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Adverse childhood experiences (ACEs) on mental disorders in young adulthood: Latent classes and community violence exposure

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ABSTRACT

Adverse childhood experiences (ACEs) have significant impacts on mental health outcomes. There is a growing interest in expanding the scope of ACEs beyond household environments. To date, few studies examine multidimensional ACEs with community violence. This study aims to (1) identify underlying ACE classes including exposure to community violence, and (2) investigate the associations of ACE classes with mental disorders in adulthood: depression, anxiety, and Post-Traumatic Stress Disorder (PTSD). We employed Latent Class Analysis (LCA) and logistic regression analyses using the data from the National Longitudinal Study of Adolescent and Adult Health (Add Health). The LCA identified four heterogeneous ACE classes: (1) child maltreatment (17.47%), (2) household dysfunction (14.39%), (3) community violence (5.36%), and (4) low adversity (62.79%). Three logistic analyses showed that the "child maltreatment" class was more likely to report a depression (OR = 1.56, CI = 1.26–1.92), anxiety (OR = 1.31, CI = 1.06–1.62), and PTSD (OR = 1.97, CI = 1.35–2.87) in adulthood compared to the "low adversity" class. Also, the "community violence" class was more likely to have PTSD (OR = 2.15, CI = 1.14–4.06) in adulthood, compared to the "low adversity" class. However, the "household dysfunction" class was not significantly different in all three mental disorders from the "low adversity" class. Findings supported the differences in mental disorders in young adulthood by types of exposures to ACEs. The study highlights the importance of considering types of ACEs exposure for promoting mental health of young adults.

1. Introduction

Adverse childhood experiences (ACEs) are traumatic exposures to maltreatment, household dysfunction, and other stressors that children younger than 18 years old experience (Anda et al., 2010; Center for Disease Control and Prevetion [CDC], 2019). ACEs are enormously prevalent in the United States according to numerous reports that 60 to 85% of adults experienced at least one form of ACEs (CDC, 2019; Corcoran and McNulty, 2018; Iniguez and Stankowski, 2016; Mersky et al., 2018; Shi, 2013).

The CDC-Kaiser ACE Study was first to find evidence regarding the prevalence and consequences of ACEs with attentions to ACE exposures such as child maltreatment and household dysfunctions (Felitti et al., 1998). A large body of research has also found that ACEs increases the risk of health behaviors, psychiatric problems, and chronic disease over a lifetime (Carr et al., 2013; Dube et al., 2003; Iniguez and Stankowski, 2016; Kalmakis and Chandler, 2015; Menard et al., 2004). Previous studies have discussed gaps in the current knowledge. First, the scope of ACEs should consider community dysfunction (e.g., community violence) to account for ACEs in diverse cultural and social settings (Anda et al., 2010; Finkelhor et al., 2013, 2015; WHO, 2009). Second, the cumulative-risk approach limits understanding of the multidimensional nature of ACEs (Barboza, 2018; Merians et al., 2019). Moreover, prior research that documented a strong tie between ACEs and mental health (Carr et al., 2013; Corcoran and McNulty, 2018) has suggested that early adversities experienced in community contexts may also play distinct roles in the severity of mental disorders. Therefore, we aim to identify ACEs profiles by expanding the types of adverse experiences and examine associations between different profiles of ACEs and mental disorders in adulthood.

1.1. Mental health consequences of ACEs

The National Institute of Mental Health [NIMH] (2019b) estimated

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that approximately 19% of adults experienced mental illness, and 5% experienced serious mental illness in the United States. At some point in life, 7% of adults were estimated to experience at least one major depressive episode, 31% an anxiety disorder, and 7% post-traumatic stress disorder (PTSD) (NIMH, 2017a, 2017b, 2019b, 2019a). The prevalence of overall mental illness and major depressive disorders was highest among young adults between 18 and 25 years old (NIMH, 2019b).

