

The Relationship between Self-Reported Adult Impact of Adverse Childhood Events and Health-Related Quality of Life

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Abstract

Childhood maltreatment has become a widespread public health problem that can have life-long impact, according to the National Center of Child Abuse and Neglect. The literature is replete with epidemiologic and correlational research about the relationship between adverse childhood events (ACE's) and a wide range of negative health and mental health outcomes. Anecdotal evidence suggests that only some individuals who experience ACE's follow a trajectory of poor outcomes, and not all individuals perceive the impact of ACE's as necessarily negative. The purpose of this study was to investigate the relationship between individual's current perceived impact of ACE in adulthood and health related quality of life (HRQL). Self-report data on ACE experiences, including number, severity, and 'impact' were collected from 154 community members recruited on the basis of having adverse childhood experiences that might affect adult health related quality of life. Results indicated that, regardless of the number of different types of adverse events experienced, high levels of perceived impact and the rating of this impact as negative or positive were strong predictors of current HRQL. Participants with high levels of perceived negative impact of ACE in adulthood had significantly lower levels of HRQL. Clinical implications and future directions are discussed.

Keywords: Childhood maltreatment; Impact; Quality of life; Life stress

Introduction

The experience of adverse childhood events (ACE's) is an unfortunate reality in the lives of many individuals. Childhood maltreatment has become a public health problem that has reached epidemic proportions, according to the National Center of Child Abuse and Neglect. In FY 2011, 676,596 victims of child abuse were reported nationwide [1]. Of these, 78.5% of individuals were neglected, 17.6% were physically abused, and 9.1% were sexually abused. 81.2% of abuse was inflicted by parents, 12/8% non-parents, and 6.1% the perpetrator's relationship to the child was unknown.

In 1988, the Adverse Childhood Event Study retrospectively estimated the prevalence of a broad range of ACE exposure in an adult primary care population of 17,337 adults comprised of 9,367 women & 7970 men [2]. Prevalence rates in this population were high for individual ACE categories; emotional abuse 10.6%, physical abuse 28.3%, sexual abuse 20.7%, emotional neglect 14.8% and physical neglect 9.9%. There is strong evidence that ACE is associated with significant physical and mental health disease burden later in life. Efforts to examine how individuals cope with such adversity has shed some light on both adaptive and maladaptive patterns of behavior that may impact longer term (for example adult) health risk behaviors and outcomes. Despite a growing number of studies correlating ACE with a variety of poor health outcomes, less is known about why some adults are more negatively impacted by ACE while others appear to be less affected.

The majority of studies on ACE have focused on correlational approaches which characterize the type of adversity such as physical, sexual, emotional abuse, neglect/physical and general household dysfunction and quantify the number of categories of events to which individuals were exposed. A 'total ACE score' which reflects the sum of all categories of ACE a given individual has experienced is used to create associational estimates of ACE impact on adult health outcomes. Felitti et al. [2] studied large numbers of individuals enrolled in a large HMO examining ACE and multiple emotional, physical, and psychosocial outcomes. They found that adults with histories of ACE were more

likely to suffer from emotional problems (depression, post-traumatic stress disorder, hallucinations and somatization/medically unexplained symptoms), health risks (smoking, alcohol use, intravenous drug use), social problems (sexual assault, domestic violence, increased numbers of sexual partners, unintended pregnancy, impaired work performance) adult disease and disability (smoking, COPD, liver disease, sexual transmitted diseases) and higher physical and mental health care costs and lower life expectancy when compared to individuals without ACE. They described significant graded relationships between the number of categories of childhood ACE exposure and each of the adult health risk behaviors and diseases studied. For example, persons who had experienced four or more categories of childhood exposure, as compared to those who had experienced three or less, had a 4- to 12 fold increased health risks for alcoholism, drug abuse, depression and suicide attempt. The number of ACE categories has been correlated with a graded relationship with the presence of additional adult diseases including ischemic heart disease, cancer, chronic lung disease, skeletal fractures and liver disease [3].

Exposure to individual ACE categories and various outcomes have also been studied. Finestone et al. [4] described an association for adult females between histories of childhood sexual abuse (CSA) and chronic pain and health care utilization (2000). They found higher rates of chronic pain (pain conditions with greater than 3 month duration), increased numbers of painful body areas, diffuse pain and fibromyalgia diagnosis in women with CSA versus non-CSA controls. CSA exposure

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was also associated with more surgeries, hospitalizations and family physician visits. Another study in a community sample of New Zealand women with and without CSA histories and found a higher number of medical conditions reported by women with histories of CSA [5]. These conditions included chronic fatigue, bladder and heart problems, headaches, diabetes and asthma. Najman et al. [6] studied a large sample of Australian adults with histories of CSA and found that men had higher rates of impaired mental health (but not physical health) and women had higher rates of impairment in both mental and physical health as measured by the SF-36.

