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ORIGINAL RESEARCH

Rural-urban differences in exposure to adverse childhood experiences among South Carolina adults

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ABSTRACT:

Introduction: Adverse childhood experiences (ACEs) are traumatic events that occur in a child's life between birth and 18 years. Exposure to one or more ACE has been linked to participation in risky health behaviors and the experience of chronic health conditions in adulthood. The risk for poor outcomes increases as the number of ACEs experienced increases. This research investigates rural–urban differences in exposure to ACEs using a sample from a representative southern US state, South Carolina.

Methods: Using data from the 2014–2015 South Carolina Behavioral Risk Factor Surveillance System (BRFSS) and residential rurality based on UICs, ACE exposure among South Carolina adults was tabulated by urban versus rural

residence and selected other demographic characteristics. Using standard descriptive statistics, frequencies and proportions were calculated for each categorical variable. Multivariable regression modeling was used to examine the impact of residential rurality and selected sociodemographic characteristics on overall and specific types of ACE exposure. All analyses used survey sampling weights that accounted for the BRFSS sampling strategy.

Results: The analytic sample of 18 176 respondents comprised 15.9% rural residents. Top reported ACEs for both rural and urban residents were the same: parental divorce/separation, emotional abuse, and household substance use. Compared to urban residents, a higher proportion of rural respondents reported experiencing no ACEs (41.4% vs 38.3%, $p<0.01$). The prevalence of four or more ACEs in rural respondents was 15.0%; in comparison, 17.6% of urban respondents had four or more ACEs ($p<0.01$). In logistic regression predicting exposure to four or more ACEs and adjusting for sex, age, race/ethnicity, education, and income, rural respondents were less likely than urban respondents to report four or more ACEs (adjusted odds ratio 0.75, 95% confidence interval 0.74–0.75).

Conclusions: Despite reporting less ACE exposure than urban counterparts, almost 60% of rural residents reported at least one ACE and 15% reported experiencing four or more ACEs. In contrast to urban residents, rural residents may experience more social connections within their families and communities, which may influence ACE exposure; however, care coordination, social support services, and access to health care are limited in rural areas. Thus, families in rural areas may be less equipped to mitigate and manage the effects of ACEs. Findings from this study thus suggest that interventions to prevent ACE exposure are just as needed in rural southern communities as they are in urban southern communities. Topics important for future research could include an examination of ACEs in rural communities in terms of individuals' health outcomes and their access to health care, as well as the role of protective factors. Programs and policies that assist in ACE prevention in rural areas are important to reducing these multigenerational threats to health and wellbeing.

KEYWORDS:

ACEs, adverse childhood experiences, child maltreatment, USA

FULL ARTICLE:

Introduction

Adverse childhood experiences (ACEs) are widely researched household and individual events, experienced by children between birth and 18 years, that have the potential to affect a child's lifelong health and wellbeing[1]. Exposure to these traumatic events in childhood may increase an individual's risk for heart disease, liver disease, diabetes, cancer, depression, or other chronic illnesses later in life[2-15]. Exposure to ACEs may also increase an individual's tolerance for risky behaviors, leading to unintended pregnancies; alcohol, smoking, or other substance abuse; intimate partner violence; or suicide[2-15]. The effects of ACE exposure may also result in an intergenerational cycle of experiences, with the effects of parents' ACE exposure negatively affecting their children[16,17]. Outcomes related to ACE exposure can have notable and damaging personal consequences, as well as societal consequences that potentially affect use and costs in the employment and workforce, and in the healthcare, mental health, and judicial systems[1,16-20]. Characterizing ACEs among all populations is an important step to identifying appropriate prevention and intervention efforts.

