Journ Child Adol Trauma (2017) 10:275–287
DOI 10.1007/s40653-016-0093-0

ORIGINAL ARTICLE

The Impact of Adverse Childhood Experiences on Health in College Students

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Published online: 3 May 2016

Abstract Adverse Childhood Experiences (ACEs) are linked to poor adult health (Felitti et al. *American Journal of Preventive Medicine*, *14*(4), 245–258, 1998; Brown et al. *BMC Public Health*, *10*, 20, 2010). Research on ACEs exposure in college students is lacking. This study examined the impact of ACEs, health risk behaviors, and resiliency factors on objective and subjective measures of health in college students. ACEs and health risk behaviors emerged as significant predictors of health problems. However, when resiliency factors were accounted for, gender and life satisfaction were the only significant predictors of health problems. Likewise, ACEs score and health risk behaviors emerged as significant predictors of self-rated health. However, when resiliency factors were accounted for, gender, social support, and affect were the only significant predictors of self-rated health. Life satisfaction mediated the relationship between ACE score and health problems. Findings suggest that ACEs exposure has a lasting impact on health. The ability of resiliency factors to predict health has important implications for working with college students.

Keywords Resiliency · Satisfaction with life · Affect · Social support · University students

Research on adult community samples has established a relationship between Adverse Childhood Experiences and poor physical health in adulthood (Anda et al. 1999, 2002; Brown et al. 2010; Dong et al. 2004a, b; Felitti et al. 1998). Adverse Childhood Experiences (ACE) included acts of physical, emotional, and sexual abuse, neglect by caretakers, and family disruption in the years prior to turning 18. Family disruption was defined as witnessing violence between adults in the family, a family member abusing alcohol or drugs, a household member with a mental illness, and/or criminal behavior in the home. Within the original ACEs studies, as well as the current one, behaviorally specific questions asked if a particular adverse event occurred in the person's life prior to the age of 18. Individuals responded "yes" or "no" and each affirmative response received a score of 1. The total ACE score was the total number of "yes" responses (Felitti et al. 1998).

Research has found that exposure to ACEs substantially increases risk for disease conditions, such as cancer, cardiovascular disease, and chronic obstructive pulmonary disease, which are some of the leading causes of death in U.S. adults (Felitti et al. 1998; Brown et al. 2010; Danese et al. 2009; Fuller-Thomson and Brennenstuhl 2009). Other aspects of health functioning have also been linked to ACEs, including decreased health-related quality of life, increased health care utilization and premature death (Kendall-Tackett 2000; Chartier et al. 2010; Edwards et al. 2007; Corso et al. 2008).

Detrimental childhood experiences have been linked to engagement in health damaging behaviors in adulthood. Exposure to maltreatment predicts increased risk for alcohol dependence and abuse and alcohol related problems (Anda et al. 2002; Dube et al. 2002, 2006), smoking and smoking persistence in the face of a smoking-related medical condition (Edwards et al. 2007; Ford et al. 2011; Anda et al. 1999), use of illicit drugs, particularly injectable drugs (Dube et al. 2003a; Dong et al. 2003), and sexual health risk behaviors (Felitti and Anda 2010; Hillis et al. 2000). Specific adverse childhood events have not been found to be as predictive of

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poor health outcomes as the total number of adverse events that an individual had been exposed to (Anda et al. 2006). Research on the long term impact of adverse childhood experiences focused on adult community samples. Studies utilizing younger populations are necessary to help delineate causal mechanisms in the relationship between adverse experiences in childhood and long term psychological and physical outcomes. As such, research utilizing a college student sample can extend research on the ACEs pathway into the younger years, as well as explore a population that has unique characteristics and needs (Arnett 2000, 2005; Flood et al. 2009).

Emerging Adulthood

Research has begun to identify emerging adulthood as a unique developmental stage. Recent large scale societal changes have led to a stronger need for young people to acquire education and training beyond high school in order to gain entry into the middle class (Arnett 2014). This continued engagement in vocational and educational training increases opportunities for self-socialization and allows emerging adults to broaden their connections to social groups distinct from their families of origin (Arnett 2007). For ACEs survivors entering this developmental stage, college entry may present an opportunity to gain distance from families that may have been the source of their victimization experiences (United States Department of Health & Human Services [USDHHS] 2010). College is a time when students are immersed in a community of peers and faculty and exposed to new ideas and ways of living. This allows for engagement with a new environment and encourages students to focus on developing their own unique capacities (Arnett 2007). As such, college settings provide opportunities for ACE survivors to increase their adaptive functioning.

Five factors have been found to be most relevant to the development of adaptive or resilient functioning: 1) constructive attachments to other people that involve emotional support and encouragement, 2) the development of intellectual skills, increased knowledge, and increased problem-solving abilities, 3) the ability to regulate emotions and cognitions, 4) the motivation to master new skills, take action to aid goal achievement, and recognize the rewards available for hard work, and 5) the ability to see beyond current difficulties and have hope or faith in change, as well as to find meaning in life (Masten 2014). Emerging adulthood may be a time when the impact of early exposure to trauma can be mitigated by the promotion of adaptive factors, such as emotionally supportive relationships, opportunities for success, motivation for skills mastery, and increased opportunities to enhance hopefulness and life meaning (Masten 2014).

Research has demonstrated that the level of trauma exposure in college populations is comparable to community samples (Rutter et al. 2013; Anders et al. 2012). However, college students differ from adults in how they respond to adversity (Brener et al. 1999; Rind et al. 1998; Watson and Haynes 2007). In these studies, traumatic experiences were significantly broader than in the ACEs studies. They included traumatic events outside of family relationships as well as events such as car accidents, severe illness, and natural disasters. While alcohol and substance use patterns often emerged in early or mid-adolescence (Hingson et al. 2003), emerging adulthood creates a window of time where health behaviors could solidify or change. College students are immersed in a community of peers who might encourage the expansion of adaptive resiliency-building behaviors or increased engagement in health risk behaviors. The consequences of health risk behaviors have not yet manifested in early adulthood, but might emerge later in life as mid and late age-of-onset diseases (Felitti et al. 1998; Anda et al. 2008; Dong et al. 2004a, b).

Differences in the prevalence rates of disease conditions, disorders, and syndromes in this population, differences in health risk behavior engagement, and differences in other major health outcomes (e.g., psychopathology) lend evidence to the premise that the relationship between adverse childhood experiences and physical health might show unique and different patterns in college students (Anders et al. 2012). For example, comparisons of university students to community or clinical samples tend to find that students evidence smaller and more homogeneous effect sizes when the influence of child sexual abuse on adult psychological adjustment was examined, indicating that college students might experience less maladjustment as compared to other groups (Jumper 1995; Rind et al. 1998). These differences have important implications for working with college students. As demonstrated by Duncan (2000), as well as Anders et al. (2012) adjustment difficulties following trauma can have profound effects on college students, including increased risk for dropping out of college, poorer grades, and poorer self-rated health, even if symptoms of maladjustment do not reach pathological levels. As such, it is important to study subclinical issues in this population, as even moderate levels of maladjustment can have significant implications on college success and completion.