Impact/Centrality

Most research examining the relationships between ACE and clinical outcomes does not account for the perceived impact of the event by an individual and typically only considers whether a candidate adverse experience was reported or not. Also, most ACE research uses a summed ACE score as a predictor of health and mental health outcomes. This approach assumes that different types of adverse events are similar in their potential impact on a given individual and do not account for other factors which might contribute to various outcomes. In our own research, we found that negative affect was a strong predictor of whether adults rate the current adulthood impact of past childhood adversity as negative – features of the adversity such as perceived severity were not strongly predicted of the negative impact rating [7].

Other research has focused on the concept of “centrality” which considers how individuals who experience traumatic events construct them as being a part of their own subjective identity of self [8]. Measures of centrality of events include how individuals assess a traumatic/stressful event and its impact on their lives. Higher levels of centrality of event scores for traumatic events have been correlated with higher rates of post-traumatic stress disorder symptoms and also with post traumatic growth [9,10]. Therefore impact and centrality of traumatic events are examples of variables that may influence the outcomes of ACE on individuals beyond the numbers of individual categories of adversity exposure.

The purpose of this study was to identify adults who had experienced ACE and to explore the relationships between perceived adult impact of childhood adversity and its relationship to current (adulthood) health related quality of life (HRQL). In this paper, we explore the effects of endorsing a negative impact rating of ACE in adulthood and its relationship with current health related quality of life. We hypothesized that ratings of continued adulthood impact of ACE as either negative, neutral or positive would be related to health-related quality of life (HRQL), such that negative impact ratings will be associated with worse HRQL, over and above the impact of total ACE summary scores on HRQL.

Methods

The University Of New Mexico School Of Medicine Human Research Review Committee approved the Coping, Health, Happiness, Adversity and Mental Health (CHHARM) study from which these data come. The CHHARM study was an observational study examining relationships among childhood adversity, resilience, coping and adult health and mental health outcomes in participants with ACE candidate experiences.

Participant recruitment

We recruited participants who self-identified as having had adverse childhood experiences. To ensure that we sampled individuals having a

range of perceived current (adulthood) impact of ACE experiences, our recruitment activities approached the valence of ACE impact. Initial recruitment materials emphasized the potential relationship between prior trauma and current negative health outcomes. Subsequent recruitment materials were revised to recruit participants who endorsed that “bad things” happened during childhood might affect coping and health in adulthood. Examples were given of ‘bad things’ such as “abuse of yourself or other family members (such as physical, sexual or verbal abuse)”, “household members who were alcoholics/addicts/mentally ill/in prison”, “domestic violence in the home”, “childhood poverty/homelessness, or any other traumatic childhood experiences”. The final round of recruitment materials emphasized the possibility of post traumatic growth, or having overcome challenges from having a “difficult childhood”.

Prospective participants were screened by phone. Eligible individuals met with a research assistant who obtained informed consent and set them up on a computer to complete the CHHARM instrument, which took an average of 90 minutes to complete. All participants were compensated with a \$25.00 merchandise card from a local retailer.

Demographic measures

We collected baseline demographic variables of age, gender, education, and ethnicity from all participants.

Measuring adversity during childhood

We assessed presence/absence of each of 4 types of abuse/maltreatment with a yes/no question. The abuse types were physical abuse, sexual abuse, psychological/emotional abuse, and neglect. We posed the same set of questions for each type of abuse. As an example, the question for physical abuse was:

“Before you became an adult, were you physically harmed by a parent, guardian or caregiver? For example, were you severely spanked, pushed, grabbed, shoved, slapped, had something thrown at you, or hit so hard that you had marks or injuries?”

The sum of “yes” responses over these four categories of exposure was used as the ‘total ACE score’ variable in this study (possible range of 1-4). The full text all of questions have previously been published [7].

We assessed perceived adult impact of ACE experiences with two questions: “How much of an impact does this continue to have on your life now?” with response options between ‘None’, ‘A Little’, ‘Some’ and ‘A lot’, and “How would you describe the impact in your life now?” with response options ‘very negative’, mostly negative’, ‘50/50’, mostly positive’, and ‘very positive’.