Research examining the prevalence and patterns of ACEs specifically in rural communities is limited. One published brief focused on ACE exposure among adults from 11 US states, as reported in data from the Behavioral Risk Factor Surveillance System (BRFSS)[21]. This research found that almost 57% of rural residents reported experiencing at least one ACE in childhood, and 14.6% reported experiencing four or more ACEs; however, the odds of exposure to four or more ACEs were similar for both rural and urban residents[21]. This same research found a similar rank order for types of ACEs across rural and urban participants and concluded overall that rural and urban residents bore similar burdens of ACE exposure[21]. The 2011-2012 National Survey of Children's Health surveyed parents about their children's exposure to a slightly different list of ACE questions, including one related to economic insecurity[22]. This survey found that a

higher proportion of children from rural areas experienced at least one ACE compared to their urban counterparts[22]. The same report found that children from rural areas were more likely than their urban counterparts to experience selected ACEs (parental divorce or separation, incarceration of a parent, domestic violence, or living with someone who is mentally ill or has a problem with drugs or alcohol), and for all children, this study found that increasing household incomes were associated with decreased ACE exposure[22].

Care coordination, social support services, and access to health care are limited in rural areas[23]. Thus, families in rural areas may be less equipped to mitigate and manage the effects of ACEs. With almost 13 million children living in rural areas across the USA and with rural areas experiencing higher levels of poverty, higher levels of child maltreatment, and overall lower life expectancies than their urban counterparts, the assessment of ACEs in rural communities is important[22-28].

ACE exposure among rural southern residents has yet to be investigated. South Carolina (SC) is representative of the traditional South: it has a much higher rate of African-American residents (27.9% vs 12.6%, $p<0.01$) and a higher proportion of rural residents (33.7% vs 19.3%, $p<0.01$) than the rest of the country[29]. These characteristics are shared by many southern states. Thus, the present study aimed to examine rural–urban differences in the types and counts of ACEs among SC residents and assess for any predictors of ACE exposure among rural residents. Based on previous research using BRFSS data to examine rural–urban differences in ACE exposure[21], the authors anticipated that ACE exposure among rural residents would be notable and that the burden of ACE exposure would be similar to that of urban SC residents. Also based on previous research, we expected that race, ethnicity, income, and educational status would predict ACE exposure among SC residents[2,30].

Methods

Data source

Using the 2014–2015 BRFSS, a cross-sectional analysis of self-reported ACEs was conducted among respondents from SC. The US Centers for Disease Control and Prevention (CDC) developed and oversees administration of the BRFSS nationwide. The survey collects information on chronic conditions and health-related risk behaviors by state[31]. The South Carolina Department of Health and Environmental Control (DHEC) manages the administration of the BRFSS, and the University of South Carolina's Institute of Public Service and Policy Research administers the survey for the state of South Carolina. The survey is conducted daily and uses random digit dialing of landlines and cell phones to reach non-institutionalized adults aged 18 years or more.

In 2014, Children's Trust of South Carolina, a non-profit organization focused on the prevention of child maltreatment and promotion of child wellbeing, partnered with DHEC to collect 11 questions related to ACEs via the BRFSS[30]. The ACE questions provided data on type and number of ACEs reported by a survey respondent; however, the survey did not obtain data related to the frequency or severity of any specific ACE. Questions related to ACEs were included in the 2014 and 2015 surveys[30].

The BRFSS was administered to 22 634 SC adults in 2014–2015; 19 843 participants agreed to answer the ACE questions used for this study (Table 1). The sample was restricted to 18 176 participants with complete demographic information. Population weights were assigned to each survey respondent by the CDC to correct for under- or oversampling and non-response or non-coverage[30].

Table 1: Adverse child experience questions included in the South Carolina Behavioral Risk Factor Surveillance System, 2014–2015

Childhood experience	Survey question(s)†
Household mental illness	1. Did you live with anyone who was depressed, mentally ill, or suicidal?
Household substance use	2. Did you live with anyone who was a problem drinker or alcoholic?
	3. Did you live with anyone who used illegal street drugs or who abused medications?
Household incarceration	4. Did you live with anyone who served time or was sentenced to serve time in a prison, jail, or other correctional facility?
Parental separation/divorce	5. Were your parents separated or divorced?
Witnessing household violence	6. Did your parents or adults in your home ever slap, hit, kick, punch, or beat each other up?
Experiencing physical abuse	7. Did a parent or adult in your home ever hit, beat, kick, or physically hurt you in any way?
	8. Did a parent or adult in your home ever swear at you, insult you, or put you down?
Sexual abuse	9. Did anyone at least five years older than you or an adult ever touch you sexually? 10. Did anyone at least five years older than you or an adult try to make you touch them sexually?
	11. Did anyone at least five years older than you or an adult force you to have sex?