Traumatic experiences and stress from ACEs potentially create neurobiological changes that deteriorate psychological development (Brady and Back, 2012; Heim and Nemeroff, 2001). Numerous studies have suggested evidence on the association of ACEs with the development of mental disorders, in addition to a graded relationship between greater ACE exposure and escalated psychological disturbance (Cambron et al., 2014; Corcoran and McNulty, 2018; Reiser et al., 2014; Sachs-Ericsson et al., 2010). Researchers commonly use the ACEs sum score to demonstrate the effects of accumulative risk factors on mental health (Anda et al., 2010; Barboza, 2018). A higher frequency of ACEs increased levels of depressive symptoms and poor health outcomes in an urban racial and ethnic minority sample in Chicago (Mersky et al., 2013). Further, greater exposure to ACEs was associated with depression, anxiety, and other health risks in a rural population-based sample (Iniguez and Stankowski, 2016) and in a sample of low-income women receiving home visiting services in Wisconsin (Mersky et al., 2018).

1.2. Community-level ACEs

Emerging studies have suggested expanding the scope of ACEs beyond household-level environments to community-level contexts to consider diverse contexts and populations (Finkelhor et al., 2013, 2015; Pachter et al., 2017). This expansion adds exposure to community violence, unsafe neighborhoods, foster care, discrimination, and racism (Wade et al., 2016; Wolff et al., 2018). Inclusion of community-level contexts added groups to the study pool that would have been otherwise overlooked by conventional ACE measures (Cronholm et al., 2015). Like conventional ACEs, these community-level ACEs appear to exhibit a strong dose-response with mental health problems, particularly with depression (Wade et al., 2016).

1.3. ACE patterns

Most ACEs studies have employed a cumulative risk approach that counts the total frequency of ACEs, but many types of ACEs are interrelated and exist in naturally occurring clusters (Barboza, 2018). Latent class analysis (LCA) is a person-centered approach that enable us to identify the naturally occurring classes of individuals with similar ACEs exposures. Recent studies have presented distinct ACE patterns (Barboza, 2018; Kim et al., 2019; Vaughn et al., 2017). However, few studies examined the patterns of ACE exposure including community-level adversity and the relationship with mental health in adulthood. The Midwest Evaluation of the Adult Functioning of Former Foster Youth is one of few studies that used LCA to identify ACE patterns, including environmental-based harm (e.g., serious injury, witnessing others hurt/killed, life-threating accidents, physical fighting, and natural disaster/fire) (Rebbe et al., 2017). The study identified three distinct ACE patterns (low adversity, complex adversity, and environmental adversity) and found higher rates of PTSD for environmental adversity compared to low adversity in former foster youths.

1.4. Study objectives

Community-level ACEs consider multidimensional structural conditions that would not be ruled out in mental health. Little is known about multidimensional ACE patterns as they pertain to community-level adversities, despite the nature of ACEs occurring in clusters rather than as single event (Dong et al., 2004). We aim to contribute to filling the gap in current knowledge by using a nationally representative longitudinal sample of youth and including a variety of mental disorders in adulthood. The objectives include to (a) identify underlying latent classes of ACE patterns by including community-level adversities, and (b) investigate the associations of ACEs with mental disorders in adulthood.

2. Methods

2.1. Data and sample

This study used data from the National Longitudinal Study of Adolescent and Adult Health (Add Health): Wave I (1994–1995), Wave III (2001 − 2001), and Wave IV (2008–2009). Nationally representative estimates were accomplished using stratified, multistage, and school-based cluster sampling methods (Chen and Chantala, 2014; Harris, 2011). Participants were a representative sample of students in grades 7–12 in Wave I. We selected a total of 10,784 adolescents who completed all three waves and whose main caregiver participated in the Wave I parent survey. The final analytic sample consisted of 10,686 adolescents after excluding 98 adolescents with missing data (0.91%).

