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ORIGINAL ARTICLE

Adverse Childhood Experiences, Depression, Resilience, & Spirituality in African-American Adolescents

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Abstract

Research shows that exposure to adverse childhood experiences (ACEs) is common among adolescents and that exposure to ACEs is associated with an increased risk of depression in adolescents. Furthermore, it is unknown whether resilience and spirituality moderate the association between ACEs and depression in African-American adolescents. Thus, the present study examined the prevalence of ACEs and the association between ACEs and the risk for depression in African-American adolescents and examined whether this association is moderated by resilience and spirituality. Survey data were collected from African-American adolescents who attended youth-targeted events held by churches in Houston, TX. An expanded ACE tool was used to collect data and respondents were dichotomized into two groups based on their summed ACE scores, i.e., 0–3 ACEs versus 4–19 ACEs. Logistic regression was conducted to examine the association between ACEs and the likelihood of depression and to examine whether this association is moderated by resilience and spirituality. The results indicate that half of the sample had been exposed to four or more ACEs and that ACEs are negatively associated with depression: higher levels of resilience and spirituality suggest a lower likelihood of depression. These results suggest the need to explore the prevalence of cumulative ACEs among homogenous samples of African-American adolescents and the need to continue exploring and addressing the prevalence of individual ACEs among homogenous samples of African-American adolescents. No clinical trials were performed for this study.

Keywords ACEs · Adolescents · African-American · Trauma · Black · Depression · Resilience · Spirituality

Adverse Childhood Experiences

Exposure to traumatic events before age 18, known as adverse childhood experiences (ACEs), is an important public health issue because it can negatively affect physical and mental health over an individual's lifetime (Felitti et al. 1998). ACEs are perceived, intentional and/or nonintentional, acts of abuse, neglect, or household dysfunction (Anda et al. 2006; Felitti et al. 1998). Exposure to ACEs can have immediate and long-term effects on physical and mental health, as well as on behavior, in adolescents (Anda et al. 2006; Bethell et al. 2014). The immediate effects of ACEs can be seen in school behavior and classroom performance, which may include poor grades, inappropriate behavior, violence against

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peers, and truancy (Anda et al. 2006, 2010). For example, Holt et al. (2007) found that the prevalence of learning/behavior problems was higher among 689 students with an ACE score of ≥4 (i.e., exposure to at least 4 or more ACEs) than among those with an ACE score of 0. Other common effects of ACEs include constant disruptions in the classroom, fights with other students, and multiple detentions and expulsions from school (Anda et al. 2006; Bethell et al. 2014; Burke et al., 2011; Freeman 2014). For example, in a sample of 95,677 children and adolescents, Bethell et al. (2014) found that those with two or more ACEs had lower rates of school engagement and were more than twice as likely to repeat a grade in school than those who had experienced no ACEs.

The 2011–2012 National Survey of Children's Health (NSCH), estimates that in Texas, approximately one quarter of children have experienced two or more ACEs (Bethell et al. 2014). There are racial/ethnic differences in ACEs: African-American adolescents tend to experience more ACEs than white adolescents (Turner et al. 2006). African-American adolescents also experience a wide variety of ACEs that are not included in the original ACE study survey (Felitti 2002; Wade et al. 2014). Thus, in addition to the original ten ACEs, it is important to examine the ACEs experienced by adolescents, such as economic hardship, negative peer relationships, discrimination, and involvement in the child welfare and juvenile justice system (Felitti 2002; Wade et al. 2014).

ACEs: Measurement Prevalence

The original 10 ACEs have been studied extensively among nationally representative samples of children and adolescents (Bethell et al. 2014; Freeman 2014; Turner et al. 2006). For example, the 2011–2012 NSCH survey, which comprised 95,677 children and adolescents (age 0–17 years), revealed that nearly half of the sample reported exposure to at least one ACE and that 23% reported exposure to at least two out of eight ACEs that covered child abuse and household dysfunction (Bethell et al. 2014). The 2011–2012 NSCH survey also estimated that 23% of 1800 racially/ethnically diverse children and adolescents in Texas have experienced two or more ACEs. In recent years, there has been a call to assess additional ACEs among ethnic-minority adolescent populations and communities because these groups are likely to be exposed to a wider variety of ACEs than their nonethnic-minority counterparts (Finkelhor et al. 2007; Wade et al. 2014). ACE prevalence studies have used expanded survey tools that include the original three ACE categories (abuse, neglect, and household dysfunction) and additional hardship questions to measure exposure to adversity, such as the National Study of Children's Health (NSCH) survey and the Juvenile Victimization Questionnaire (JVQ). Expanding the questionnaire to include additional hardships that effect child development can improve predictability of short- and long-term health outcomes (Finkelhor et al. 2013). Additional ACE categories include violent crimes, property crimes, child welfare violations, violence of warfare and civil disturbances, bullying victimization, and peer/sibling victimization (Finkelhor et al. 2015; Turner et al. 2006). The National Survey of Children's Exposure to Violence study assessed exposure to 34 victimizations (ACEs) during the past year in a sample of 2030 children and adolescents (age 2–17 years) using the JVQ. In addition to the original 10 ACEs, the JVQ included exposure to violent crimes, property crimes, child welfare violations, violence of warfare and civil disturbances, bullying, physical assault, peer/sibling abuse, and witnessing/indirect abuse (Turner et al. 2006). Of the sample, 71% had experienced one ACE, 14% had experienced four to six ACEs, and 7% had experienced more than six ACEs (Turner et al. 2006). Those with four or more ACEs lived in larger cities, were older, and were African American. Specifically, in terms of race/ethnicity, African-American youth were more likely than non-African-American adolescents to experience more than six types of ACEs (Freeman 2014; Turner et al. 2006). These studies with nationally representative samples suggest that African-American adolescents are disproportionately affected by ACEs; however, studies are needed to confirm this finding in a racially homogenous sample of urban African-American adolescents.