Health related quality of life

We used the Medical Outcomes Study Short Form (SF-8), an 8-item, multipurpose survey to evaluate physical and mental health status. Each of the 8 items in the survey measures one of the 8 domains of health in the original SF-36 survey [11]. The items in the instrument use a 5 or 6 category Likert response scale and each item is scored using weighted, norm-based scoring methods, derived from the initial validation for this instrument. Specifically, all scores above and below 50 are above and below average in the general population. In this study, we used the ‘Physical Component Summary Scale’ (PCS) score and the ‘Mental Component Summary Scale’ (MCS) score as primary outcomes, and the 8 subscale scores (physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental

health) for follow-up analyses. Scores were computed using the Health Outcomes Scoring software [12].

Analysis

Impact: Each type of childhood adversity reported was associated with two adult impact questions, as described above. We computed a ‘mean impact’ rating for each participant by first categorizing the reported valence of impact for each childhood event as ‘very/mostly positive’=1, ‘50/50’=0, and ‘very/mostly negative’=-1, and then taking the mean rating over all ACE categories reported. The range of this variable was therefore -1 to 1, with scores below zero representing a mean negative impact rating and scores above zero representing a mean positive impact rating. This mean impact variable was used as a continuous variable in analyses to test for relationships with health-related quality of life, using total ACE score as a covariate. For the purpose of comparing mean health related quality of life, individuals were categorized into groups, with individuals scoring above .50 classified as ‘predominately positive’ impact, below -.50 classified as ‘predominately negative’ impact and those scoring between -.50 and +.50 classified as ‘neutral’ impact. The total ACE score was calculated by summing individual categories of reported ACE (range 1-4). Descriptive analyses included total ACE score, and comparisons of ACE and health related quality of life between the impact groups.

To test the hypothesis that impact ratings would predict HRQL outcomes above and beyond the contribution of the total ACE score, a series of linear regressions were performed with SF-8 scores as outcomes. Residuals were screened for distributional assumptions and found to be adequate. There were two steps: first the total ACE score was used as a predictor in Step 1 of the regression, estimating the independent effect of ACE on HRQL. In Step 2, the impact variable is entered as a second predictor, allowing for an examination of the effect of impact on HRQL while controlling for ACE. A finding that the total ACE scores is not a significant predictor when entered with the impact variable would be evidence for the relative superiority of impact as a predictor of HRQL. Both the ‘Physical Component Summary Scale’ score and the ‘Mental Component Summary Scale’ outcomes were analyzed in this way. To follow up these analyses, individual regressions of the 8 HRQL subscales on the impact variable were performed, using a Bonferonni alpha adjustment.

Results

Participants

Individuals with histories of physical abuse, sexual abuse, psychological/emotional abuse, and neglect were included in the analyses for this study (N=154). Demographics of study participants are provided in Table 1.

Descriptive statistics

The sample reported the cumulative frequency of ACE events as follows: 16 (10.4%) with 1 event, 31 (20.1%) with 2 events, 50 (32.5%) with 3 events and 57 (37.0%) with 4 events. The mean number of events was 2.96 (SD=1.0). Individual events were reported with similar frequencies: physical abuse N=110 (71.4%), sexual abuse N=101 (62.6%), psychological/emotional abuse N=123 (79.9%), and neglect N=122 (79.2%).

The calculation of the mean impact variable resulted in 79 individuals in the ‘mostly/very negative’, 49 individuals in the ‘50/50’ and 16 individuals in the ‘mostly/very positive’ categories. The groups did not differ on mean total ACE scores reported, ($p>.10$), with means

Variable	Range	Mean (SD)
Age		
	40-71	53.34 (7.07)
Sex		N (%)
	Male	47 (30.5)
	Female	107 (69.5)
Education Level		
	Grade School or Less	3 (1.9)
	Some High School	5 (3.1)
	HS graduate/GED	25 (15.2)
	Some college	51 (31.3)
	College Grad	34 (20.9)
	Some graduate work	16 (9.8)
	Completed Master's Degree	23 (14.1)
	Professional Degree	5 (3.1)
Ethnicity*		
	Caucasian/White	121 (74.2)
	American Indian	4 (2.5)
	African American	10 (6.1)
	Other	19 (11.7)
	Hispanic	50 (30.7)

*This was asked as two separate questions, and therefore the total exceeds 154

Table 1: Demographic characteristics of study participants.

	Total ACE Score, Step 1	Total ACE Score, Step 2 ¹	Impact Score Step 2
Mental Component Summary	-1.77*	-1.0	6.51***
Physical Component Summary	-1.44	-1.30	1.37
Physical Functioning	-1.95*	-1.70*	2.37
Role Physical	-1.96*	-1.44	3.20*
Bodily Pain	-1.53*	-1.22	3.00*
General Health	-1.05	-.66	3.70***
Vitality	1.16	.67	-4.59***
Social Functioning	-1.59	-1.01	5.44***
Role Emotional	-1.25	-.79	4.35**
Mental Health	-2.73**	-1.88*	8.06***

Note: ¹This coefficient represents the effect of total ACE score on HRQL when impact is also estimated in the regression. * $p<.05$, ** $p<.01$, *** $p<.001$
Significance of predictors for all subscales was evaluated at $p<.0063$.