† All questions refer to the time period before respondent was aged 18 years and were prefaced with the phrase 'Now, looking back before you were 18 years of age...'

Variable construction

The primary exposure of interest was the geographic residence of each respondent, classified into one of two categories, rural or urban, based on county of residence. South Carolina BRFSS analysts determined the rural or urban status of each respondent prior to releasing the data using self-reported counties cross-walked with urban influence codes (UICs)[32]. Metropolitan counties (UICs 1, 2) were characterized as urban; micropolitan, small adjacent, and remote rural counties (UICs 3-12) were considered rural.

The primary outcome of interest was overall ACE exposure prior to 18 years. Consistent with previous work on ACEs by rurality[21], overall ACE exposure was determined by collapsing overall counts of ACEs into two categories: respondent reports of experiencing fewer than four ACEs (ie 0–4 ACEs) and four or more ACEs. The category of four or more ACEs was used because collective adverse experiences have been associated with poorer collective outcomes[33-35].

Covariates included selected sociodemographic characteristics: sex, age, race/ethnicity, educational attainment, and income level. Race and ethnicity were self-reported and grouped into four categories: non-Hispanic white, non-Hispanic black, Hispanic, and other non-Hispanic. Authors grouped age at survey response into seven categories: 18–29, 30–39, 40–49, 50–59, 60–69, 70–79, and 80 years and above. Educational attainment was collapsed into two categories: less than or equal to high school diploma/General Educational Development and at least some college. Income was measured using four categories: less than $25,000, $25,000–49,999, $50,000 or greater, and 'don't know/missing'.

Analytic methods

Standard descriptive statistics were used to report frequencies and proportions for each categorical variable. Bivariate analyses assessed for statistical differences between variables, including differences in types and counts of ACEs by rural or urban geographic residence, using χ^2 tests, which were considered significant at $\alpha=0.05$. Multivariable regression models were used to examine the impact of residential rurality and selected sociodemographic

characteristics on overall and specific types of ACE exposure. All analyses used survey sampling weights that accounted for the sampling strategy used by the BRFSS study.

Statistical Analytical Software v9 was used for the analyses (SAS; http://www.sas.com).

Ethics approval

The study was approved by the University of South Carolina's Institutional Review Board as exempt under protocol number Pro00058520.

Results

Demographic findings

For weighted results, the majority of the sample was urban (84.1%), female (52.8%), non-Hispanic white (68.1%), and had at least some college (55.3%, Table 2). Approximately 35.2% of respondents were aged less than 40 years; 51.0% of respondents were between the ages of 40 and 69 years; 14.0% were aged 70 years or more. Over a third (35.2%) of respondents reported an annual income of $50,000 or more. Based on responses to BRFSS questions, the majority of the respondents self-reported that they were in good health (81.3%) and had low to moderate mental distress (86.7%).

In bivariate analysis, rural respondents (15.9% of the overall sample) were more likely to be non-white, less educated, and poorer than their urban counterparts. Over a third (34.9%) of rural respondents reported their race as non-Hispanic black compared to 23.3% of urban respondents ($p<0.01$). Rural respondents were less likely to have at least some college than their urban counterparts (45.8% vs 57.1%, $p<0.01$) and were less likely to report incomes of $50,000 or more (26.3% versus 36.9%, $p<0.01$). Compared to urban respondents, a larger proportion of rural respondents reported poor health (23.9% vs 17.5%, $p<0.01$).