Adverse Childhood Experiences and Depression

Exposure to ACEs has been linked to adverse mental health outcomes, including depression, and depression that initiates during adolescence can have life-long effects on an individual's health and well-being (Bethell et al. 2014; Rytilä-Manninen et al. 2014). In the United States, depression affects more than 12% of adolescents (age 12–17 years), 9% of whom are African-American (National Institute of Mental Health (NIMH) 2016). It is estimated that by age 18, 20% of adolescents will have had at least one depressive episode, with most of these adolescents being African-American (Avenevoli and Merikangas 2006; Moon and Rao 2010). Although there are many etiologies for the onset of depression, the accumulated exposure to a variety of ACEs warrants attention because of their immediate and long-term effects on mental health outcomes, including depression, among children and adolescents (Chapman et al. 2004; O'Grady & Metz, 1987). For example, studies of national samples of adolescents show that many adolescents are exposed to adversity before age 18 and that this exposure increases the risk for depression (Bethell et al. 2014; Schilling et al. 2007; Turner et al. 2006). In a study among a diverse sample of adolescents

(age 13–17 years), over 80% were diagnosed with a psychiatric disorder, including depression, and had experienced at least one ACE (Brockie et al. 2015). Furthermore, in a study among a diverse population of adolescents (age 10–17 years), those who had experienced four or more ACEs scored three times higher on depression and anger/aggression scales than adolescents who had experienced no ACEs (Turner et al. 2006). Exposure to traumatic experiences such as ACEs impacts brain structures and can cause prolonged or permanent damage since the child's brain is still in the developmental stages (Anda et al. 2006, 2010). It can damage neuron regulatory systems and lead to long-lasting nervous system issues and psychiatric problems. Problems such as these are expressed when the body remains in a state of fight or flight instead of returning to a relaxed state after exposure to a traumatic event (Anda et al. 2006, 2010).

Resilience

While exploring the association between ACEs and risk for depression, it is important to also investigate protective factors that can potentially decrease the risk for depression in the presence of ACEs so that these protective factors can be amplified and reduce the risk of having depression during adulthood. Resilience is the process of adapting well in the face of adversity, trauma, tragedy, threats, or significant sources of stress and has been found to mitigate the negative effects of ACEs on depression (Anyan and Hjemdal 2016). In one study among adolescents (age 13–17 years), resilience was found to moderate the association between adolescent stress and depressive symptoms; specifically, adolescents with high levels of stress and high resilience scores reported fewer or less severe depressive symptoms. (Anyan and Hjemdal 2016). Other studies have found that resilience decreases the likelihood of the onset or progression of depression among adolescents with exposure to certain ACEs, including homelessness, being in the justice system, being in the welfare system, having incarcerated parents, having parents with substance abuse and mental illness, and being exposed to domestic and community violence (Bethell et al. 2014; Masten 2001). For example, when resilience, maltreatment scores, and depression were measured together, child maltreatment was significantly correlated with depression symptoms, and resilience was negatively associated with depressive symptoms (Masten 2001). Furthermore, resilience decreased the risk for depression in those with a history of ACEs, with resilience moderating the effect of childhood sexual abuse and depression symptoms (Bethell et al. 2014). Thus, resilience may mitigate the negative impact of ACEs on the risk for depression.

Spirituality

Spirituality is an integrated part of African American identity and is rooted in African religious traditions and culture (Boyd-Franklin, 1989). It is significant in the African American community and is a source of hope, healing, and community. Spirituality can help to protect against the negative effects of exposure to ACEs and is a significant predictor of higher resilience scores (Barton and Miller 2015). For example, among adolescent girls, daily spiritual experiences, forgiveness, and positive religious coping were associated with less depressive symptomology (Desrosiers and Miller 2007). Among adolescent boys, social support provided by congregations or religious groups was associated with less depressive symptomology (Desrosiers and Miller 2007). Among adolescents and emerging adults, depression was found to be less frequent in those with high spirituality compared to those with low spirituality; thus, personal spirituality may be a foundation from which positive psychology traits develop (Barton and Miller 2015).

Current Study

To our knowledge, no studies have examined the prevalence of ACEs using an expanded version of the original ACE questionnaire in a racially homogenous sample of urban African-American adolescents. This study examined the prevalence of ACEs using an expanded version of the original ACE questionnaire in a racially homogenous sample of urban African-American adolescents. (Harris et al. 2017; Bornstein et al. 2013). Furthermore, it allows the identification of the variety of ACEs within this population. This study also expands the current knowledge about the association between ACEs and risk for depression by examining whether this association exists in a homogenous sample of African-American church-going adolescents in a large urban city and, if so, whether it is moderated by resilience and spirituality. This will allow us to determine whether resilience and spirituality decrease the likelihood of depression in the presence of ACEs, and if so, whether these effects are strong enough to suggest that they should be used as strategies in future interventions. Thus, this study aimed to (a) to determine the prevalence of cumulative and individual ACEs among urban African-American adolescents, (b) to examine whether prevalence estimates vary by sociodemographic characteristics such as gender and grade level, (c) examine whether there is an association between the number of self-reported ACEs and the likelihood of depression among African-American church-going adolescents in grades 6–12, and (d) examine whether this association is moderated by resilience and spirituality. The findings will enable researchers, policymakers, and other public health professionals to better understand the most prevalent ACEs in

urban African-American adolescents and the subgroups who may be most at-risk. A better understanding of ACEs is critical for deploying interventions to mitigate their potential immediate and long-term adverse mental and physical health effects in this high-risk population.