2.2. Measures

2.2.1. Mental disorders

The dependent variables included three clinically diagnosed mental health variables, depression, anxiety, and PTSD measured in Wave IV (ages 24–32). These variables were respectively assessed by two questions regarding diagnosis and age of diagnosis: “Has a doctor, nurse or other health care provider ever told you that you have or had [(a) depression, (b) anxiety, or (c) panic disorder/PTSD]?” and “How old were you when the doctor, nurse or other health care provider diagnosed you with [(a) depression, (b) anxiety, or (c) panic disorder/PTSD]?” For each disorder, we coded 1 if respondents were diagnosed at age 18 or older.

2.2.2. Adverse childhood experiences (ACEs)

The independent variable was the type of ACEs identified using 12 binary indicators experienced in childhood: supervisory neglect, emotional neglect, physical abuse, emotional abuse, sexual abuse, suicidal attempt of household adults, parental alcohol misuse, parental separation or divorce, household adult incarceration, experience in the foster care system, direct witnessing of violence, and being the victim of a violence.

Supervisory neglect was determined by the question “By the time you started 6th grade, how often had your parents or other adult caregivers left you home alone when an adult should have been with you?” (0 = never happened, 1 = one or more than ten times). Emotional neglect was assessed by two questions: “Most of the time, [(a) your father or (b) your mother] is warm and loving toward you” (0 = disagree or strongly disagree, 1 = otherwise). Physical, emotional, and sexual abuses were respectively measured by the following questions: “Before your 18th birthday, how often did a parent or other adult caregivers (a) hit you with a fist, kick you, or throw you down on the floor, into a wall, or downstairs?; (b) say things that really hurt your feelings or made you feel like you were not wanted or loved?; (c) touch you in a sexual way, force you to touch him or her in a sexual way, or force you to have sexual relations?” (0 = never happened, 1 = one or more than ten times).

A suicide attempt of a household's adult was determined by the question “Have any of your family members tried to kill themselves during the past 12 months?” (1 = yes, 0 = no). Parental alcohol misuse was coded as 1 if either or both biological parents had a health problem of alcoholism. Parental separation or divorce was dichotomized as having “married parents” (=1) and otherwise (=0). Parental incarceration was defined as having “any primary caregiver figure in jail or prison” versus “none” using four questions: “(Has/did) your [(a)

biological mother, (b) biological father, (c) mother figure, or (d) father figure] ever (spent/spend) time in jail or prison?." Foster care was measured using the question "Did you ever live in a foster home?" (1 = yes, 0 = no).

Having witnessed community violence was assessed by the question "During the past 12 months, how often did the following happen? You saw someone shoot or stab another person" (0 = never, 1 = one or more than once). Having been victims of community violence was based on three questions: "During the past 12 months, how often did the following happen? (a) someone pulled a knife or gun on you; (b) someone shot or stabbed you; (c) someone cut or stabbed you" (1 = yes in any, 0 = none).

Emotional, physical, and sexual abuse and supervisory neglect were retrospective reports obtained at Waves III (ages 18–26) or IV (ages 24–32), whereas other ACE data were obtained at Wave I (grade 7–12). All of the adverse experiences referred to events experienced before age 18.

2.2.3. Covariates

Covariates included sociodemographic characteristics and childhood mental health: age; gender; race/ethnicity (White, Black, Hispanic, Asian, and Native American); education (less than high school, high school graduate or GED, and college or higher); household income (less than $50,000, $50,000–$99,999, and $100,000 or more); homeless experience; health insurance (private insurance, Medicaid, and no insurance); marital status (married, and never married, separated or divorced); general health (excellent, very good, good, fair, and poor); and public assistance receipt, depressive symptoms (CES-D) and anxiety symptoms before age 18. Childhood variables came from Wave I (grade 7–12) and sociodemographic characteristics from Wave IV (ages 24–32).