Table 2: Characteristics of South Carolina Behavioral Risk Factor Surveillance System respondents who participated in the adverse child experiences module of questions, by rurality, 2014–2015

Characteristic	Total sample† *N*=18 176		Rural *N*=4460		Urban *N*=13 716	
	n	%	*n*	%	*n*	%
Sex**						
Male	7514	47.2	1718	46.0	5796	47.5
Female	10 662	52.8	2742	54.0	7920	52.5
Age (years)**						
18–29	1633	19.8	304	16.7	1329	20.4
30–39	1703	15.4	348	13.5	1355	15.8
40–49	2381	16.4	523	15.6	1858	16.6
50–59	3452	17.7	926	19.4	2526	17.2
60–69	4565	16.9	1187	19.2	3378	16.5
70–79	3116	10.1	819	11.4	2297	9.9
≥80	1326	3.9	353	4.4	973	3.8
Race/ethnicity**						
White, non-Hispanic	12 837	68.1	2801	60.2	10 036	69.6
Black, non-Hispanic	4445	25.1	1491	34.9	2954	23.3
Hispanic	322	3.6	51	2.7	271	3.8
Other non-Hispanic	572	3.2	117	2.2	455	3.4
Education**						
High school diploma/GED or less	7174	44.7	2126	54.2	5048	42.9
At least some college	11 002	55.3	2334	45.8	8668	57.1
Income**						
<$25,000	4933	27.9	1515	35.9	3418	26.4
$25,000–49,999	4302	24.0	1056	23.4	3246	24.1
≥$50,000	6392	35.2	1204	26.3	5188	36.9
Don't know/refused/missing	2549	12.9	685	14.4	1864	12.6
Self-reported good health	14 329	81.3	3298	75.9	11 031	82.3
Self-reported low/moderate mental distress	16 046	86.7	3942	87.0	12 104	86.6

** Differences significant in weighted data by residence, $p<0.01$.
† Values presented are weighted. A total of 16 606 answered all 11 ACE questions.
GED, General Educational Development.

ACEs findings

Among all SC respondents, 61.2% reported experiencing at least one ACE, and 38.7% reported experiencing no ACEs; 44% reported one to three ACEs, and 17.2% reported four or more ACEs. Among all respondents, the top three reported ACEs were parental divorce/separation (30%), emotional abuse (29.6%), and household misuse of alcohol (24.7%). A total of 10.4% of all respondents reported that someone at least 5 years older had touched them sexually.

Rural–urban differences existed for overall ACE exposure. More rural respondents (41.4%) than urban respondents (38.3%) reported not experiencing an ACE ($p<0.01$, Table 3). Over half (58.6%) of all rural respondents reported at least one ACE compared to 61.7% of all urban respondents ($p<0.01$). Examining the highest category of ACE exposure, 15.0% of rural respondents reported experiencing four or more ACEs compared to 17.6% of urban respondents ($p<0.01$).

Rural–urban differences also existed for the types of ACEs. Fewer rural respondents experienced each type of ACE than their urban counterparts. For example, a smaller percentage of rural respondents reported experiencing household mental illness (living with anyone who was depressed, mentally ill, or suicidal) compared to urban respondents (12.6% vs 16.6%, $p<0.01$, Table 3). Only 9.1% of rural respondents reported living with anyone who used illegal street drugs or abused prescription medications compared to 11.8% of urban respondents ($p<0.01$). Rural residents also reported lower rates of household incarceration, parental separation/divorce, household domestic violence, and physical, emotional, and sexual abuse.