Methods

Study Overview

This cross-sectional study was conducted during three youth-targeted events held at predominantly African-American churches in Houston, TX in spring 2017. Event facilitators provided an overview of the study and informed consent forms to the event attendees. Event attendees consisted of adolescents in middle school and high school who were members of the participating churches and their friends. The anonymous survey was administered to all participants with affirmative parental consent. Participants were instructed to provide their answers directly on the paper survey using a pen and to not write their name anywhere on the survey. Once completed, surveys were collected, sealed in an envelope, and stored in a locked drawer at the church. For the purposes of this study, "church-going" is used to reflect church affiliation because the events were hosted by churches. This study was approved by the institutional review board of The University of Texas Health Science Center at Houston (HSC-SPH-18-0041).

Data Collection

Data were collected using a self-administered, three-page, double-sided paper survey. It contained five sections (resilience, depression, spirituality, ACEs, and demographics) and a total of 73 questions. Event facilitators distributed surveys and pens to the participants. A total of 350 parents received a parental consent form; of these, 325 returned the consent form. A total of 325 surveys were distributed; of these, 292 surveys were completed. A total of 33 participants declined to complete the survey, noting they did not feel like taking the survey, there were too many questions, or they did not feel comfortable answering the questions. Of the 292 completed surveys, 38 were ineligible due to self-reported race/ethnicity, and 13 had incomplete data, leaving an analytic sample of 241.

Measures

Independent Variable

Adverse Childhood Experiences ACEs were measured using an expanded, 19-item version of the original ACE scale (Cronbach's alpha = .88) (Felitti et al. 1998). This expanded ACE scale included the original 10 ACEs: (a) physical abuse, (b) sexual abuse, (c) emotional abuse, (d) physical neglect, (e) emotional neglect, (f) mother treated violently, (g) household substance abuse, (h) household mental illness, (i) parental separation or divorce, and (j) incarcerated household member. Because African-American adolescents are exposed to various ACEs not included on the original ACE scale, the expanded ACE scale also included the following nine ACEs (Cooley-Quille et al. 2001; Cronholm et al. 2015; Wade et al. 2014): (a) witness to neighborhood violence, (b) extreme economic hardship, (c) racism/unfair judgment, (d) deportation, (e) personally arrested or incarcerated, (f) personal illness, (g) been pregnant or got someone pregnant, (h) verbal or physical abuse from romantic partner, and (i) homelessness or foster care. This expanded ACE scale is similar to the 34-question Juvenile Victimization Questionnaire (JVQ) because it includes additional exposures not included on the original ACE scale (Turner et al. 2006). It is also similar to the Elsie Allen Health Center Modified Childhood Traumatic Events Scale (Elsie Scale), which has been used to screen for ACEs in urban high school students (ACEs Connection 2015).

The total ACE score ranged from 0 to 19 and was calculated by summing the number of ACEs to which a participant answered yes. Exposure to no ACEs was indicated with a score of 0, and exposure to all ACEs was indicated with a score of 19. Summed ACE scores were then dichotomized into two groups, i.e., 0–3 ACEs versus 4–19 ACEs. Previous research using the original 10-item ACE scale or an expanded ACEs scale has reported that individuals who have experiences at least 4 ACEs have a significantly higher risk for depression as well as other negative mental health outcomes (Felitti 2002; Turner et al. 2006).

Dependent Variable

Depression The likelihood of depression was measured using the 22-item Columbia DISC Depression Scale (Shaffer et al. 2004; Shrout and Yager 1989). This scale has been used in populations as young as 11 years old and provides diagnostic information (Shrout and Yager 1989). A sample item is "In the last 4 weeks have you often felt sad or depressed?" In a previous study, this scale had a sensitivity score of 0.75, a specificity score of 0.83, and a positive predictive value of 16% (Shaffer et al. 2004). Scale scores were calculated by summing the "Yes" responses across all 22 items. Similar to previous studies (Rausch et al. 2012), the depression scores were dichotomized into two categories: a score of 0–11 indicated a lower likelihood of depression, and a score of 12–22 indicated a higher likelihood of depression.

Candidate Moderator Variables

Resilience Resilience was measured using the shortened 10-item Connor Davidson Resilience Scale (CD-RISC)

(Davidson and Connor 2018). This scale assesses five factors of resilience: (a) personal competence, high standards, and tenacity; (b) trust in one's instincts, tolerance of negative affect, and strengthening effects of stress; (c) positive acceptance of change and secure relationships; (d) control; and (e) spiritual influences and has a Cronbach's alpha of 0.95 (Davidson and Connor 2018). A sample item is "I am able to adapt to change." For this study, response options were adapted from five response options to four by removing the neutral option. Items were assessed on a 4-point scale that ranged from "Strongly Agree" to "Strongly Disagree". Scale scores were calculated by summing the points on each item to create a total score. A higher score indicates higher resilience. Total scores were treated as continuous for analysis.

Spirituality Spirituality was measured using the 16-item Daily Spiritual Experience Scale (DSES) (Underwood, 2006). This scale measures constructs of spirituality, including (a) gratitude, mercy, (b) sense of connection with the transcendent, (c) love, (d) awareness of inspiration and (e) a sense of deep inner peace and has a Chronbach's alpha of 0.89 and a Pearson correlation of 0.85 (Underwood, 2006). A sample item is "I feel God's presence." Items were assessed on a 6-point Likert scale that ranged from "many times a day" to "never". Scale scores were calculated by summing the points on each item to create a total score. A higher score indicates higher spirituality. Total scores were treated as continuous for analysis.