Trauma and Health in College Students

Studies that have assessed the impact of trauma on college students have used a variety of measures when investigating the impact of exposure to highly distressing events on health in college students. Flood et al. (2009) used the Life Events Checklist (LEC; Blake et al. 1995) that included such diverse events as: transportation accidents, sexual assault, and life-threatening injury. They found that post-traumatic stress symptoms were linked to overall health symptoms, specific health problems and conditions, and functional impairment,

even when participants did not meet full criteria for Posttraumatic Stress Disorder (PTSD), whether or not they fully met Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (DSM-IV) diagnostic criteria (APA 1994). Anders et al. (2012) used the Traumatic Life Events Questionnaire (TLEQ; Kubany 2004). Similar to the LEC, this instrument measured a large range of events, including emotional maltreatment, someone breaking an important promise, the unwanted dissolution of a relationship, and being stalked. Thus, studies of the impact of trauma on college students tend to focus on events across the lifespan, rather than examining traumatic events occurring within the family prior to the age of 18. Runtz (2002) conducted one of the only studies with college students that is comparable to the ACEs research, assessing the impact of multiple forms of maltreatment in childhood on physical health in female college students. This study found that a history of maltreatment was related to increases in general health symptoms, as well as premenstrual and menstrual symptoms.

Research has also demonstrated a relationship between broadly defined trauma exposure in college students and engagement in health risk behaviors. Brener et al. (1999) found that students with a history of rape were more likely to report health risk-behavior engagement. Heavy drinking and marijuana use emerged as significantly related to rape history. Flood et al. (2009) found significant correlations between PTSD symptomology and a range of health risk behaviors. Reed et al. (2007) found a link between PTSD and an increased risk for drug abuse and dependence. Exposure to trauma, with no subsequent presence of PTSD symptoms, did not predict drug abuse or dependence, or emergence of problematic use. Trauma severity influenced rates of drug and alcohol related consequences (Read et al. 2012). Roemmele and Messman-Moore (2011) found positive correlations between physical, sexual, and emotional child abuse and the lifetime number of sexual partners in college students; physical and sexual abuse were correlated with high-risk sexual behaviors. Studies have also found increases in alcohol consumption and alcohol-related consequences in college students with a history of maltreatment (Goldstein et al. 2010), as well as higher rates of smoking for students who met criteria for PTSD (Read et al. 2012).

Several studies have demonstrated the role of health risk behaviors as partial mediators in the relationship between trauma exposure and health in college students. Flood et al. (2009) found that substance use moderately mediated the relationship between PTSD symptoms and physical health in college students; no mediation effect was observed for smoking. Rutter et al. (2013) found that lack of exercise mediated the relationship between PTSD and depressive symptoms and poorer functional and physical health, such that participants with more psychological symptoms were less likely to engage in physical activity and more likely to have health problems.

Limitations of Existing Research on College Students

The existing research on trauma experiences in college populations does not examine the impact of cumulative exposure to adversity in childhood on health and health risk behaviors. Rather, it focuses on specific categories of childhood abuse (Runtz 2002), or broadly addresses trauma exposure across the lifespan (Anders et al. 2012; Rutter et al. 2013; Flood et al. 2009; Reed et al. 2007). Research has increasingly found that co-occurrence and polyvictimization occurs more often than single types of trauma (Hamby and Grych 2013). Experiencing one form of abuse has been found to drastically increase the risk of experiencing another form of abuse, and the negative outcomes of adversity increase greatly for each additional category of experience endorsed (Felitti et al. 1998; Wegman and Stetler 2009; Jumper 1995; Dong et al. 2004a, b). Research has also demonstrated that individuals who endure multiple categories of abuse or trauma evidence more physical and mental health symptoms, as compared to individuals experiencing one event (Felitti 2002; Kendall-Tackett 2000; Brown et al. 2009). Research done on trauma exposure across the lifespan may miss important distinctions, as the impact of trauma across the lifespan may differ from the impact of trauma during critical periods of great developmental vulnerability (Felitti et al. 2010; Taylor et al. 2011; Middlebrooks and Audage 2008; Dong et al. 2004a, b).

The Current Study

The current study examined the impact of ACEs on objective and subjective measures of health in college students, as well as the role of risk and resiliency factors in this relationship. In line with previous research, it was expected that higher ACEs exposure would be linked to poorer objective and subjective health. Furthermore, health risk behaviors and resiliency factors were predicted to serve as mediators in the relationship between ACEs exposure and health.

Methods

Participants

Participants were undergraduate students at a mid-sized eastern university, currently enrolled in an introductory Psychology course. Only students between the ages of 18 and 24 were included. A total of 214 students completed the study. Data from two participants was excluded because over 10 % of items were left unanswered, resulting in a total sample size of 212. Tables 1 and 2 depict frequencies for the categorical variables of gender and race/ethnicity. The mean age for participants was 18.97 (SD = 10.28).

Table 1 Frequencies for gender

	n	%
Male	121	57.1
Female	91	42.9

Procedures

Participants completed eight measures which were administered via a computer-based survey program. The Family History questionnaire assessed for ACE exposure, health risk behaviors, and collected demographic data. The Health Appraisal Questionnaire served as a measure of objective health. The RAND 36 assessed for subjective perceptions of health. Participants also completed the Positive and Negative Affect Schedule (PANAS), the Satisfaction with Life Scale (SWLS), the Perceived Stress Scale (PSS), and the Perceived Social Support scale (PSS). These four measures assessed the role of resiliency factors in the relationship between ACE score and health. Questionnaires were counterbalanced to mitigate the possible effects of order of presentation. Participants were allowed as much time as needed to complete all eight measures. Total administration time was half an hour to 45 min.

Measures

Family History Questionnaire The Family History questionnaire, as utilized in the original ACE study (Felitti et al. 1998), collects a broad range of demographic information as well as personal information and family history. The ACE score was obtained by determining if criteria were met for a particular category using pre-determined cut-offs and summing the categories for which criteria were met. Possible ACE scores range from a score of zero (endorsing no ACEs) to a score of 10 (endorsing all ten ACEs). In the present study, ACE scores ranged from 0 to 8 with a mean score of 2.

The Family History Questionnaire also assesses five categories of health risk behaviors. Similar to ACE score calculation, participants were considered to meet criteria for a specific health risk behavior based on pre-determined cut-off scores. Health risk behavior score was obtained by summing the health risk behaviors for which criteria were met, with possible scores ranging from zero to five health risk behaviors. In the present study, health risk behavior score ranged from 0 to 5 with a mean of 1.93.

The Family History questionnaire was modified for use with a college student population. Three additional health risk behavior questions were added to assess for the usage of tobacco products other than cigarettes. In conjunction with items assessing exercise frequency and weight, an additional item assessing for height at the time the individual weighed most was added to allow for the calculation of highest BMI ever for the participant. Due to concerns that the extensive length of the original survey would jeopardize accurate reporting, items that did not directly relate to the research questions were removed; this included questions regarding parent health risk behaviors, such as smoking and detailed questions regarding romantic relationships and sexual encounters in adulthood.