In logistic regression predicting overall ACE exposure (whether a respondent had four or more ACEs) and adjusting for sex, age, race/ethnicity, education, and income, rural respondents were less likely than urban respondents to report four or more ACEs (adjusted odds ratio (aOR) 0.75, 95% confidence interval (CI) 0.74–0.75, Table 4). Other factors associated with reporting four or more ACEs were sex, age, race/ethnicity, education, and income. The odds of reporting four or more ACEs were higher for female than for male respondents (aOR 1.59, 95%CI 1.58–1.60). Respondents aged 30–39 years were more likely to report four or more ACEs than those aged 18–29 years (aOR 1.11, 95%CI 1.11–1.12). Non-Hispanic blacks were less likely to report four or more ACEs (aOR 0.49, 95%CI 0.48–0.49) than non-Hispanic white respondents. Hispanic respondents also had lower odds of reporting four or more ACEs than non-Hispanic white respondents (aOR 0.44, 95%CI 0.43–0.45). Having at least some college was associated with a lower risk of reporting four or more ACEs compared to respondents who had a high school degree or less (aOR 0.82, 95%CI 0.82–0.82). Finally, higher levels of income were associated with a lower odds of reporting multiple ACEs, with the odds of reporting four or more ACEs lower for those earning $50,000 or more annually (aOR 0.45, 95%CI 0.45–0.45).

Table 3: Types and numbers of adverse child experiences reported by respondents to the South Carolina Behavioral Risk Factor Surveillance System, by rurality, 2014–1015

ACE exposure	Total sample† *N*=18 176		Rural *N*=4460		Urban *N*=13 716	
	n	%	*n*	%	*n*	%
ACE summary score**						
None	7505	38.7	1916	41.4	5589	38.3
1–3 ACEs	6861	44.0	1660	43.6	5201	44.1
≥4 ACEs	2240	17.2	446	15.0	1794	17.6
1. Household mental illness**						
Yes	2361	16.0	452	12.6	1909	16.6
No	15 579	82.6	3954	86.2	11 625	82.0
Don't know/refused	236	1.4	54	1.2	182	1.4
2. Household substance use 1**						
Yes	4101	24.7	955	22.3	3146	25.2
No	13 895	74.2	3458	76.5	10 437	73.8
Don't know/refused	180	1.0	47	1.3	133	1.0
3. Household substance use 2**						
Yes	1396	11.3	267	9.1	1129	11.8
No	16 610	87.6	4151	89.6	12 459	87.3
Don't know/refused	170	1.0	42	1.2	128	1.0
4. Household incarceration**						
Yes	1059	8.8	226	7.5	833	9.1
No	16 973	90.3	4197	91.7	12 776	90.0
Don't know/refused	144	0.9	37	0.9	107	0.9
5. Parent's divorce/separation**						
Yes	4190	30.0	945	27.9	3245	30.4
No	13 410	66.1	3334	66.7	10 076	66.0
Don't know/refused	576	3.9	181	5.4	395	3.6
6. Household domestic violence**						
Yes	2954	19.1	708	18.2	2246	19.3
No	14 817	78.7	3637	79.5	11180	78.6
Don't know/refused	405	2.2	115	2.3	290	2.2
7. Physical abuse**						
Yes	2148	13.9	445	11.7	1703	14.3
No	15 798	84.8	3953	86.9	11 845	84.4
Don't know/refused	230	1.3	62	1.4	168	1.3
8. Emotional abuse**						
Yes	4715	29.6	989	25.7	3726	30.3
No	15 798	68.4	3361	71.9	9699	67.7
Don't know/refused	230	2.1	110	2.3	291	2.0
9. Sexual abuse 1**						
Yes	1710	10.4	355	9.7	1355	10.6
No	16 145	87.7	4028	88.4	12 117	87.6
Don't know/refused	321	1.8	77	1.9	244	1.8
10. Sexual abuse 2**						
Yes	1158	7.5	239	6.2	919	7.7
No	16 712	90.8	4148	91.8	12 564	90.6
Don't know/refused	306	1.8	73	2.0	233	1.8

11. Sexual abuse 3**						
Yes	732	4.7	172	4.3	560	4.8
No	17 148	93.5	4224	94.1	12 924	93.4
Don't know/refused	296	1.8	64	1.7	232	1.8

** Differences significant in weighted data by residence, $p<0.01$.
† Values presented are weighted. A total of 16 606 answered all 11 ACE questions.
ACE, adverse childhood experience.

