 to 0.28)	0.14 (−0.02 to 0.30)	0.12 (−0.10 to 0.34)	0.24 (−0.15 to 0.64)	0.04 (−0.14 to 0.23)	0.17 (−0.00 to 0.34)	0.03 (−0.12 to 0.19)
Environmental mastery	**−0.35 (−0.50 to −0.21)**	**−0.22 (−0.38 to −0.07)**	**−0.65 (−0.88 to −0.41)**	**−0.78 (−1.24 to −0.33)**	**−0.83 (−1.02 to −0.63)**	**−0.24 (−0.43 to −0.06)**	0.09 (−0.07 to 0.25)
Personal growth	−0.09 (−0.23 to 0.04)	−0.07 (−0.22 to 0.08)	−0.14 (−0.36 to 0.08)	−0.21 (−0.61 to 0.19)	−0.07 (−0.25 to 0.11)	**−0.21 (−0.39 to −0.04)**	0.02 (−0.13 to 0.16)
Positive relations with others	**−0.66 (−0.84 to −0.49)**	**−0.42 (−0.61 to −0.23)**	**−1.21 (−1.49 to −0.92)**	**−1.47 (−2.00 to −0.93)**	**−1.25 (−1.48 to −1.01)**	**−0.44 (−0.66 to −0.22)**	−0.04 (−0.23 to 0.15)
Purpose in life	**−0.27 (−0.42 to −0.12)**	−0.14 (−0.30 to 0.02)	**−0.55 (−0.79 to −0.31)**	**−0.75 (−1.18 to −0.33)**	**−0.35 (−0.54 to −0.16)**	**−0.29 (−0.48 to −0.11)**	−0.14 (−0.30 to 0.02)
Self-acceptance	**−0.62 (−0.78 to −0.46)**	**−0.41 (−0.59 to 0.24)**	**−1.05 (−1.30 to −0.79)**	**−1.44 (−1.97 to −0.91)**	**−1.12 (−1.34 to −0.90)**	**−0.54 (−0.75 to −0.34)**	0.06 (−0.12 to 0.23)
Social well-being							
Meaningfulness of society	**−0.21 (−0.34 to −0.07)**	−0.14 (−0.29 to 0.02)	**−0.40 (−0.62 to −0.18)**	−0.29 (−0.70 to 0.11)	**−0.24 (−0.42 to −0.06)**	−0.03 (−0.20 to 0.14)	**−0.21 (−0.36 to −0.06)**
Social integration	**−0.56 (−0.75 to −0.37)**	**−0.31 (−0.52 to −0.11)**	**−1.15 (−1.45 to −0.85)**	**−1.19 (−1.77 to −0.60)**	**−1.24 (−1.49 to −0.98)**	**−0.49 (−0.72 to −0.25)**	0.13 (−0.08 to 0.33)
Acceptance of others	**−0.42 (−0.57 to −0.27)**	**−0.28 (−0.44 to −0.13)**	**−0.79 (−1.04 to −0.55)**	**−0.58 (−1.01 to −0.15)**	**−0.78 (−0.97 to −0.58)**	**−0.27 (−0.45 to −0.09)**	0.03 (−0.13 to 0.20)
Social contribution	**−0.25 (−0.41 to −0.09)**	**−0.18 (−0.36 to −0.00)**	**−0.41 (−0.67 to −0.14)**	−0.46 (−0.95 to 0.03)	−0.21 (−0.43 to 0.01)	**−0.28 (−0.49 to −0.08)**	−0.10 (−0.28 to 0.08)
Social actualization	**−0.41 (−0.60 to −0.23)**	**−0.30 (−0.50 to −0.11)**	**−0.77 (−1.06 to −0.48)**	−0.32 (−0.83 to 0.20)	**−0.80 (−1.04 to −0.56)**	−0.20 (−0.43 to 0.02)	0.07 (−0.12 to 0.27)

Adjusted by gender, age group, race, education level, marital status, household total income, and survey wave

Reference for childhood adversity is no ACE; for childhood adversity count is 0; for abuse is No; for household dysfunction is No; for financial strain is No

Bold values are statistically significant at $p < 0.05$

Those with an ACE had significantly lower levels of psychological well-being except for the measures of autonomy and personal growth, which were not significant. Those with an ACE had significantly lower sense of social well-being as well. Reporting abuse in childhood was associated with lower levels of life satisfaction, psychological well-being (autonomy and personal growth not being significant), and social well-being (social contribution not being significant). Similarly, household dysfunction in childhood was associated with lower levels of life satisfaction, psychological well-being (autonomy not being significant), and social well-being (meaningfulness of society and social actualization not being significant). Experiencing financial strain in childhood, however, was not significantly associated with any construct except meaningfulness of society. We further checked the influence of ACE in MIDUS survey waves. Having an ACE was related to significant survey time differences in positive relations with others and acceptance of others. Higher ACE counts had significant survey time differences in positive relations with others, self-acceptance, and acceptance of others. Abuse in childhood had significant survey time differences in autonomy, environmental mastery, purpose in life, and meaningfulness of society. Financial strain in childhood had significant survey time differences in positive relations with others, social integration, and acceptance of others.