2.3. Analysis strategy

First, we first employed LCA to identify unobserved classes of ACEs using the 12 indicators. The ACE classes were determined based on model fit indices: Akaike information criterion (AIC), Bayesian information criterion (BIC), adjusted BIC, Entropy, and Lo-Mendell-Rubin Likelihood Ratio test (LMRT) (Magidson and Vermunt, 2004; Masyn, 2013; Muthén and Muthen, 2017). Second, we performed descriptive and bivariate analyses to understand the sociodemographic characteristics by ACE classes. Third, we conducted three logistic regression analyses to examine the association between the ACE classes and three mental disorders in young adulthood. We employed sampling weight to account for the complex survey design (Chen and Chantala, 2014). All analyses were conducted using STATA 15 and M-plus.

3. Results

3.1. Latent classes of ACEs

Table 1 shows the model fit indices for 2- through 5-class models of ACEs. The 5-class model solution showed marginally lower AIC, BIC, and adjusted BIC values than the 4-class model, but the LMRT (p = 0.69) indicated that the 5-class model was not statistically better than the preceding solution. We retained four heterogeneous latent classes of ACEs because the 4-class solution showed good model fits overall as well as better substantive interpretability (Table 2; Fig. 1).

Table 1
Model-fit statistics comparison for the unconditional latent class analysis.

Model	AIC	BIC	Adjusted BIC	Entropy	Lo-Mendell-Rubin adjusted LRT p-value
2-Class	95,497.96	95,680.11	95,600.66	0.59	< 0.001
3-Class	94,492.65	94,769.51	94,648.75	0.64	< 0.001
4-Class	**93,752.32**	**94,123.90**	**93,961.83**	**0.73**	**< 0.001**
5-Class	93,517.94	93,984.23	93,780.84	0.68	0.69

Note. Final solutions are in bold; AIC = Akaike information criterion; BIC = Bayesian information criterion; LMRT = Lo-Mendell-Rubin Likelihood Ratio test.

The first class—"child maltreatment" (17.47%)—comprised high proportions of individuals who had experienced supervisory neglect (60%), emotional neglect (17%), physical abuse (69%), emotional abuse (99%), and sexual abuse (18%) in childhood. The second class—"household dysfunction" (14.39%)—was characterized by individuals with high proportions of parental alcohol misuse (62%), parental separation or divorce (63%), and parental incarceration (48%) in childhood. The third class—"community violence" (5.36%)—comprised high proportions of individuals who witnessed (88%) or were directly victimized (95%) by community violence in childhood. The fourth class—"low adversity" (62.79%)—presented fairly low rates of each adversity.

The four latent classes showed significant differences in all sociodemographic characteristics (Table 3). The "child maltreatment" class showed significantly higher levels of depression and anxiety. The "household dysfunction" group was characterized by low socioeconomic status, with 53% having a low household income and 38% receiving public assistance. The "community violence" class included a relatively high proportion of males (72%) and Hispanics (23%). In contrast, the "low adversity" class consisted of those with a better socioeconomic status; 69% with a college degree, 22% with a high income, and 75% with private insurance.

3.2. Mental disorders by ACEs latent class

Fig. 2 presents the results of three logistic regression. The "child maltreatment" class was more likely to be diagnosed with all three mental health disorders in adulthood compared to the "low adversity" class. The "child maltreatment" class had 1.56 times higher odds of depression disorder (95%; CI = 1.26–1.92), 1.31 times higher odds of anxiety disorder (95%; CI = 1.06–1.62), and 1.97 times higher odds of PTSD diagnosis (95%; CI = 1.35–2.87) compared to the "low adversity" class. The "household dysfunction" class was not significantly different from the "low adversity" class and the "community violence" class in the odds of being diagnosed with three mental disorders. For the "community violence" class, the odds of being diagnosed with PTSD were 2.15 times greater than the "low adversity" class (95%; CI = 1.14–4.06). Yet, the analysis did not find significant differences in the odds of depression and anxiety between the "community violence" and "low adversity" class.