Data Analysis

Survey data were shared with the academic partner for analysis. The data from the 292 surveys were entered into an Excel spreadsheet using the double entry method. Participants who (a) identified as black or African-American or as partially African-American (multiracial), (b) reported being in grades 6–12, and (c) had complete data for each measure comprised the analytic sample ($n = 241$).

Descriptive statistical methods were used to describe the sociodemographic characteristics of the sample. First, the ACE score for each participant was calculated by summing the yes responses. Respondents were then dichotomized into two groups based on their scores: 0–3 ACEs versus 4–19 ACEs. For gender and grade level, frequency tables were used to calculate the number and relative frequency in each category. Next, chi-square tests were performed to examine any differences in ACE prevalence (cumulative and individual ACEs) by gender and by grade level. Then, logistic regression was used to examine (a) the associations between ACEs, likelihood of depression, resilience, and spirituality and (b) whether resilience and spirituality moderated the association between ACEs and likelihood of depression. A regression analysis (model 1) was conducted to determine if the number of ACEs was associated with the likelihood of depression. Next, a regression analysis (model 2) was conducted to determine whether ACEs were associated with the likelihood of depression while adjusting for gender and grade level. Then, a regression analysis was conducted to determine the main effects of resilience (model 3a) and spirituality (model 3b) on the likelihood of depression while controlling for gender, grade level, and ACEs. Finally, a regression analysis was conducted to determine the moderating effects of resilience (model 4a) and spirituality (model 4b) on the association between ACEs and likelihood of depression while adjusting for gender and grade level. An additional model was run to examine the simultaneous moderating effects of resilience and spirituality (together), adjusted for demographics, on the association between ACEs and likelihood of depression. SPSS Version 25 (SPSS Inc., Chicago, IL) statistical software was used to analyze the data in this study.

Results

Sociodemographic Characteristics and Prevalence of Cumulative ACEs

Of the total sample ($n = 241$), 63% were female, and 53% were in high school (Table 1). The number of reported ACEs ranged from 0 to 19. Of the 241 participants, 51% reported experiencing four or more ACEs. ACE scores did not significantly differ by gender or grade level.

Prevalence of Individual ACEs

Of the 19 ACEs, the most prevalent ACE was experiencing the death of a very close friend or family member (72%), followed by experiencing being pushed, grabbed, slapped, hit, or having something thrown at them (56%); having often seen or heard violence in your neighborhood or in your school's neighborhood (48%); and parental divorce (47%). The least prevalent ACE was being pregnant or gotten someone pregnant (5%), followed by being detained, arrested, or incarcerated (7%; Table 2).

The prevalence of some ACEs did significantly differ by gender and grade level. For example, in terms of gender, male participants were significantly more likely than female participants to report having ever been detained, arrested, or incarcerated or had experienced verbal or physical abuse or threats from a romantic partner (i.e., boyfriend or girlfriend). Furthermore, female participants were more likely than male participants to report experiencing the death of a very close friend or family member. In terms of grade level, high school participants were more likely than middle school participants to report having been sworn at, insulted frequently or put down verbally by a household member; having ever had a household member who was mentally ill, depressed, or

Table 1 Sample characteristics

Variable	Total n (%) 241	ACE Score = 4+ n (%) 122 (51%)	Chi-square[a]	*p*
Gender				
Female	152 (63%)	79 (52%)	0.359	0.549
Male	89 (37%)	43 (48%)		
Grade-level				
Middle School	113 (47%)	57 (50%)	0.139	0.709
High School	127 (53%)	66 (52%)		
Dependent Variable (n, %)				
Depression	Higher Likelihood	54 (22%)		
	Lower Likelihood	187 (78%)		
Moderator Candidates (Mean, SD, Range)				
Resilience Score [b]	20 (4.3); 4–30			
Spirituality Score [c]	40 (13.9); 15–86			

[a] Chi-square test using 1 degree of freedom

[b] Higher score indicate greater resiliency

[c] Higher score indicate greater spirituality

committed suicide; and having had a household member go to jail/prison or be deported. However, there were no significant gender (Table 3) or grade level (Table 4) differences for physical abuse, sexual abuse, lack of emotional support or love from family, lack of food or clean clothes, parental physical abuse or witnessing parental physical abuse, parental substance abuse, parental divorce or separation, homeless or in foster care, discrimination, illness or injured, or neighborhood/school violence.

Logistic Regression Analyses

Overall, 51% of participants reported exposure to four or more ACEs, and 22% reported a higher likelihood of depression. The sample mean score for resilience was 20 (SD = 4.3), and scores ranged from 4 to 30. The sample mean score for spirituality was 40 (SD = 13.9), and scores ranged from 15 to 86.

As hypothesized, exposure to four or more ACEs was associated with a higher likelihood of depression. There was a statistically significant association between experiencing 4 or more ACEs and a higher likelihood of depression in the unadjusted model (OR = 6.524; 95% CI = 2.662–15.987; p = <.0001) and in the adjusted model (OR = 6.733; 95% CI = 2.724–16.643; p = <.0001) (Table 5). The association between resilience and likelihood of depression was statistically significant (OR = 0.897; 95% CI = 0.829–0.970; p = 0.0062) after adjusting for ACEs, gender, and grade level. Similarly, the association between spirituality and likelihood of depression was statistically significant (OR = 0.927; 95% CI = 0.881–0.976; p = 0.0037) after adjusting for these same variables. However, when resilience and spirituality were included in the same model, spirituality remained a significant protective factor (OR = 0.944; 95% CI = 0.892–0.998; p = 0.0424), but resilience was no longer a protective factor (OR = 0.926; 95% CI = 0.853–1.006; p = 0.679). The association between resilience and spirituality and the likelihood of depression was statistically nonsignificant.