Weighted kappa-statistics for a version of the Family History questionnaire that utilized eight ACE categories were in the range of .52 to .72 for ACE items. Witnessing one's mother "ever threatened or hurt by a knife or gun" had the lowest reliability coefficient (.52). The weighted kappa-coefficient for ACE score was .64 (Dube et al. 2004).

Table 2 Frequencies for race/ethnicity

	n	%
Asian	3	1.4
Black	22	10.4
American Indian	1	.5
White	179	84.4
Hispanic	2	.9
Other	5	2.4

Health Appraisal Questionnaire The Health Appraisal questionnaire utilized in Felitti et al. (1998) study is comprised of approximately 200 questions assessing demographic data, mental health, functional health, abuse history, self-rated health, and physical health/disease conditions through a comprehensive review of body systems. In medical practice, 75–80 % of patient information regarding current disease conditions and disease history is obtained via patient self-report, much like this questionnaire, rather than through more objective measures such as medical records and laboratory tests (V. Felitti, personal communication, September 8, 2013 & September 14, 2013).

The Health Appraisal questionnaire was shortened for the purpose of the present study. Items assessing demographic data, mental health, and abuse history were removed. Some body systems lists were shortened to allow for faster completion time. Each body systems category had an open-ended item that prompted participants to detail any health condition which was not listed. The last item of the questionnaire once again prompted participants to report any disease condition that was not asked about throughout the survey.

The modified Health Appraisal questionnaire utilized in the present study consists of 15 body systems categories, including a men's health and a women's health category. A total disease conditions score was derived by summing the number of disease conditions the participant endorsed under that particular category. In the present study, scores ranged from 0 to 11 with a mean of 3.71.

RAND 36 The RAND 36-Item Health Survey (Hays et al. 1995) assesses functional health across eight domains: physical functioning, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, general mental health, social functioning, energy/fatigue, and general health perceptions. The present study utilized the General Health scale as a measure of self-rated health. Scale scores range from zero to 100 with higher scores representing a better state of health. In the present study, the mean score was 68.4.

Reliability coefficients for the RAND 36 exceed .70 for every scale. Cronbach's alpha for Physical Functioning and General Health are .93 and .78, respectively. Convergent validity for all items is .40 or higher; and each item had at least a .40 correlation with the scale it belongs to. Measures of physical health correlate highly with other measures of this construct (Hays et al. 1995).

Positive Affect Negative Affect Schedule The Positive Affect Negative Affect Schedule **(**PANAS) assesses for current affect (Watson et al. 1988). Participants are asked to rate on a scale of one to five to what extent they experienced a certain emotion "… in general, that is, on average." Positive Affect (PA) and Negative Affect (NA) scores are derived by summing the items belonging to that scale, with possible scores ranging from 10 to 50. A higher scale score indicates greater overall affectivity on that scale. In the present study, Positive Affect scores ranged from 11 to 50 with a mean score of 35.12. Negative Affect scores ranged from 0 to 44 with a mean of 22.15.

The PANAS has been found to have good construct validity, with latent modeling resulting in two correlated factors (positive affect and negative affect) corresponding to the PA and NA scales (Crawford and Henry 2004). Cronbach's alpha ranges from 0.86 to 0.90 for the PA scale, and from 0.84 to 0.87 for the NA scale (Watson et al. 1988). Test–retest correlations range from 0.47 to 0.68 for the PA scale, and from 0.39 to 0.71 for the NA scale. As affect changes over time, it would be expected that affect scores do not remain stable.

Satisfaction with Life Scale The Satisfaction with Life Scale (SWLS) (Diener et al. 1985) assesses for life satisfaction. Participants are asked to indicate their agreement with each item on a seven point Likert scale, with "1" indicating strong agreement and "7" indicating strong disagreement. A total scale score is obtained by summing the scores for each of the items. Scores range from 5 to 35, with lower scores indicating less life satisfaction. In the present study, SWLS scores ranged from 5 to 35 with a mean of 25.14.

In previous studies, the 2-month test–retest correlation coefficient for the SWLS was .82. Coefficient alpha was .87. Factor analysis on the inter-item correlation matrix produced one factor, which accounted for 66 % of the variance. Factor loadings for each item range from .61 to .84. Item-total correlations range from .57 to .75 (Diener et al. 1985).

Perceived Stress Scale The Perceived Stress Scale (PSS) assesses the degree to which an individual perceives current life events as stressful (Cohen et al. 1983). The PSS consists of fourteen items assessing emotions and cognitions related to stress. Participants are asked to rate, on a scale of one to four, how often they have felt or thought a certain way over the past month (0 = Never; 4 = Very Often). The PSS score is derived by reverse scoring seven positively stated items and then summing all 14 items. Higher scores indicate greater levels of stress.

In the present study, item one was omitted in error. Reliability analysis for the remaining 13 items revealed a slightly negative Cronbach's alpha coefficient for item 12. As such, a 12-item version of the PSS, with item one and item 12 omitted, was used for this study. The PSS scores ranged from 4 to 37, with a mean of 20.18.

In three separate college student samples, internal consistency was .84, .85, and .86, respectively. In the present study, Cronbach's alpha was .836 for the 12-item version of the PSS. Test–retest reliability was .85 in a sample of college students who were re-tested after 2 days, and .55 in a sample of college students re-tested after 6 weeks (Cohen et al. 1983); it would be expected that perceived stress would change over a 6 week period.

Perceived Social Support Scale Perceived Social Support (Turner and Marino 1994) assesses participants' subjective perceptions of social support. In this study, this scale was used to assess for the impact of social support on the relationship between self-reported ACEs and self-reported disease conditions/self-rated health. The Perceived Social Support scale consists of 25 items assessing perceived social support across four domains, spouse/partner support, friend support, relative support, work support. Lower scores indicate higher levels of social support.

In an epidemiological study (Turner and Marino 1994), alpha coefficients were .83 for spouse/partner support, .94 for friend support, .94 for relative support, and .75 for co-worker support. Factor analysis conducted on a version of the PSS that assessed only family and friend support produced two factors: family support and friend support. Three items that did not show significant loadings were dropped from the questionnaire.

Results

Table 3 depicts means and standard deviations for all of the continuous variables utilized in this study, including the outcome variables of health problems and self-rated health. While

Table 3 Descriptive statistics for continuous variables

	Min	Max	Mean	SD
Age	18	24	18.97	1.028
ACE score	0	8	2.00	1.786
Health risk behaviors	0	5	1.94	1.098
Perceived stress	4	37	20.154	6.799
Social support	1	3.52	1.829	.552
Positive affect	11	50	35.09	7.226
Negative affect	10	44	22.15	7.226
Satisfaction with life	5	35	25.187	6.767
Health problems	0	11	3.66	2.566
General health	0	100	68.37	19.222

Table 5 ACE score frequencies

ACE score	*n*	%
0	52	24.5
1	48	22.6
2	42	19.8
3	24	11.3
4	23	10.8
5	15	7.1
6	5	2.4
7	2	.9
8	1	.5

$N = 212$

this study did not examine the impact of age or race/ethnicity on health, as both variables were highly constricted in this predominantly Caucasian, age-homogenous sample. Descriptive information for these variables is reported in Table 2 (race/ethnicity) and Table 3 (age). Table 4 depicts zero-order correlations for all of the variables examined in this study.