The supplementary analyses showed that the "child maltreatment" class was more likely to being diagnosed with depression (OR = 1.56, 95%; CI = 1.09–2.22) and anxiety (OR = 1.52, 95%; CI = 1.13–2.05) than the "household dysfunction" class. The "community violence" class did not show any significant difference in all three mental disorders when compared to the "child maltreatment" and the "household dysfunction" classes.

4. Discussion

This study contributes to current knowledge with two key findings: community violence was identified as a distinct class of ACEs, and the identified classes of ACEs were shown to be differently associated with mental disorders in adulthood.

Overall, all four classes were characterized and separated by homogenous types, indicating the multidimensional nature of ACEs. It is important to note that among the 12 ACE items, witnessing of community violence (20%) was reported as the fourth most common followed by emotional abuse, supervisory neglect, and parental separation and divorce. Community violence is defined as exposure to intentional

Table 2
Item response probabilities by latent classes of ACEs (weighted).

Items	Child maltreatment (17.47%)	Household dysfunction (14.39%)	Community violence (5.36%)	Low adversity (62.79%)	Total (100%)
Supervisory neglect	**0.60**	0.46	0.56	0.32	37.71
Emotional neglect	**0.17**	0.04	0.12	0.05	7.49
Physical abuse	**0.69**	0.07	0.32	0.03	17.46
Emotional abuse	**0.99**	0.42	0.55	0.32	46.01
Sexual abuse	**0.18**	0.05	0.05	0.01	4.83
Family suicide attempt	0.08	0.07	0.12	0.02	4.53
Parental alcohol misuse	0.25	**0.62**	0.29	0.05	14.50
Parental separation or divorce	0.34	**0.63**	0.44	0.14	26.59
Parental incarceration	0.33	**0.48**	0.32	0.04	17.27
Foster care	0.04	0.06	0.02	0.00	2.23
Witnessed community violence	0.10	0.08	**0.88**	0.04	19.43
Victims of community violence	0.12	0.11	**0.95**	0.07	11.33

Note. Final solutions are in bold.