Discussion

The purpose of this study was to determine the prevalence of 19 ACEs (original 10 and additional nine ACEs that have been less commonly studied among at-risk populations) in a racially homogenous sample of urban African-American adolescents. In the current sample, 51% of participants reported experiencing four or more ACEs. This estimate is higher than estimates of 12–15% obtained from subsamples of African-American adolescents in nationally representative studies that used a similar expanded ACE scale (Freeman 2014; Turner et al. 2006). This difference may be due to different sampling methods used across studies. For example, this study used a racially homogenous sample of African-American adolescents residing in one metropolitan area, compared with other studies that used samples of adolescents across multiple states. Additionally, 53% of the current sample was composed of older adolescents, who are more likely than younger adolescents to have experienced more ACEs because of their age (Bethell et al. 2014; Turner et al. 2006).

In this study, the most prevalent ACE reported was experiencing the death of a very close friend or family member, followed by experiencing being pushed, grabbed, slapped, hit, or having something thrown at them, and having seen or heard violence in their neighborhood or in their

Table 2 Prevalence of individual ACEs indicators in the total sample

ACE indicator	n[a]	# yes	% yes
Original 10 ACEs			
Have you experienced being sworn at, insulted frequently, or been put down verbally by a household member (physical abuse)?	240	102	43
(a) Has your parent ever experienced being pushed, grabbed, slapped, or had something thrown at them, or been hit so hard that they were injured or had a mark (parental physical abuse)?	240	63	26
b) If so, did you see this happen?	204	39	19
Has someone ever pushed, grabbed, slapped, hit, or threw something at you (physical abuse)?	241	136	56
Has anyone touched your private parts or asked you to touch their private parts in a sexual way, against your will, made you feel uncomfortable, or sexually abused you (sexual abuse)?	240	33	14
Have you often felt that no one in your family loved you, or looked out for you, or felt close to you (lack of emotional support or love from family)?	240	62	26
Have you ever experienced not having enough to eat, had to wear dirty clothes, or had no one to protect you (lack of food and clean clothes)?	241	32	13
Have you ever lived with someone that was a problem drinker or alcoholic, or had a drug addiction problem?	240	33	14
Were your parents/guardians ever separated or divorced?	241	113	47
Have you ever had a household member who was mentally ill, depressed, or committed suicide?	240	50	21
Have you ever had a household member go to jail/prison or be deported?[a]	240	72	30
Additional 9 ACEs			
Have you ever experienced homelessness or been in foster care?	241	25	10
Have you ever been treated badly because of race, gender, or sexual orientation, disability, or religion (discrimination)?	239	94	40
Have you experienced the death of a very close friend or family member?	241	173	72
Have you been extremely ill or injured?	241	83	34
Have you ever been pregnant or gotten someone pregnant?	241	11	5
Have you often seen or heard violence in your neighborhood or in your school's neighborhood (neighborhood/school violence)?	239	115	48
Have you been detained, arrested, or incarcerated?	239	17	7
Have you experienced verbal or physical abuse or threats from a romantic partner (i.e., boyfriend or girlfriend)?	240	28	12

[a] Sample size across individual items varied due to missing data

school's neighborhood. There are several possible explanations for these findings. With respect to experiencing the death of a close friend or family member, death by suicide is increasing among ethnic-minority adolescent populations (U.S. Department of Health and Human Services National Institutes of Mental Health 2017), and compared with white populations, African Americans are more likely to die from chronic disease and cancer (Dong et al. 2003), and as a result, African-American adolescents may experience the death of a loved one due to these causes more often. More research is needed to determine whether participants are referring to a family member, a friend, or both and whether death of a family member or friend is prevalent among other ethnic-minority groups. However, accessibility and availability of grief counseling services for African-American adolescents may be warranted to help mitigate the effects of grief. With respect to physical abuse, the observed high prevalence could be due to methods of discipline used in the home, given that physical reprimand is common in African-American families (Baumrind 1997; Lau et al. 2006). Last, with respect to neighborhood and school violence, the observed high prevalence is consistent with that reported by studies using similar samples, suggesting that almost half of adolescents report having often seen or heard violence in their neighborhood or in their school's neighborhood (Finkelhor et al. 2014; Wade et al. 2014). Collectively, our findings provide additional information on the potential number of African-American adolescents in unhealthy relationships or violent environments.

The most prevalent ACE in this study, however, is inconsistent with that in the 2011–2012 NSCH survey, which has economic hardship (Sacks et al. 2014). There are some possible explanations for this inconsistency. First, the 2011 NSCH survey assessed ACEs in a nationally representative sample using parental reports. Second, the 2011 NSCH survey assessed economic hardship slightly differently than the current study. In this study, participants were asked about experiences of not having enough to eat, having to wear dirty clothes, or having no one to protect them. In the 2011 NSCH survey, participants were explicitly asked whether they had experienced economic hardship "somewhat often" or "very often" (i.e., the family found it hard to cover costs of food and housing). The ACE measure in the current study may thus need to be modified to explicitly ask about economic hardship (Center for Public Health Priority 2016). Future