Table 5 depicts the frequency distribution for ACE scores. Scores ranged from zero to eight, with a mean score of two; 75.4 % of participants reported exposure to one or more ACEs. Table 6 depicts the frequency of each ACE category endorsed. Emotional neglect was most common (37.3 %), followed by parental divorce or separation (33.5 %), and household substance abuse (30.2 %).

A hierarchical regression analysis was conducted to examine the relative contributions of eight predictor variables in explaining the variance in Health Problems (see Table 7). The order in which predictor variables were entered into the model was based on theoretical knowledge and study design. Control variables were entered first (e.g., gender), followed by variables that occurred early in life (e.g., ACE score), followed by currently occurring variables (e.g., health risk behaviors, life satisfaction, perceived stress, social support, positive/negative affect). As this study sought to examine the independent contributions of health-risk behaviors and resiliency factors (e.g., stress and social support), health risk behaviors and resiliency factors were entered into separate blocks of the model. Together, all of the predictor variables accounted for 24.6 % of the variance in Health Problems, (F (8, 203) = 8.825, $p < .001$), *adjusted* $R^2 = .216$.

The first block of the hierarchical regression model examined gender as a control variable. Gender explained 8 % of the variance in Health Problems, (F (1, 210) = 18.22, $p < .001$). The influence of gender was highly statistically significant ($p < .001$), such that female participants reported more health problems than male participants.

The influence of ACE score, entered into the second block of the model, was statistically significant ($p < .001$) and explained an additional 4.5 % of the variance in health problems, (F (2,209) = 14.955, $p < .001$). Participants reporting higher ACE scores also reported more health problems. Health risk behaviors, entered into the third block of the model, also emerged as statistically significant at the $p < .05$ level and

Table 4 Zero-order correlations

	1	2	3	4	5	6	7	8	9	10
1. Gender[a]	–									
2. ACE score	.066	–								
3. Health risk behaviors	−.273**	.162*	–							
4. Perceived stress	.120	.268**	.265**	–						
5. Social support	−.097	.281**	.073	.291**	–					
6. Positive affect	−.195**	−.238**	−.143*	−.590**	−.315**	–				
7. Negative affect	.047	.220**	.217**	.589**	.243**	−.358**	–			
8. Satisfaction with life	.079	−.352**	−.175*	−.519**	−.383**	.408**	−.416**	–		
9. Health problems	.283**	.231**	.100	.348**	.145*	−.264**	.282**	−.334**	–	
10. General health	−.162*	−.180**	−.173*	−.407**	−.280**	.443**	−.463**	.272**	−.393**	–

* $p < .05$, ** $p < .01$

[a] Gender was re-coded, such that 0 = male and 1 = female

Table 6 Frequency of ACE categories

ACE category	*n*	%
Physical abuse	41	19.3
Psychological abuse	32	15.1
Sexual abuse	7	3.3
Physical neglect	36	17
Emotional neglect	79	37.3
Witnessing maternal battering	12	5.7
Household mental illness	59	27.8
Household substance abuse	64	30.2
Household criminal activity	22	10.4
Parental divorce or separation	71	33.5

$N = 212$

explained an additional 2.2 % of variance, (F (3, 208) = 11.935, $p < .001$). Participants who reported more health risk behavior engagement also reported more health problems.

Five resiliency factors, entered into the fourth and final block of the model, together explained an additional 10 % of the variance in health problems. Of the five resiliency factors, satisfaction with life was the only variable to reach statistical significance ($p < .01$), such that low life satisfaction scores predicted high health problem scores.

As depicted in Table 7, when all of the predictors were included in the model, the following variables emerged as statistically significant predictors of health problems: gender and satisfaction with life. While ACE score and health risk behaviors were statistically significant predictors of health problems in the second and third block, they were no longer statistically significant predictors of health problems in the final block of the model.

A similar hierarchical regression analysis was conducted to examine the relative contributions of the same eight predictor variables in explaining the variance in self-rated health (see Table 8). Together, all of the predictor variables accounted for 33.2 % of the variance in self-rated health, (F (8, 203) = 12.632, $p < .001$, *adjusted* $R^2 = .306$).

The first block of the hierarchical regression model examined gender as a control variable. Gender explained 2.6 % of the variance in self-rated health, (F (1, 210) = 5.693, $p < .05$). The influence of gender was statistically significant ($p < .05$), such that female participants reported poorer self-rated health than male participants. The influence of the ACE score, entered into the second block of the model, was statistically significant ($p < .05$) and explained an additional 2.9 % of the variance in self-rated health, (F (2,209) = 6.115, $p < .01$). Participants reporting higher ACE scores also reported poorer self-rated health. Health risk behaviors, entered into the third block of the model also emerged as statistically significant at the $p < .01$ level and explained an additional 3.9 % of variance, (F (3, 208) = 7.231, $p < .001$). Participants who reported more health risk behavior engagement also reported poorer self-rated health.

Five resiliency factors, entered into the fourth and final block of the model, together explained an additional 23.8 %

Table 7 Hierarchical multiple regression with health problems as the outcome variable

	Beta (β)	*T* value	Sig.	Adjusted R^2	R^2 change
Block 1					
Gender	.238***	4.268	.000	.075	.080
Block 2					
Gender	.268***	4.139	.000	.117	.045
ACE score	.213**	3.292	.001		
Block 3					
Gender	.313***	4.666	.000	.135	.022
ACE score	.185**	2.835	.005		
Health risk behaviors	.156*	2.299	.023		
Block 4					
Gender	.308***	4.532	.000	.216	.099
ACE score	.069	1.020	.309		
Health risk behaviors	.089	1.318	.189		
Social support[a]	.016	.228	.820		
Positive affect	.015	.196	.845		
Negative affect	.073	.954	.341		
Satisfaction with life	−.231**	−2.949	.004		
Perceived stress	.110	1.197	.223		

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

[a] Social support is scored such that a lower score indicates a higher level of social support

Table 8 Hierarchical multiple regression with self-rated health as the outcome variable

	Beta (β)	*T* value	Sig.	Adjusted R^2	R^2 change
Block 1					
Gender	−.162*	−2.386	.018	.022	.026
Block 2					
Gender	−.151*	−2.243	.026	.046	.029
ACE score	−.170*	−2.528	.012		
Block 3					
Gender	−.211**	−3.054	.003	.081	.039
ACE score	−.132	−1.968	.050		
Health risk behaviors	−.209**	−2.999	.003		
Block 4					
Gender	−.137*	−2.142	.033	.306	.238
ACE score	.007	.106	.915		
Health risk behaviors	−.100	−1.573	.117		
Social support[a]	−.138*	−2.122	.035		
Positive affect	.256**	3.448	.001		
Negative affect	−.323***	−4.473	.000		
Satisfaction with life	−.022	−.296	.768		
Perceived stress	.005	.053	.958		

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

[a] Social support is scored such that a lower score indicates a higher level of social support

of the variance in self-rated health. Of the five resiliency factors, three reached significance: social support ($p < .05$), positive affect ($p < .001$), and negative affect ($p < .001$). High levels of social support and higher positive affect predicted better self-rated health, while higher levels of negative affect predicted poorer self-rated health.