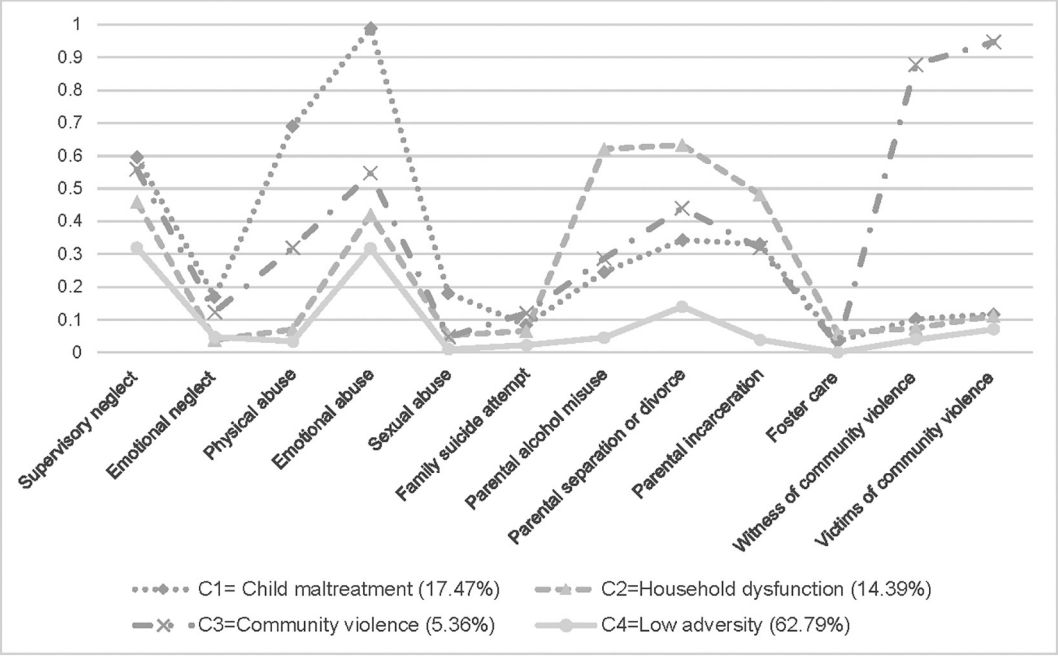

Fig. 1. Latent classes of ACEs (weighted).
Note. Class 1 = Child maltreatment; Class 2 = Household dysfunction; Class 3 = Community violence; Class 4 = Low adversity.

acts to threaten or harm others in the community (Cooley-Quille et al., 1995). Given this definition, the "community violence" class (5%) characterized by having witnessed and/or having been a victim to community violence was independently identified as one ACE profile, consistent with the previous study by Rebbe et al. (2017). This finding suggests that exposure to community violence needs to be included to better understand multifaceted ACEs in accordance with World Health Organization (WHO) recommendations (WHO, 2009).

The LCA analysis allowed for new insights into the differentiated risk of specific ACE patterns for mental disorders in adulthood. Based on these findings, we can tailor support and interventions more effectively to target ACE subgroups at risk for mental disorders. This study found that the "child maltreatment" class had the highest prevalence of depression, anxiety, and PTSD among the latent classes of ACE, controlling for other characteristics. Consistent with previous studies, the results suggest that childhood abuse increases adult mental health problems (Cukor and McGinn, 2006; Harkness and Lumley, 2008). Given that family plays a key role in child growth and development, direct physical or emotional abuse from family members may heavily affect children's emotional or physical development and increase the long-term psychological consequences.

Of interest, this study found that the "household dysfunction" class had the lowest prevalence of depression, anxiety, and PTSD across the three high risk classes. All three mental disorders were not statistically different between the "household dysfunction" and the "low adversity" classes, which suggests that ACEs caused by household dysfunction may not have a direct relationship with mental health in adulthood. A recent systemic review and meta-analysis similarly showed that individuals who had an incarcerated parent in childhood exhibited a greater risk of antisocial behavior, but this factor was not associated with mental health (Murray et al., 2012). Additionally, previous research found that a parental divorce was indirectly associated with mental health in adulthood through family economic status and academic achievement, but no direct association was found (Chase-lansdale et al., 1995). As such, household dysfunction, including having incarcerated or divorced parents may matter to children's development, but protective factors in the household and communities may provide resources and supports that help buffer negative risk and stress coming from early adversity.

Of critical interest is that the "community violence" class was at a higher risk of PTSD, but not the other two mental disorders, compared to the "low adversity" class. However, PTSD was not significantly different between the "community violence" class and "child maltreatment" class. This finding highlights that the development of PTSD may stand out in those exposed to community violence as it does in those

Table 3
Sociodemographic characteristics by latent classes of ACEs (weighted).