Table 4: Overall adverse child experience exposure reported by South Carolina Behavioral Risk Factor Surveillance System respondents, by rurality and other selected characteristics, 2014–2015

Predictor variable	Fewer than four ACEs	Four or more ACEs	Adjusted odds ratio (95%CI)		
	Weighted percentage	Weighted percentage	Point estimate	95% Wald confidence limits	
Geographic residence**					
Urban	83.67	87.55	Referent		
Rural	16.33	12.45	0.75	0.74	0.75
Sex**					
Male	48.33	38.10	Referent		
Female	51.67	61.90	1.59	1.58	1.60
Age in years**					
18–29	18.89	27.67	Referent		
30–39	14.55	22.31	1.11	1.11	1.12
40–49	15.74	21.99	1.03	1.02	1.04
50–59	17.88	14.88	0.56	0.55	0.56
60–69	17.69	10.02	0.37	0.36	0.37
70–79	11.00	2.50	0.13	0.13	0.13
≥80	4.25	0.63	0.08	0.07	0.08
Race/ethnicity**					
White, non-Hispanic	67.63	72.38	Referent		
Black, non-Hispanic	25.75	19.37	0.49	0.48	0.49
Hispanic	3.67	3.28	0.44	0.43	0.45
Other non-Hispanic	2.96	4.97	1.19	1.18	1.21
Education**					
High school diploma/GED or less	44.15	49.00	Referent		
At least some college	55.85	51.00	0.82	0.82	0.82
Income**					
<$25,000	26.65	37.96	Referent		
$25,000–49,999	24.00	24.11	0.69	0.69	0.70
≥$50,000	36.17	27.46	0.45	0.45	0.45
Missing/don't know/refused	13.17	10.47	0.57	0.57	0.58

** Differences significant in weighted data by residence, $p<0.01$.
ACE, adverse childhood experience. CI, confidence interval. GED, General Educational Development.

Discussion

This study describes the prevalence and patterns of ACE exposure among rural SC residents who responded to a 2014–2015 BRFSS survey. The results provide new insight into the ACE burden borne by adults in the South, as the study focused on rural–urban differences in ACE exposure in a representative southern state. Overall, 58.6% of rural SC residents reported experiencing at least one ACE. This is a slightly higher proportion than the aggregate numbers

reported among rural residents in both a multi-state report based on BRFSS data (56.5%)[21] and a report based on National Survey of Children's Health (NSCH) data (large rural 54.8%; small rural 53.0%)[22]. The fact that almost 60% of rural residents in SC experienced at least one ACE highlights the need to address this statewide public health issue.

However, compared to their urban counterparts, rural respondents in SC were less likely to report exposure to one to three ACEs, less likely to report exposure to four or more ACEs, and less likely to report each type of ACE. In contrast, previous research using BRFSS data found that ACE exposures did not differ significantly by rural or urban geographic residence[21].

The present findings that rural residents of SC report slightly lower exposure to ACEs than their urban counterparts are not wholly unexpected. The 2011–2012 NSCH reported that a higher percentage of children living in rural areas shared meals daily with their families and were more likely to live in safe and supportive community environments than their urban counterparts[22]. Parents living in rural areas also reported lower levels of parental stress than parents living in urban areas[22]. In contrast to urban residents, rural residents may experience more social connections within their families and communities[22]. 'Social connections' is one of the five critical protective factors that can support and strengthen families and thus increase positive child development and decrease the likelihood of child maltreatment[36].

Consistent with previous work[21], the rank order of types of ACEs for both rural and urban SC residents was similar. Among SC respondents, the top three reported ACEs for both rural and urban residents were identical: parental divorce/separation, emotional abuse, and household misuse of alcohol. An earlier study reported the same three top-reported ACEs for both rural and urban residents; however, that study's combined category of household misuse of alcohol or drugs topped their list for both rural and urban residents[21]. Also, consistent with previous literature[31], across all SC respondents, higher education levels and higher yearly income were associated with lower likelihood of experiencing four or more ACEs.