As depicted in Table 8, when all of the predictors were included in the model, the following variables emerged as statistically significant predictors of self-rated health: gender, social support, positive affect, and negative affect. As with the predictors of health problems, ACE score and health risk behaviors were statistically significant predictors of self-rated health in the second and third block, but were no longer statistically significant predictors of self-rated health in the final block of the model.

When predictors exerted a significant effect on health problems, bootstrapping procedures and sobel testing were used to examine the potential role of these variables as mediators between ACE score and health problems. Health risk behavior score was tested as a potential mediator in the relationship between ACE score and health problems, controlling for all other predictor variables used in the multiple regression model. Standardized indirect effects were computed for 1000 bootstrapped samples. The 95 % confidence interval was used to determine the indirect effects at the 2.5th and 97.5th percentiles. No significant mediation effects were found for health risk behavior in the relationship between ACE score and health problems.

Satisfaction with life was entered as a potential mediator in the relationship between ACE score and health problems, controlling for all other predictor variables used in the multiple regression model. A significant mediation effect was found for satisfaction with life. The bootstrapped standardized indirect effect was .0609, and the 95 % confidence interval ranged from .0092 to .1444. The Sobel statistic, which is a more conservative measure of mediation, was also significant ($z = 2.0881$, $p < .05$).

Similarly, when predictors exerted a significant effect on self-rated health, bootstrapping procedures and sobel testing were used to examine the potential role of these variables as mediators between ACE score and self-rated health. Health risk behavior score was tested as a potential mediator in the relationship between ACE score and self-rated health, controlling for all other predictor variables used in the multiple regression model. No significant mediation effects were found for health risk behavior in the relationship between ACE score and self-rated health.

Social support was entered as a potential mediator in the relationship between ACE score and self-rated health, controlling for all other predictor variables used in the multiple regression model. Likewise, positive affect and negative affect were entered as potential mediators in separate equations, controlling for all other predictor variables. No significant mediation effects were found for any of these variables.

Discussion

This study sought to examine the frequency of Adverse Childhood Experiences (ACEs) in college students and the relationship between ACEs and physical health in this population. There is a growing recognition that emerging adulthood is a unique developmental stage (Arnett 2000, 2005; Flood et al. 2009). It is important to understand if the relationship between ACEs and health in emergent adulthood differs from the relationship between ACEs and health in later adulthood.

Exposure to one or more ACEs was reported by 75.5 % of participants in this study, as compared to 52 % of participants in Felitti et al. (1998) original study with an adult community sample. The finding that ACEs exposure was higher in this college student sample was surprising. As college educated individuals are considered to be high functioning members of society, the expectation might have been that they experienced lower levels of adversity in childhood, as compared to the general population.

As the ACEs framework has not been previously applied to college students, comparisons to previous research with this population must be made with caution. Studies examining trauma exposure across the lifespan find high rates of trauma in college students when trauma includes a broad spectrum of events such as sexual assault, being discriminated against, and facing a life threatening illness (Anders et al. 2012; Read et al. 2011; Watson and Haynes 2007), while the present study examined only intra-family trauma that occurred before age 18. Runtz (2002) conducted one of the few studies that focused specifically on childhood maltreatment in college students, finding that 19 % of participants reported a history of childhood sexual abuse, while 20 % reported childhood physical maltreatment. In the present study 19 % of participants reported a history of childhood physical abuse, while 3.3 % reported childhood sexual abuse.

There are several possible explanations for why ACEs exposure was higher in this college student population, as compared to studies conducted with community samples. One may be the nature of the population that was studied. The present study was conducted on a rural, predominantly Caucasian college campus in Western Pennsylvania, and it is possible that rates of childhood maltreatment are higher in this region, which is marked by a complex history of poverty and geographic isolation (Black et al. 2007). A second potential explanation, that rates of ACEs may have increased since Felitti et al. 1998 study, is not supported by recent research on adult community samples (Bynum et al. 2010; Kopec and Sayre 2004), which has continued to find similar rates of ACEs as the original study. A third explanation is that these younger participants, who have recently left their childhood homes, may be better able to recall adverse childhood experiences as compared to older adults who must reach further back in time to retrospectively report adverse events (Briere 1992).

Similar to prior research with community samples, this study found a link between ACEs and health with regard to self-rated health and specific disorders and disease conditions (Chartier et al. 2010; Corso et al. 2008; Felitti et al. 1998; Dong et al. 2003; Danese et al. 2009). A surprising result of this study was that when resiliency factors were taken into account, the contributions of ACEs exposure and health risk behaviors were reduced, and these variables were no longer statistically significant predictors of health. With the entry of resiliency factors, satisfaction with life emerged as the strongest predictor of health problems; social support and affect emerged as the strongest predictors of self-rated health.

Different resiliency factors were found to exert a significant effect on objective health problems and self-rated health. Positive affect/negative affect and social support exerted the strongest effect on self-rated health, whereas satisfaction with life exerted the strongest effect on health problems. Satisfaction with life also served as a mediator in the relationship between ACEs score and health problems; affect and social support did not play a similar mediating role. It is unclear why different resiliency variables served as significant predictors for objective versus subjective measures of health.

The results suggest that if individuals can develop key elements of resiliency, such as secure attachments in adulthood, the ability to regulate their thoughts and emotions, strong achievement motivation, and/or sources of environmental rewards for achievement (Masten 2014), these resiliency factors might mitigate the negative health effects that often follow adverse childhood experiences. Several studies lend support for the role of affect and social support as important intermediaries in the relationship between ACEs exposure and health (Dong et al. 2004a, b; Fuller-Thomson et al. 2012; Kimerling and Calhoun 1994). Previous research has also found that social support and affect play a role in the relationship between broadly defined trauma exposure and health (Kimerling et al. 2000; Kimerling and Calhoun 1994; Taft et al. 2007; Sachs-Ericsson et al. 2007). These studies point to the complex and under-researched role of social support and affect in the relationship between trauma and health. Research also links ACEs exposure to cognitive frameworks in adulthood that may be detrimental to life satisfaction (Kendall-Tackett 2002; Teegen 1999; Gauthier et al. 1995). These chronic negative and stressful thoughts can influence health through biological pathways, for example, leading to constant elevation of cortisol levels, which could suppress immune functioning and slow healing (Kendall-Tackett 2002). Research on possible causal models, specifically whether low life satisfaction contributes to poor health, is essential.