Discussion

In this sample of adults, ACEs were associated with lower life satisfaction, lower psychological well-being, and lower social well-being after adjusting for sociodemographic characteristics and the survey wave. The presence of an ACE was associated with all psychological well-being constructs except autonomy and personal growth after adjustments. Similarly, higher ACE counts were associated with lower life satisfaction and psychological well-being with the exceptions of autonomy and personal growth after adjustments. Higher ACE counts were also significantly associated with decreased social integration and acceptance of others. When considering the type of ACE, abuse and household dysfunction were significantly associated with lower life satisfaction, psychological well-being, and social well-being after adjusting; however, financial strain was not significantly associated with life satisfaction or psychological well-being. After adjusting, abuse was significantly associated with lower social well-being except for social contribution; household dysfunction was significantly associated with lower social integration, acceptance of others, and social contribution; and financial strain was significantly associated with lower meaningfulness of society. Therefore, these findings suggest psychosocial constructs may be important to consider in interventions for adults with ACEs and efforts to address life satisfaction and improve psychological and social well-being are warranted.

This study contributes to existing research on the effects of ACEs on adults over the life course. Our investigation tested for unique contributions of individual ACE indicators on the constructs that constitute scales of life satisfaction, psychological well-being, and social well-being and their relationship overall. Consistent with existing studies on life satisfaction, we found that ACEs were associated with lower life satisfaction and lower psychological well-being [21, 32, 34]. A 32-year prospective longitudinal study assessing the exposure of children to adverse psychosocial experiences, including socioeconomic disadvantage, maltreatment, and social isolation on physical health, showed that exposure to ACEs was significantly associated with a higher risk of developing depression and high inflammation levels. In addition, children who were socioeconomically disadvantaged, socially isolated, or maltreated were found to have elevated age-related-disease health risks as adults [38]. Consistent with these findings, the relationship between childhood abuse and household dysfunction has been associated with many of the leading causes of death in adults, as well as with an increased risk of premature death [3, 4]. Social and emotional support and social integration have been studied in relationship to adult stressors, adversity experienced in childhood and coping, but less is known about how ACEs impact social well-being in general [31–33, 35]. To our knowledge, this is the first analysis to show lower social well-being as significantly associated with higher ACE counts.

Social support and social integration have been identified as important intervention targets to help ameliorate the biological and psychological effects of stress in adulthood [33, 39]. Social support refers generally to psychological and material resources provided by one's social ties and can help people to adapt and cope with stressors as they occur. Social integration is a multidimensional construct that includes behavioral engagement in a variety of social relationships and activities, as well as having a diversity of self-identified social and communal roles. In their investigation of adaptation to stress and stress-related processes embedded within the social environment, McEwen and Gianaros found that social support and social integration play an important role in coping. In particular, they observed that social integration has protective physical and mental health effects and can increase longevity [33]. Yet, exposure to ACEs in early childhood can limit an individual's access to healthy social ties and social support, especially if the family/home environment was abusive or dysfunctional [29, 31]. Lack of social support among older adults has also been directly associated with ACEs and impacts a person's ability to stay physically healthy [27]. Thus, future intervention efforts

should focus attention on how to improve social and emotional support for individuals who have experienced ACEs, particularly growing up in a dysfunctional household and/or experiencing abuse as a child.

Despite this being a longitudinal study with a large sample size, there are limitations of the study to note. First, the ACE scales and the life satisfaction, psychological well-being, and social well-being scales may be subject to recall bias. Given the study design, we are unable to infer causality or directionality. Second, some forms of abuse, such as sexual abuse, were not included in the dataset and may be important to include when examining the effects of ACEs on individuals. Third, the majority of subjects included in this analysis were Non-Hispanic White, educated, married, and have moderate to high incomes, which limits the generalizability of these findings to other population subgroups. Prior research suggests that race and socioeconomic status may have an effect on exposure to ACEs and on mediating outcomes for those exposed later on in adulthood. Further research should be done to examine race, socioeconomic status, and ACEs, and their relationship to life satisfaction, psychological well-being, and social well-being, as tailored interventions are warranted for vulnerable populations to reduce disparities in health outcomes related to ACEs [8–10, 30].

Conclusions

Overall, this study showed that in a large longitudinal sample of U.S. adults ACEs were associated with lower life satisfaction, lower psychological well-being, and lower social well-being. These findings support previous research findings that ACEs increase the risk of lower life satisfaction and lower psychological well-being. In addition, this study adds evidence to the literature by showing that ACEs are associated with lower social well-being. Further research is needed to understand the relationship between social well-being, ACEs, and how individual constructs of life satisfaction, psychological well-being, and social well-being may either increase or moderate the risk associated with ACEs and lower life satisfaction, psychological well-being, and social well-being. With regard to social well-being, there is evidence to suggest that constructs like social integration can have important health protective effects and could serve as a point of intervention for clinicians and policy makers. Social support and integration are fostered through healthy communities and families. Future policies should incorporate health and well-being in their approach, especially policies that impact child and family needs, economic insecurity, health care, workplace safety, and any other related community and system-related supports [40].

Author contributions EMJ and LEE designed the study. EG acquired and analyzed the data. EG and LEE developed the analyses, and EMJ, EG, NW, CM, JSW, and LEE interpreted the data. EMJ, EG, NW, CM, JSW, and LEE critically revised the manuscript for important intellectual content. All authors approved the final manuscript.

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Compliance with ethical standards

Conflict of interest The authors report no conflicts of interest.

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