Strengths and limitations

A limitation among all studies examining ACEs using BRFSS data is that adults are retrospectively reporting their exposure to ACEs. Although these retrospective responses may introduce response bias, the likelihood is greater that responses include more false negatives than false positives, thus resulting in an underestimation of ACE exposure[37]. A second limitation of this study is that the role of residence based on current residence was examined, rather than residence at the time of the adverse event, and collapsed categories of rural and urban designation are reported, which may mask actual differences in ACE experience by geographic location. Also, the study is limited by the fact that BRFSS does not include institutionalized adults in their survey process. These individuals may have experienced ACEs disproportionally and thus introduce additional bias into the findings. Finally, as a cross-sectional study, no statements can be made on causality, and as a state-specific report, the findings may only be generalizable to similar southern states.

One strength of this study was the use of new ACE data nested in the SC BRFSS survey that allowed access to a relatively large sample size previously unexamined in terms of ACEs. A second strength was the stratification of results by geographic residence, especially in light of the paucity and mixed results of previous work related to ACEs in rural areas.

Public health implications

Although rural respondents may report slightly lower exposure to ACEs than their urban counterparts, the prevalence of ACEs was still notable among rural residents in SC. Thus, the present findings highlight the importance of reaching families and children currently living in rural communities with ACE-related awareness and prevention messages and services. These types of messages are important as the communications can include information on the impact of ACEs, effect of ACEs on child development, importance of positive parenting, and how to build child and family resilience. Additionally, ACE-related awareness and prevention messages can incorporate information on local programs and services that reinforce the content of the communications.

In addressing ACEs in rural SC communities, one barrier may be the typically reduced access to care and services in rural areas[38]. Residents of rural areas may have limited access to social, mental, medical, or public health services, as well as limited access to transportation to reach those services. Children in rural communities may only encounter child-serving agencies at school, with the children who most need the help not attending school regularly[38]. This may be one area well suited for policy interventions aimed at increasing availability of local programs and services and access to programs and services that cannot be made available in rural communities.

Researchers have suggested improving parenting skills as one means of reducing ACE exposure in children and have called on pediatricians to engage in this effort, including advocating for an assessment for ACE exposure as part of any comprehensive pediatric medical exam[39,40]. However, despite having equal access to health insurance, children in rural areas are less likely to have received a preventative healthcare visit in the past 12 months than urban children[22] and thus may be less likely to access routine preventative care. Targeted efforts are needed to increase availability and access to parenting skills programs and pediatric care in rural communities.

Others suggest that reducing childhood exposure to adverse and traumatic events requires an integrated, multidisciplinary response[16,17]. One means of reaching rural families with ACE messages may be through two-generational programs, where children receive early childhood educational services and parents receive training in child development and parenting skills, as well as support that promotes educational attainment and economic sufficiency[41]. Two-generational programs have been shown to result in better individual outcomes through improving the competencies and support services for caregivers of at-risk children while promoting child-focused development[42].

One such example of two-generational programs is the evidence-based home visiting models currently implemented in SC. Many evidence-based home visiting models have been shown to reduce child abuse and neglect through positively influencing parental engagement and improving healthcare usage and child development[43,44]. In addition to reducing child maltreatment, home visiting programs may reach families that might not otherwise access support services[45]. Ensuring that evidence-based home visiting models extend their outreach into rural communities may be one important step to reaching rural families with ACE-related messaging and prevention strategies.

Conclusions

Further research on the topic of ACEs in SC will be important to a deeper understanding of this complex issue. Topics important for future research could include an examination of ACEs in rural communities in terms of individuals' health outcomes and their access to health care, as well as the role of protective factors.

The findings of this study are important because they provide evidence that targeted interventions to prevent exposure to ACEs are just as needed in rural as they are in urban communities. With rural respondents reporting high exposures to adverse events as children, and with rural communities having less access to health and support services, future policies and programs that assist in the prevention of ACEs through targeted outreach and messaging into rural SC are necessary.

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