Table 2: Unstandardized Regression Coefficients for the Regressions Predicting Health Related Quality of Life (SF-8 Outcomes) with ACE Scores and Impact Ratings

of 2.92 (1.06), 3.15 (.88) and 2.69 (1.01) respectively for the negative, neutral, and positive impact groups. Further, none of the 16 individuals with a mean positive impact score rated any of the 4 ACE categories as being mostly/very negatively impactful in adulthood. None of the 79 individuals with a mean negative impact score rated any of the 4 ACE categories as being mostly/very positive impactful in adulthood. The majority of the 49 individuals with a mean impact score between -.50 and .50 rated most of the 4 ACE categories as being neutral (50/50) with only 2/18 rating sexual abuse as mostly negative; 1/23 rating emotional abuse as mostly negative; 1/22 rating neglect as mostly negative and 1/22 rating neglect as mostly positive; and 2/19 rating physical abuse as mostly positive.

Mean Health Related Quality of Life-Mental Health Component Scale for the impact groups was as follows: positive impact $M=46.47$ ($SD=6.57$), neutral impact $M=42.80$ ($SD=9.90$) and negative impact $M=36.56$ ($SD=9.48$). For the Physical Health Component Scale the means were: positive impact $M=44.41$ ($SD=7.17$), neutral impact $M=47.02$ ($SD=9.69$) and negative impact $M=44.87$ ($SD=9.33$).

The groups differed significantly with respect to HRQL. The one-way ANOVA with the Mental Health Summary Score as an outcome was significant, $F(2, 139)=11.09, p<.001$. Bonferonni adjusted post-hoc testing revealed significant differences between the negative and positive impact groups, and between the neutral and negative impact groups, but not between the positive and neutral impact groups. For the Physical Component Subscale, the ANOVA was non-significant, $F(2, 139)=.93, p>.50$.

Ace, health related quality of life, and impact ratings

As reflected in column 1 of table 2 (step 1 regression), total ACE score was significantly correlated with the Mental Health Composite Scale of the SF-8, in addition to significant (after adjustment) relationships with the physical functioning, role physical, bodily pain and mental health subscales. Total ACE score was not significantly correlated with the Physical Health Composite Scale. ACE score and impact rating were also significantly correlated, $r=-.176, p=.038$.

As reflected in column 3 of Table 2 (step 2 regression), after controlling for total ACE score, impact was a significant predictor of HRQL for the Mental Component Summary (MCS) Score, but not the Physical Component Summary (PCS) Score. However, when analyzed individually, 7 of the 8 subscales were significantly predicted by impact rating while controlling for total ACE score as a covariate.

Discussion

The purpose of this study was to determine if there is a relationship between how adults, with a history of adverse childhood events, perceived current *impact* of these early events and their current health-related quality of life. Our findings partially supported our hypothesis that current perception of the impact of childhood events would be a stronger predictor than the number of events themselves. This was shown in the finding that impact was a significant predictor of HRQL for the Mental Component Summary (MCS) Score, and for 7 of the 8 subscales (4 of 4 MCS and 3 of 4 PCS), when controlling for ACE score. In the physical health component subscales, perceived impact predicted Role Physical, Bodily Pain and General Health scores, with Physical Functioning not reaching significance when controlling for ACE score.

Individuals in this study reported generally low health related quality of life as measured by the SF-8 scales. Compared to the SF-8 normative values [11] which reported mean mental component summary scores of 44.24 and physical health composite summary scores of 54.35, our participants reported overall means of 40.19 and 45.61 – differences of about one-half of a standard deviation for each scale.

Much of the research exploring health-related outcomes of individuals with histories of ACE assumes that the impact of each category of ACE experienced by a given individual is the same as any other. Individuals have been shown to be at higher risk of developing a myriad of psychosocial and health risk consequences with higher ACE summary scores, no matter what categories of ACE the individual has endorsed. This research neglects to consider how current perception of past events may influence this relationship. Our data suggests that how individuals perceive the current impact (valence – negative, neutral or positive, and its intensity) of ACE predicts current HRQL even when controlling for the absolute numbers of adversities to which an individual was exposed in childhood.