Table 3 Prevalence of individual ACEs indicators by gender

ACE indicator	Male ($n = 89$)[d] n (%)	Female ($n = 152$) [d] n (%)	Chi-square[c]	*P* value
Original 10 ACEs				
Have you experienced being sworn at, insulted frequently, or been put down verbally by a household member?	32 (36)	70 (46)	2.141	0.143
(a) Has your parent ever experienced being pushed, grabbed, slapped, or had something thrown at them, or been hit so hard that they were injured or had a mark?	22 (25)	41 (27)	0.112	0.738
(b) If so, did you see this happen?	13 (16)	26 (21)	0.700	0.403
Has someone ever pushed, grabbed, slapped, hit, or threw something at you?	48 (54)	88 (58)	0.358	0.549
Has anyone touched your private parts or asked you to touch their private parts in a sexual way, against your will, made you feel uncomfortable, or sexually abused you?	10 (11)	23 (15)	0.667	0.414
Have you often felt that no one in your family loved you, or looked out for you, or felt close to you?	20 (23)	42 (28)	0.834	0.361
Have you ever experienced not having enough to eat, had to wear dirty clothes, or had no one to protect you?	13 (15)	19 (13)	0.216	0.642
Have you ever lived with someone that was a problem drinker or alcoholic, or had a drug addiction problem?	10 (11)	23 (15)	0.754	0.385
Were your parents/guardians ever separated or divorced?	38 (43)	75 (49)	0.995	0.318
Have you ever had a household member who was mentally ill, depressed, or committed suicide?	16 (18)	34 (22)	0.592	0.442
Have you ever had a household member go to jail/prison or be deported?[b]	22 (25)	50 (33)	1.879	0.171
Additional 9 ACEs				
Have you ever experienced homelessness or been in foster care?	12 (14)	13 (9)	1.468	0.226
Have you ever been treated badly because of race, gender, or sexual orientation, disability, or religion?	33 (38)	61 (40)	0.196	0.658
Have you experienced the death of a very close friend or family member?	51 (57)	122 (80)	14.609	< .00-01*
Have you been extremely ill or injured?	28 (32)	55 (36)	0.555	0.456
Have you ever been pregnant or gotten someone pregnant? [a]	8 (9)	3 (2)	6.342	0.012
Have you often seen or heard violence in your neighborhood or in your school's neighborhood?	43 (48)	72 (48)	0.002	0.962
Have you been detained, arrested, or incarcerated? [a]	12 (14)	5 (3)	8.971	0.003
Have you experienced verbal or physical abuse or threats from a romantic partner (i.e., boyfriend or girlfriend)?	16 (18)	12 (8)	5.723	0.017*

*Statistically significant at $p < 0.05$

[a] Fisher's exact test used due to $n < 5$

[b] Deportation was not assessed or included in the household incarceration question in original ACEs survey; however, in this study, it was added to the household incarceration question and is an additional ACE being measured

[c] Chi-square test using 1 degree of freedom

[d] Sample size across individual items varied due to missing data

studies should continue to assess economic hardships when screening for ACEs in Texas youth because economic hardship is common in TX and was not one of the 10 original ACEs.

Other salient ACEs reported in this study include experiencing some form of discrimination (race, gender, sexual orientation, disability, or religion), exposure to parental divorce or separation, and having a household member go to jail/prison or be deported. It was expected that experiencing bad treatment because of race, gender, sexual orientation, disability, or religion would be prevalent because it is a well-established source of chronic stress in ethnic-minority populations (Shin et al. 2016). Although the current study assessed discrimination in general terms, discrimination may occur in the form of deliberate acts, verbal abuse, bullying, or through social media, among other means. Indeed, one in five students in this country are bullied; of those students, 25% are African-American (Finkelhor et al. 2007; U.S. Department of Health and Human Services 2017). It was expected that exposure to divorce or separation would be prevalent because single-parent households are common among African-American families and African-American children are often reared in homes where their parents were never married (Youngstrom et al. 2003). Furthermore, children in single-parent homes have a greater lifetime exposure to all ACEs, increasing their risk for mental health problems (Turner et al. 2006). Last, it

Table 4 Prevalence of individual ACEs indicators by grade-level

ACE indicator	Middle School ($n = 113$) [d] n (%)	High School ($n = 127$) [d] n (%)	Chi-square[c]	*P* value
Original 10 ACEs				
Have you experienced being sworn at, insulted frequently, or been put down verbally by a household member?	39 (35)	63 (50)	5.574	0.018*
(a) Has your parent ever experienced being pushed, grabbed, slapped, or had something thrown at them, or been hit so hard that they were injured or had a mark?	23 (20)	40 (32)	3.6241	0.057
(b) If so, did you see this happen?	17 (17)	22 (22)	0.793	0.373
Has someone ever pushed, grabbed, slapped, hit, or threw something at you?	61 (54)	75 (59)	0.519	0.471
Has anyone touched your private parts or asked you to touch their private parts in a sexual way, against your will, made you feel uncomfortable, or sexually abused you?	13 (12)	20 (16)	0.908	0.341
Have you often felt that no one in your family loved you, or looked out for you, or felt close to you?	25 (22)	37 (29)	0.0869	0.297
Have you ever experienced not having enough to eat, had to wear dirty clothes, or had no one to protect you?	25 (22)	37 (29)	1.534	0.216
Have you ever lived with someone that was a problem drinker or alcoholic, or had a drug addiction problem?	14 (13)	19 (15)	0.144	0.705
Were your parents/guardians ever separated or divorced?	51 (45)	62 (48)	0.263	0.608
Have you ever had a household member who was mentally ill, depressed, or committed suicide?	16 (14)	33 (26)	5.1398	0.023*
Have you ever had a household member go to jail/prison or be deported?[b]	25 (22)	47 (37)	6.308	0.012*
Additional 9 ACEs				
Have you ever experienced homelessness or been in foster care?	10 (9)	15 (12)	0.531	0.466
Have you ever been treated badly because of race, gender, or sexual orientation, disability, or religion?	40 (36)	54 (42)	0.943	0.332
Have you experienced the death of a very close friend or family member?	78 (69)	95 (74)	0.799	0.371
Have you been extremely ill or injured?	44 (39)	39 (31)	1.907	0.167
Have you ever been pregnant or gotten someone pregnant?	2 (2)	9 (7)	3.814	0.051
Have you often seen or heard violence in your neighborhood or in your school's neighborhood?	54 (48)	61 (49)	0.001	0.977
Have you been detained, arrested, or incarcerated?[a]	4 (4)	13 (10)	3.863	0.049
Have you experienced verbal or physical abuse or threats from a romantic partner (i.e., boyfriend or girlfriend)?	8 (7)	20 (12)	4.170	0.041