Variables	Child maltreatment	Household dysfunction	Community violence	Low adversity	Total
Age (M, SE)	28.09 (0.13)	28.10 (0.15)	28.67 (0.12)	28.14 (0.12)	28.16 (0.12)
Gender (%)					
Male	41.39	47.84	72.17	49.49	49.19
Female	58.61	52.16	27.83	50.51	50.81
Race/ethnicity (%)					
White	65.52	61.95	44.73	72.09	68.43
Hispanic	12.76	9.66	23.05	9.90	11.03
Black	14.74	24.22	24.56	12.25	14.66
Asian	3.16	1.25	3.32	3.62	3.26
Native American	3.82	2.91	4.35	2.14	2.62
Education (%)					
Less than high school	9.99	14.17	18.23	6.18	8.34
High school graduate	27.40	33.03	33.31	24.41	26.34
College or higher	62.61	52.80	48.46	69.41	65.32
Household income (%)					
Less than $50,000	45.81	53.13	46.05	38.65	41.84
$50,000–$99,999	34.90	30.23	33.68	39.64	37.49
$100,000 or more	19.29	16.64	20.27	21.71	20.67
Marital status (%)					
Married	48.47	43.00	39.82	47.27	46.58
Never married, separated or divorced	51.53	57.00	60.18	52.73	53.42
Public assistance (%)	28.88	37.95	30.03	18.02	22.67
Homeless experience (%)	2.64	1.50	3.05	0.66	1.20
Health insurance (%)					
Private insurance	64.98	61.06	61.99	74.99	71.10
Medicaid	9.49	13.11	9.63	5.62	7.31
No insurance	25.53	25.83	28.38	19.39	21.59
General Health[a]	3.45 (0.03)	3.54 (0.04)	3.38 (0.06)	3.75 (0.02)	3.66 (0.02)
Depression (%)	18.70	11.83	12.56	10.53	12.11
Anxiety (%)	16.08	09.98	10.50	10.31	11.21
Trauma (PTSD) (%)	4.45	2.51	4.32	1.79	2.44

Note. N = 10,686; all observed variables were statistically different by latent classes of ACEs.
[a] General Health (5 = excellent, 4 = very good, 3 = good, 2 = fair, and 1 = poor) was treated as continuous.

with childhood maltreatment exposures consistent with previous research (Foster and Brooks-gunn, 2011; Fowler et al., 2009). Our results indicate that community-level traumatic environments contribute to toxic stress alike individual-level ACEs (e.g., abuse, neglect, household dysfunction) do (Brady and Back, 2012; Heim and Nemeroff, 2001). When adolescents experience persistent exposure to community violence, the toxic stress response can result in the permanent disruption of neural circuit in adulthood (Brady and Back, 2012; Heim and Nemeroff, 2001). Because exposure to community violence often involves lethal weapons, these traumatic experiences may lead to PTSD with high trauma symptoms, including persistent fear, flashbacks, or other dissociative reactions. The association of community violence exposure with PTSD is concerning for several reasons: (a) individuals who suffer from PTSD have a high likelihood of coping with such symptoms using alcohol and drugs (Brady and Back, 2012; Khoury et al., 2010); (b) PTSD symptoms may impair the ability to regulate behaviors and thoughts, resulting in uncontrollable and aggressive behaviors to perceived threats as well as dissociative reactions (Heim and Nemeroff, 2001); and (c) victims of violence may become perpetrators of violence (Malik et al., 1997). Many adolescents increasingly experience