The results of this study have implications for the methodological approaches used to estimate ACE risk. The landmark study

demonstrating the relationship between ACE and mortality [2] used a summing method to define ACE exposure, and this continues to be the standard in most ACE research. The number of ACEs (ranging from 0- 10) is summed to create the ACE score. Some authors have demonstrated the statistical interrelatedness of multiple forms of ACE suggesting that the presence of one ACE significantly increases the prevalence of having additional ACE experiences, elevating the adjusted odds by 2 to 17.7 times [13,14].

The application of this summing method for the purpose of calculating risk implies that each type of ACE has an equivalent impact. Our results suggest a more nuanced approach that takes perceived impact into consideration may contribute to a better understanding of the potential consequences of ACE. The summing method does not account for these important distinctions and may over- or underestimate health outcome risk. This concept is further supported by the finding in our current study that the positive and negative impact groups did not differ in their respective total ACE summary scores but did differ in 7 of 8 areas of HRQL.

Our results demonstrate that the “valence” of perceived adult impact of ACE is related to HRQL and therefore warrants further scrutiny. We choose to measure the construct of impact by summing two components; valence (positive, neutral or negative) and intensity (how much does ACE continue to impact you now). Other researchers have examined different but possibly related constructs in an attempt to understand the relationship of traumatic or adverse events on negative psychological outcomes (PTSD, depression, dissociation) as well as on the concept of post traumatic growth (PTG) [15-17]. Another such construct is “centrality”. The construct of centrality to individual identity is described as the extent to which a traumatic or stressful event forms a personal reference point for attribution of meaning for other life events, marks a salient turning point in a person’s life story and becomes a central component of a person’s identity and self-understanding. Additional research has found that high levels of event centrality are associated with both post traumatic growth and PTSD [8,18,19].

Our finding that the valence of the construct of perceived impact predicted HRQL is consistent with the possibility that how individuals construe the current impact of ACE is important. Most studies examining centrality and outcomes select a single candidate adversity or trauma. Our study extends the current research by incorporating impact ratings for multiple candidate adverse experiences to create a mean impact rating score for each individual subject and this mean impact score can be examined as a continuous variable to predict HRQL outcomes.

Participants in the current study demonstrated remarkable consistency in their individual impact rating scores across adverse experiences. Interestingly; the neutral group more closely resembled the positive impact group in terms of HRQL. The positive impact group was highest for both summary scores of HRQL with the neutral group falling being between positive and negative impact groups but significantly differing from the negative group. For the pain subscore, positive and neutral groups were significantly less impacted compared with the negative impact group. These findings suggest that individuals may “assign” a consolidated and overarching impact assessment to multiple past adverse events and that this may in turn effect aspects of mental and physical health functioning.

Clinical implications

These finding may have significant clinical implications. For

example, therapies specifically focused on mitigating the continued perceived negative impact of ACE could be developed or enhanced with the ultimate goal of increasing physical and mental health functioning. In addition, chronic, non-cancer pain is a major health problem in the United States. Our research raises the issue of whether clinicians should be screening for ACE and current negative impact of these events in patients seeking treatment for chronic pain. It is conceivable that focused interventions might be developed, targeting adult individuals with chronic pain and continued high negative impact of ACE, that helps facilitate a change in the valence of this perceived impact, thereby improving their HRQL and perhaps reducing the disability of their pain syndromes.

Limitations: Research linking childhood adversity and adult health outcomes has suffered from a dearth of prospective studies in this area, and this study which relies on retrospective reports of childhood adversity is no exception. However, we suggest that our research focusing on the effects of *current perception* of the impact of childhood adversity in adults' current lives partially overcomes this limitation, as our central hypothesis is that current perception is in fact part of the causal chain between ACE and adult outcomes.

Future directions

Given our results suggesting that bodily pain is significantly associated with negative adult impact of ACE, further research into this relationship seems warranted. A recent consensus report from the Institute of Medicine ("Relieving Pain in America: A Blueprint for Transforming Prevention, Care, Education and Research, 2011) as well as recent recommendations from the National Guideline Clearinghouse (2009) suggests that associations between ACE and chronic pain should be assessed. Our study extends this call to action with the recommendation that any future research on the relationship between ACE experience and chronic pain incorporate the "impact" questions. Our team is currently validating the CHHARM ACE scale in combination with pain assessments (pain interference and HRQL) to assess the relationships between ACE, impact and chronic pain among patients being treated in a pain clinic on a regular basis. Given the prevalence of pain experience among patients in primary care practices, a similar effort is recommended in primary care settings. Should these relationships hold as hypothesized, interventions specifically tailored to patients with chronic pain who report adult impact of ACE should be developed and tested.

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