*Statistically significant at $p < 0.05$

[a] Fisher's exact test used due to $n < 5$

[b] Deportation was not assessed or included in the household incarceration question in original ACEs survey; however, in this study, it was added to the household incarceration question and is an additional ACE being measured

[c] Chi-square test using 1 degree of freedom

[d] Sample size across individual items varied due to missing data

was expected that exposure to parental incarceration would be prevalent because household incarceration is higher among African-American families than families of other races (Youngstrom et al. 2003). Future studies, however, should separate deportation from incarceration to allow for more accurate comparisons across ACE prevalence studies.

In this study, the least prevalent ACE was being pregnant or having gotten someone pregnant, followed by being detained, arrested, or incarcerated. The low prevalence estimate for pregnancy is inconsistent with previous findings showing that pregnancy rates among African-American adolescents are high (Bryant 2006). It is possible, however, that pregnancy was underreported in the current study because premarital sex is viewed as a sinful act by the church (Petersen and Donnenwerth 1997). Alternatively, the church may act as a protective factor for teen pregnancy because it encourages obedience to scriptural guidance on sustaining from premarital sex, provides opportunities for socialization among like-minded peers, and allows for mentoring relationships with trusting adults (Petersen and Donnenwerth 1997; Salas-Wright et al. 2014). The 7% prevalence estimate for incarceration is lower than the 11.6% of African-American youth (age 10–17 years) referred to juvenile probation in 2016 in Texas (Texas Juvenile Justice Department 2017). This finding could also be attributed to involvement in the church, which can act as a protective factor against behaviors that lead to being detained, arrested, or incarcerated (Salas-Wright et al. 2014).

Table 5 Results of logistic modeling for ACEs, resilience (RES) and Spirituality and depression (SP) ($n = 241$)

	Aces β	RES β	SP β	ACES*RES β	SP*ACES β
model 1: crude	16.8215*				
model 2: adjusted [a]	17.0586*				
model 3a: RES main effect[a]	17.3003*	7.4826*			
model 3b: SP main effect[a]	18.5329*		8.4050*		
model 4a: RES moderating effect[a]	3.3118	0.0007		1.1102	
model 4b: SP moderating effect[a]	0.3014		5.3852		1.5744
model 5 RES and SP main effect[a]	1.2790		13.3750*		

*Denotes significance at $p = 0.05$

There were a few significant differences in ACE prevalence by gender or grade level, which is consistent with previous research (Bethell et al. 2014). ACEs such as having experienced verbal or physical abuse or threats from a romantic partner (i.e., boyfriend or girlfriend) and having experienced the death of a very close friend or family member were significant, but this may be due to reporting differences in gender. Compared with females, males were more likely to have been detained, arrested, or incarcerated, which may be because of their association with aggressive or violent behavior (Bethell et al. 2014). ACEs tend to accumulate over time, and some ACEs may become more apparent in children as they age. As children get older, they may begin to recognize or understand ACEs such as parental mental illness or learn about parental suicide, incarceration, or deportation and therefore may be more likely to report such ACEs. These findings suggest that all ACEs should be assessed by gender and grade level, as well as other sociodemographic characteristics, to help identify subgroups at high risk for ACEs.

This study also extends the literature on ACEs by examining the association between exposure to ACEs and likelihood of depression among African-American church-going adolescents and the moderating effects of resilience and spiritualty on this association. Overall, the results revealed an association between experiencing four or more ACEs and a higher likelihood of depression. However, the results revealed that neither resilience nor spirituality moderate this association.

The positive association between ACEs and a higher likelihood of depression suggests that depression may be an early consequence of exposure to ACEs in African-American adolescents, which aligns with previous studies (Bethell et al. 2014; Schilling et al. 2007; Turner et al. 2006). If the onset of depression occurs during adolescence, the risk of becoming depressed during adulthood may increase (O'Grady and Metz 1987). In fact, in the current study, 22% of adolescents achieved scores that correspond with a higher likelihood of depression. This prevalence estimate is higher than the estimated 9% national prevalence of African-American adolescents with depression (National Institute of Mental Health (NIMH) 2016). The increased likelihood of depression in this sample may be due to the use of a homogenous sample for the study, which allows for more in-depth examination and thus more representative results. Studies should further examine associations between ACEs and the likelihood of depression by gender and race/ethnicity to learn more about the individual ACEs that lead to the onset of depression.

Resilience was found to be a protective factor for depression against the risk of depression, which is consistent with previous studies (Bethell et al. 2014; Masten 2011). However, contrary to previous studies (Anyan and Hjemdal 2016), resilience did not moderate the association between ACEs and likelihood of depression. Resilience alone was not enough to counteract the negative effects of accumulated ACEs in African-American adolescents in this sample. The lack of moderation may be because most of the sample reported high levels of resilience, which made it difficult to observe any effects. The lack of a moderating effect of resilience in the current sample presents the opportunity for future studies to explore (a) additional internal characteristics that may counteract depression outcomes in African-American adolescents who already have high levels of resilience and (b) whether resilience, in the presence of other protective factors, can counteract the negative effects of accumulated ACEs in African-American adolescents.