Limitations and Future Research

Several limitations of the present study should be noted. This study was correlational and cross-sectional in nature. As such, limited conclusions can be made regarding causal relationships between variables, particularly the directional relationship between ACEs exposure and health. However, a focus on adverse experiences in childhood, rather than trauma across the lifespan, makes it more likely that childhood events preceded, and therefore impacted, health status in adulthood.

Secondly, this study relied on participant self-report for all measures. This form of data collection might be susceptible to a range of influences. For example, reports of adverse experiences might have been susceptible to forgetting, and health-risk-behaviors might have been under-reported due to denial and shame. Social desirability effects might have led to over-reporting of positive affect, social support, and satisfaction with life, and under-reporting of stress and negative affect. Research has also demonstrated that participants might under-report or fail to recall adverse experiences (Williams 1994; Widom and Shepard 1996). As such, retrospective studies like this one might under-represent the actual rate of ACEs and their impact on health.

Future research should further explore rates of ACEs exposure in young adults, particularly differences in exposure between young adults who attend college, those who do not attend college, and those who begin college but do not complete their education. If emergent adults who attend at least some college show more resilience than those that do not, then an important intervention to decrease the impact of ACEs might be to promote continuing education after high school.

Secondly, more research is needed to further elucidate and inform the inter-relationships between ACEs, health risk behaviors, resiliency factors, and health. Although challenging to implement, prospective, longitudinal studies and controlled experiments could contribute to our knowledge of causal pathways in the relationship between ACEs exposure and health. A longitudinal study examining the impact of ACE exposure on physical health and psychological health throughout college would be a feasible and valuable direction for future research (D. Corwin, personal communication, August 25, 2015).

Thirdly, the ACEs survey includes only a limited number of the adverse experiences that can occur in childhood and adolescence. Cronholm et al. (2015) have found that poor, inner city minority populations have artificially lowered rates of violence exposure if only the traditional ACEs questionnaire is used. They expanded the original survey to include experiencing racism, witnessing violence, living in an unsafe neighborhood, experiencing bullying, and having lived in foster care. They found that including these additional items increased the predictive power of detecting adverse childhood events over the original items alone. They found that 50 % of their sample had experienced 1–2 of these additional events and 13 % experienced three or more adverse events (Cronholm et al. 2015). Adding these items would expand the original ACEs questionnaire to more accurately capture experiences of adversity in relation to poverty and racial injustice.

Finally, many researchers on adverse childhood experiences suggest therapeutic interventions to address experiences in childhood, with the hope of mitigating their long-term effects (Finestone et al. 2000; Cicchetti et al. 2013; Edwards et al. 2003, 2007). However, there has been a dearth of research on the utilization and efficacy of therapeutic approaches for individuals exposed to adverse experiences in childhood, particularly the use of present-focused therapies that emphasize the development of resiliency in adulthood. This study suggests that interventions that help individuals develop a sense of life satisfaction and meaningfulness may be effective in mitigating the negative impact of adverse childhood experiences.

Acknowledgments The authors would like to thank Krzysztof Kaniasty, Ph.D for his extensive guidance and expertise in study design and statistical analysis.

Compliance with Ethical Standards

Conflict of Interest All authors declare that they have no conflicts to report.

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

References

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: American Psychiatric Association. Revised.

Anda, R. F., Croft, J. B., Felitti, V. J., Nordenberg, D., Giles, W. H., Williamson, D. F., & Giovino, G. A. (1999). Adverse childhood experiences and smoking during adolescence and adulthood. *JAMA: The Journal of the American Medical Association*, *282*(17), 1652–1658. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/10553792.

Anda, R. F., Whitfield, C. L., Felitti, V. J., Chapman, D., Edwards, V. J., Dube, S. R., & Williamson, D. F. (2002). Adverse childhood experiences, alcoholic parents, and later risk of alcoholism and depression. *Psychiatric Services (Washington, D.C.)*, *53*(8), 1001–1009. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/12161676.

Anda, R. F., Felitti, V. J., Bremner, J. D., Walker, J. D., Whitfield, C. H., Perry, B. D., & Giles, W. H. (2006). The enduring effects of abuse and related adverse experiences in childhood. *European archives of psychiatry and clinical neuroscience, 256*(3), 174–186.

Anda, R. F., Brown, D. W., Dube, S. R., Bremner, J. D., Felitti, V. J., & Giles, W. H. (2008). Adverse childhood experiences and chronic obstructive pulmonary disease in adults. *American Journal of Preventive Medicine, 34*(5), 396–403. doi:10.1016/j.amepre.2008.02.002.

Anders, S. L., Frazier, P. A., & Shallcross, S. L. (2012). Prevalence and effects of life event exposure among undergraduate and community college students. *Journal of Counseling Psychology, 59*(3), 449–457. doi:10.1037/a0027753.

Arnett, J. J. (2000). Emerging adulthood: a theory of development from the late teens through the twenties. *American Psychologist, 55*(5), 469.

Arnett, J. J. (2005). The developmental context of substance use in emerging adulthood. *Journal of Drug Issues, 35*(2), 235–254.

Arnett, J. J. (2007). Socialization in emergent adulthood: From the family to the wider world, from socialization to self-socialization. In J. E. Grusec & P. D. Hastings (Eds.), *Handbook of socialization: Theory and research* (pp. 208–231). New York: Guilford Press.

Arnett, J. J. (2014). *Emerging adulthood: The winding road from the late teens through the twenties*. New York: Oxford University Press.

Black, D. A., Mather, M., & Sanders, S. G. (2007). *Standards of living in Appalachia, 1960–2000*. Washington, DC: Population Reference Bureau.

Blake, D. D., Weathers, F. W., Nagy, L. M., Kaloupek, D. G., Gusman, F. D., Charney, D. S., & Keane, T. M. (1995). The development of a clinician-administered PTSD scale. *Journal of Traumatic Stress, 8*(1), 75–90.

Brener, N. D., McMahon, P. M., Warren, C. W., & Douglas, K. A. (1999). Forced sexual intercourse and associated health-risk behaviors among female college students in the United States. *Journal of Consulting and Clinical Psychology, 67*(2), 252–259. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/10224736.

Briere, J. (1992). Methodological issues in the study of sexual abuse effects. *Journal of Consulting and Clinical Psychology, 60*(2), 196.

Brown, D. W., Anda, R. F., Tiemeier, H., Felitti, V. J., Edwards, V. J., Croft, J. B., & Giles, W. H. (2009). Adverse childhood experiences and the risk of premature mortality. *American Journal of Preventive Medicine, 37*(5), 389–396. doi:10.1016/j.amepre.2009.06.021.

Brown, D. W., Anda, R. F., Felitti, V. J., Edwards, V. J., Malarcher, A. M., Croft, J. B., & Giles, W. H. (2010). Adverse childhood experiences are associated with the risk of lung cancer: a prospective cohort study. *BMC Public Health, 10*, 20. doi:10.1186/1471-2458-10-20.