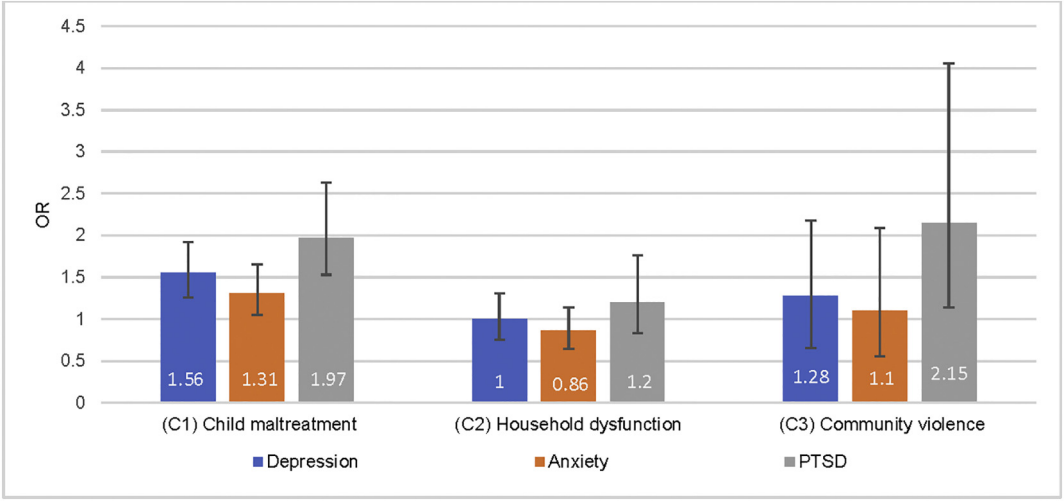

Fig. 2. Multivariate logistic regression for mental disorder in young adulthood (weighted).
Note. N = 10,686; The reference group is low adversity for ACEs; all models controlled for socio-demographics (age, gender, race, household income, education level, marital status, public assistance, homeless experience, health insurance) and health status (general health, depression at wave I, anxiety at wave I).

community violence directly or indirectly in addition to being a victim or a perpetrator. This study urges caregivers and community members to be aware that community violence can be a significant toxic stressor contributing to PTSD.

In our study, Hispanics and Blacks presented higher exposures to ACEs, in particular community violence, but they were less likely to be diagnosed with mental disorder than Whites in adulthood (full results available upon request). That is, Hispanics were less likely to be diagnosed with depression, and Blacks were less likely to be diagnosed with all mental disorder compared to Whites. These findings suggest that racial and ethnic minorities may have limited access to and may be less likely to use mental health services due to a lack of health insurance and a cultural bias as previous studies have suggested (Mcguire and Miranda, 2008). This study shows that racial and ethnic minority children with ACE exposures are in need of support and assistance to reduce harmful mental disorders in their communities and in society. We strongly urge future studies to delve into potential variations in the mechanisms of ACEs and mental disorder by race and ethnicity. Evidence from more studies may contribute to informing early interventions designed for different groups of racial and ethnic minority to buffer the negative effects of adversity.

4.1. Limitations

Our study has several potential limitations. First, most information regarding ACEs was based on retrospective self-report, which could introduce recall bias and reverse causality. The validity and reliability of retrospective recall questions in ACEs have been established among adult populations (Hardt and Rutter, 2004). Though most of our ACE measures were similar to those in previous studies, including the CDC-Kaiser ACE study, readers should be aware of some differences. Second, we used suicide attempts of household adult members and parental alcoholism as surrogate indicators of household mental illness and drug addiction due to data availability and included foster care experience. Also, domestic violence against the mother and drug abuse of household was not available. Third, our study did not account for frequency, severity, or timing and duration of ACEs. Finally, this study used a cross-sectional design, which cannot infer causation, though childhood adversities clearly preceded adult mental health disorders in a temporal sequence of data.

5. Conclusion

This study demonstrated the variations in adulthood mental disorders by ACE patterns.

Our findings highlight the importance of considering exposure to ACEs related to community violence to promote the mental health of young adults. By addressing an important public health challenge—the long-term mental health consequence of ACEs—our findings have tangible, specific, practice implications. Understanding the specific aspects of ACEs is imperative when implementing effective and integrated programs and interventions. For children and adolescents who are exposed to community violence, a school-based trauma and grief counseling intervention can help reduce symptoms of trauma (PTSD) and depression, and assist in building resilience (Saltzman et al., 2001). Appropriate early intervention are critically important to buffer the negative effects of adversity on mental health and build resilience, particularly for racial and ethnic minority children who may have limited access to mental health services due to a lack of health insurance coverage and cultural bias against using those services (Baglivio et al., 2016; Mcguire and Miranda, 2008). Culturally sensitive and integrated interventions and policies should be developed with multiple sectors, such as education, public health agencies, and government, to ensure safe environments and to nurture stable relationships for minority and all other children in the fight against the long-term effects of ACEs.

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CRediT authorship contribution statement

Haenim Lee: Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing. **Youngmi Kim**: Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing. **Jasmine Terry**: Writing - original draft.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ypmed.2020.106039.

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