Spirituality was also found to be a protective factor against the likelihood of depression. However, similar to resilience, it did not moderate the association between ACEs and the likelihood of depression. Because the sample was drawn from events held at three churches, it is likely that many of the adolescents in the sample were members of one of the churches hosting the events. Thus, church participation may be relevant because the majority of the sample reported moderate to high levels of spirituality. It is also possible that spirituality was already acting as a protective factor, and some exposures to ACEs require additional support to counteract the likelihood of depression. The lack of a moderating effect of spirituality in the current sample presents the opportunity for future studies to explore additional spiritual-based

constructs that may counteract depressive symptoms in African-American adolescents who already have high levels of spirituality. It also presents the opportunity to break down the components of spirituality into specific constructs and examine their effects on the likelihood of depression.

Notably, resilience and spirituality are similar and bring out many of the same personal characteristics an individual draws upon when coping with adversity (Anyan and Hjemdal 2016; Harris et al. 2008; Van Dyke et al. 2009). Thus, they may be assessed as different constructs in one scale or as a component of each other, i.e., spirituality as a component of resilience and vice versa (Harris et al. 2008; Van Dyke et al. 2009). In this study, resilience and spirituality were assessed as two different constructs: they were measured on two different scales and were treated as two different variables. Because both were found to be significant individually, a model with both was run to explore additional associations. When both variables were in the model, spirituality remained significant, while resilience became insignificant. In other studies, authors treated spirituality as a form of resilience or used it as a means to measure resilience (Masten 2011; Van Dyke et al. 2009). The differences in measurement and similarity as coping mechanisms may account for the lack of moderating effects for resiliency and spirituality on the risk for depression. Nevertheless, the mitigating role of these factors in protecting African-American adolescents exposed to ACEs from experiencing depressive symptoms and other mental health outcomes needs further research.

There are limitations to this study that should be noted. First, unlike other ACE prevalence studies, it did not directly ask about exposure to property crimes, economic hardship, and peer and sibling victimizations, and authors suggest not to adjust for intraclass correlation among items in each scale. The term "property crime" was not in a survey question; however, the survey did ask about neighborhood violence, which could be considered similar to including property crimes (Sacks et al. 2014). Additionally, the survey did not ask exclusively about peer and sibling victimizations, but it asked about verbal or physical abuse or threats from a romantic partner and physical abuse from anyone, which may include abuse by peers and siblings (Finkelhor et al. 2007). Second, the current study relies on self-reported data that cannot be independently verified. The data may also have potential sources of bias such as selective memory, social desirability, and trust that the information is maintained confidentially. Data were collected during events held at churches where many participants frequent. Thus, social desirability bias and familiarity of peers and leaders may have caused participants to not answer honestly due to potential shame or embarrassment (Dong et al. 2003). To mitigate these potential biases, participants were assured of confidentiality and were reminded to not put their name on the survey. Third, this sample may not be reflective of other African-American adolescents, given that Houston, TX, is one of the largest cities in the United States (U.S. Census 2018). Forth, this sample consisted mainly of church-going adolescents, which allows for generalization only to other urban African-American church-going adolescents This affiliation to a church introduces additional factors, such as resource connection and social support, that may or may not be present in African-American adolescents not affiliated with a faith-based organization. Additionally, inferences about any causal relationships between ACEs and likelihood of depression cannot be made because a cross-sectional study design was used.

These findings have important implications for health interventions and future research. Health risk behaviors in childhood are the bridge that links ACEs to adverse mental and physical health outcomes in adulthood because they are often used as long-term strategies to cope with the stress of ACEs (Turner et al. 2006). Interventions implemented during adolescence may defer or delay the onset of negative health behaviors before they become adverse health outcomes during adulthood. To inform timely and appropriate interventions, health and school clinicians serving predominantly African-American adolescents could conduct annual ACE screening for patients and students utilizing an expanded ACE questionnaire. Additionally, churches serving predominantly African-American adolescents could form partnerships with mental health practitioners to provide individual and group grief counseling and other mental health and social services, given that those who experience four or more ACEs may need additional or more intense therapy. Churches could also identify trusted leaders and train them to be mentors, which may provide adolescents access to trusted adults during stressful times.

Future research should continue to examine the prevalence of ACEs among homogenous samples of youth. The prevalence of ACEs in ethnic-minority populations and the factors that may protect against adverse mental health outcomes, specifically, depressive symptoms that could stem from exposure to ACEs, also require further research. The current study suggests the need for intervention and prevention efforts that enhance and utilize resilience and spirituality for African-American adolescents affected by ACEs. Because the likelihood of depression was high among the current sample, strategies that increase access to mental health services should be prioritized. For instance, churches that serve predominantly African-American adolescents could increase access to mental health services by partnering with local mental health providers to leverage grant programs and funding opportunities to provide free or low cost services. Mental health practitioners could also co-locate their services at churches in the community which may decrease barriers such as transportation and parking costs. Additionally, church leaders could collaborate with social service providers to incorporate components of spirituality into interventions and

allow implementation of those interventions to occur at their churches.

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Compliance with Ethical Standards

Consent to Participate and Consent to Publish Informed consent was obtained from legal guardians.

Ethical Approval This study was approved by the Committee for the Protection of Human Subjects at The University of Texas Health Science Center at Houston (HSC-SPH-18-0041).

Conflict of Interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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