Bynum, L., Griffin, T., Ridings, D. L., Wynkoop, K. S., Anda, R. F., Edwards, V. J., et al. (2010). Adverse childhood experiences reported by adults—five states, 2009. *Morbidity and Mortality Weekly Report (MMWR)*, *59*(49), 1609–1613. Retrieved from: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5949a1.htm.

Chartier, M. J., Walker, J. R., & Naimark, B. (2010). Separate and cumulative effects of adverse childhood experiences in predicting adult health and health care utilization. *Child Abuse & Neglect, 34*(6), 454–464. doi:10.1016/j.chiabu.2009.09.020.

Cicchetti, D., Folger, S. F., Wright, M. O. D., Gilligan, R., Ager, A., Powers, A., & Rhodes, A. E. (2013). Annual research review: resilient functioning in maltreated children—past, present, and future perspectives. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 54*(4), 81–88. doi:10.1080/19371918.2011.619433.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24*, 385–396.

Corso, P. S., Edwards, V. J., Fang, X., & Mercy, J. A. (2008). Health-related quality of life among adults who experienced maltreatment during childhood. *American Journal of Public Health, 98*(6), 1094–1100. doi:10.2105/AJPH.2007.119826.

Crawford, J. R., & Henry, J. D. (2004). The Positive and Negative Affect Schedule (PANAS): construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 43*(3), 245–265.

Cronholm, P. F., Forke, C. M., Wade, R., Bair-Merritt, M. H., Davis, M., Harkins-Schwarz, M., Pachter, L. M., & Fein, J. A. (2015). Adverse childhood experiences: expanding the concept of adversity. *American Journal of Preventive Medicine, 49*, 354–361.

Danese, A., Moffitt, T. E., Harrington, H., Milne, B. J., Polanczyk, G., Pariante, C. M., … Caspi, A. (2009). Adverse childhood experiences and adult risk factors for age-related disease: depression, inflammation, and clustering of metabolic risk markers. *Archives of Pediatrics & Adolescent Medicine*, *163*(12), 1135–1143.

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*, 71–75.

Dong, M., Dube, S. R., Felitti, V. J., Giles, W. H., & Anda, R. F. (2003). Adverse childhood experiences and self-reported liver disease: new insights into the causal pathway. *Archives of Internal Medicine, 163*(16), 1949.

Dong, M., Anda, R. F., Felitti, V. J., Dube, S. R., Williamson, D. F., Thompson, T. J., & Giles, W. H. (2004a). The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction. *Child Abuse & Neglect, 28*(7), 771–784.

Dong, M., Giles, W. H., Felitti, V. J., Dube, S. R., Williams, J. E., Chapman, D. P., & Anda, R. F. (2004b). Insights into causal pathways for ischemic heart disease: adverse childhood experiences study. *Circulation, 110*(13), 1761–1766. doi:10.1161/01.CIR.0000143074.54995.7F.

Dube, S. R, Anda, R. F., Felitti, V. J., Edwards, V. J., & Croft, J. B. (2002). Adverse childhood experiences and personal alcohol abuse as an adult. *Addictive Behaviors*, *27*(5), 713–725. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/12201379.

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

Dube, S. R., Williamson, D. F., Thompson, T., Felitti, V. J., & Anda, R. F. (2004). Assessing the reliability of retrospective reports of adverse childhood experiences among adult HMO members attending a primary care clinic. *Child Abuse & Neglect, 28*(7), 729–737. doi:10.1016/j.chiabu.2003.08.009.

Dube, S. R, Miller, J. W., Brown, D. W., Giles, W. H., Felitti, V. J., Dong, M., & Anda, R. F. (2006). Adverse childhood experiences and the association with ever using alcohol and initiating alcohol use during adolescence. *The Journal of Adolescent Health: Official Publication of the Society For Adolescent Medicine*, *38*(4), 444.e1–e10. doi:10.1016/j.jadohealth.2005.06.006.

Duncan, R. D. (2000). Childhood maltreatment and college drop-out rates implications for child abuse researchers. *Journal of Interpersonal Violence, 15*(9), 987–995.

Edwards, V. J., Holden, G. W., Felitti, V. J., & Anda, R. F. (2003). Relationship between multiple forms of childhood maltreatment and adult mental health in community respondents: results from the adverse childhood experiences study. *American Journal of Psychiatry, 160*(8), 1453–1460.

Edwards, V. J., Anda, R. F., Gu, D., Dube, S. R., & Felitti, V. J. (2007). Adverse childhood experiences and smoking persistence in adults with smoking-related symptoms and illness. *The Permanente Journal, 11*(2), 5–13.

Felitti, V. J. (2002). The relation between adverse childhood experiences and adult health: turning gold into lead. *Permanente Journal, 6*(1), 44–47.

Felitti, V. J., & Anda, R. F. (2010). The relationship of adverse childhood experiences to adult medical disease, psychiatric disorders and sexual behavior: Implications for healthcare. In R. A. Lanius, E. Vermetten, & C. Pain (Eds.), *The impact of early life trauma on*

health and disease: The hidden epidemic (pp. 77–87). New York: Cambridge University Press.

Felitti, V. J., Jakstis, K., Pepper, V., & Ray, A. (2010). Obesity: problem, solution, or both? *The Permanente Journal, 14*(1), 24–30.

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine, 14*(4), 245–258.

Finestone, H. M., Stenn, P., Davies, F., Stalker, C., Fry, R., & Koumanis, J. (2000). Chronic pain and health care utilization in women with a history of childhood sexual abuse. *Child Abuse & Neglect, 24*(4), 547–556.

Flood, A. M., McDevitt-Murphy, M. E., Weathers, F. W., Eakin, D. E., & Benson, T. A. (2009). Substance use behaviors as a mediator between posttraumatic stress disorder and physical health in trauma-exposed college students. *Journal of Behavioral Medicine, 32*(3), 234–243. doi:10.1007/s10865-008-9195-y.

Ford, E. S., Anda, R. F., Edwards, V. J., Perry, G. S., Zhao, G., Li, C., & Croft, J. B. (2011). Adverse childhood experiences and smoking status in five states. *Preventive Medicine, 53*(3), 188–193. doi:10.1016/j.ypmed.2011.06.015.

Fuller-Thomson, E., & Brennenstuhl, S. (2009). Making a link between childhood physical abuse and cancer: results from a regional representative survey. *Cancer, 115*(14), 3341–3350. doi:10.1002/cncr.24372.

Fuller-Thomson, E., Bejan, R., Hunter, J. T., Grundland, T., & Brennenstuhl, S. (2012). The link between childhood sexual abuse and myocardial infarction in a population-based study. *Child Abuse & Neglect, 36*(9), 656–665. doi:10.1016/j.chiabu.2012.06.001.

Gauthier, L., Stollak, G., Messé, L., & Aronoff, J. (1995). Recall of childhood neglect and physical abuse as differential predictors of current psychological functioning. *Child Abuse & Neglect, 20*(7), 549–559.

Goldstein, A. L., Flett, G. L., & Wekerle, C. (2010). Child maltreatment, alcohol use and drinking consequences among male and female college students: an examination of drinking motives as mediators. *Addictive Behaviors, 35*(6), 636–639.

Hamby, S., & Grych, J. (2013). *The web of violence: Exploring connections among different forms of interpersonal violence and abuse*. New York: Springer.

Hays, R. D., Sherbourne, C. D., & Mazel, R. (1995). *User's manual for the Medical Outcomes Study (MOS) core measures of health-related quality of life*. Santa Monica: Rand Corporation.

Hillis, S. D., Anda, R. F., Felitti, V. J., Nordenberg, D., & Marchbanks, P. A. (2000). Adverse childhood experiences and sexually transmitted diseases in men and women: a retrospective study. *Pediatrics, 106*(1), E11. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/10878180.

Hingson, R., Heeren, T., Zakocs, R., Winter, M., & Wechsler, H. (2003). Age of first intoxication, heavy drinking, driving after drinking and risk of unintentional injury among US college students. *Journal of Studies on Alcohol and Drugs, 64*(1), 23.

Jumper, S. A. (1995). A meta-analysis of the relationship of child sexual abuse to adult psychological adjustment. *Child Abuse & Neglect, 19*(6), 715–728.

Kendall-Tackett, K. A. (2000). Physiological correlates of childhood abuse: chronic hyperarousal in PTSD, depression, and irritable bowel syndrome. *Child Abuse & Neglect*, *24*(6), 799–810. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/10888019.

Kendall-Tackett, K. (2002). The health effects of childhood abuse: four pathways by which abuse can influence health. *Child Abuse & Neglect, 26*(6–7), 715–729. doi:10.1016/S0145-2134(02)00343-5.

Kimerling, R., & Calhoun, K. S. (1994). Somatic symptoms, social support, and treatment seeking among sexual assault victims. *Journal of Consulting and Clinical Psychology*, *62*(2), 333–340. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/8201071.

Kimerling, R., Clum, G. A., & Wolfe, J. (2000). Relationships among trauma exposure, chronic posttraumatic stress disorder symptoms, and self-reported health in women: replication and extension. *Journal of Traumatic Stress, 13*(1), 115–128. doi:10.1023/A:1007729116133.

Kopec, J. A., & Sayre, E. C. (2004). Traumatic experiences in childhood and the risk of arthritis. *Canadian Journal of Public Health, 95*(5), 361–365.

Kubany, E. (2004). *Traumatic Life Events Questionnaire and PTSD Screening and Diagnostic Scale*. Los Angeles: Western Psychological Services.

Masten, A. S. (2014). *Ordinary magic: Resilience in development*. New York: Guildford Press.

Middlebrooks, J. S., & Audage, N. C. (2008). *The effects of childhood stress on health across the lifespan*. Atlanta: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.

Read, J. P., Ouimette, P., White, J., Colder, C., & Farrow, S. (2011). Rates of DSM–IV–TR trauma exposure and posttraumatic stress disorder among newly matriculated college students. *Psychological Trauma: Theory, Research, Practice, and Policy, 3*(2), 148.

Read, J. P., Colder, C. R., Merrill, J. E., Ouimette, P., White, J., & Swartout, A. (2012). Trauma and posttraumatic stress symptoms predict alcohol and other drug consequence trajectories in the first year of college. *Journal of Consulting and Clinical Psychology, 80*(3), 426.

Reed, P. L., Anthony, J. C., & Breslau, N. (2007). Incidence of drug problems in young adults exposed to trauma and posttraumatic stress disorder: do early life experiences and predispositions matter? *Archives of General Psychiatry, 64*(12), 1435.

Rind, B., Tromovitch, P., & Bauserman, R. (1998). A meta-analytic examination of assumed properties of child sexual abuse using college samples. *Psychological Bulletin, 124*(1), 22.

Roemmele, M., & Messman-Moore, T. L. (2011). Child abuse, early maladaptive schemas, and risky sexual behavior in college women. *Journal of Child Sexual Abuse, 20*(3), 264–283.

Runtz, M. G. (2002). Health concerns of university women with a history of child physical and sexual maltreatment. *Child Maltreatment, 7*(3), 241–253. doi:10.1177/1077559502007003006.

Rutter, L. A., Weatherill, R. P., Krill, S. C., Orazem, R., & Taft, C. T. (2013). Posttraumatic stress disorder symptoms, depressive symptoms, exercise, and health in college students. *Psychological Trauma: Theory, Research, Practice, and Policy, 5*(1), 56–61. doi:10.1037/a0021996.

Sachs-Ericsson, N., Kendall-Tackett, K., & Hernandez, A. (2007). Childhood abuse, chronic pain, and depression in the National Comorbidity Survey. *Child Abuse & Neglect, 31*(5), 531–547. doi:10.1016/j.chiabu.2006.12.007.

Taft, C. T., Vogt, D. S., Mechanic, M. B., & Resick, P. A. (2007). Posttraumatic stress disorder and physical health symptoms among women seeking help for relationship aggression. *Journal of Family Psychology, 21*(3), 354.

Taylor, S. E., Way, B. M., & Seeman, T. E. (2011). Early adversity and adult health outcomes. *Development and Psychopathology, 23*(3), 939–954. doi:10.1017/S0954579411000411.

Teegen, F. (1999). Childhood sexual abuse and long-term sequelae. In A. Maercker, M. Schutzwohl, & Z. Solomon (Eds.), *Posttraumatic stress disorder: A lifespan developmental perspective* (pp. 97–112). Seattle: Hogrefe & Huber.

Turner, R. J., & Marino, F. (1994). Social support and social structure: a descriptive epidemiology. *Journal of Health and Social Behavior, 35*, 193–212.

U.S. Department of Health and Human Services, Administration for Children and Families, Administration on Children, Youth and

Families, Children's Bureau. (2010). Child maltreatment 2008. Retrieved from: http://www.acf.hhs.gov/programs/cb/stats_research/index.htm#can.

Watson, D. (1988). Intraindividual and interindividual analyses of positive and negative affect: their relation to health complaints, perceived stress, and daily activities. *Journal of Personality and Social Psychology, 54*(6), 1020.

Watson, S. B., & Haynes, S. N. (2007). Brief screening for traumatic life events in female university health service patients. *International Journal of Clinical and Health Psychology, 7*(2), 261–282.

Wegman, H. L., & Stetler, C. (2009). A meta-analytic review of the effects of childhood abuse on medical outcomes in adulthood. *Psychosomatic Medicine, 71*(8), 805–812. doi:10.1097/PSY.0b013e3181bb2b46.

Widom, C. S., & Shepard, R. L. (1996). Accuracy of adult recollections of childhood victimization: part 1. Childhood physical abuse. *Psychological Assessment, 8*(4), 412.

Williams, L. M. (1994). Recall of childhood trauma: a prospective study of women's memories of child sexual abuse. *Journal of Consulting and Clinical Psychology, 62*(6), 1167.