

Longitudinal Impact of Childhood Adversity on Early Adolescent Mental Health During the COVID-19 Pandemic in the ABCD Study Cohort: Does Race or Ethnicity Moderate Findings?

Supplemental Information

Included Measures and Coding for ACEs

The following information outlines the measures informing each ACE category and any necessary re-coding needed to create an ACE risk score. ACEs were assessed by these measures at baseline and 1-year follow-up (1-4) when applicable.

Emotional Abuse

The experience of emotional abuse, along with other traumatic experiences, was assessed through parent report on the computerized Kiddie Structured Assessment of Affective Disorders and Schizophrenia (K-SADS) for DSM-5 Post-traumatic stress disorder (PTSD) (5). Related to emotional abuse, parents were asked whether a family member or non-family member had ever threatened to harm their child. A yes on either question contributed a point to the overall ACEs score.

Physical Abuse

Prior experience of physical abuse was assessed through parent report on the KSADS for DSM-5 PTSD module (5). Parents were asked if their children had ever been shot, beaten, or stabbed by a non-family member or an adult in the home or ever had bruises because of being hit. A parent saying yes to at least one of the outlined questions added a point to the ACEs risk score.

Sexual Abuse

History of sexual abuse was captured through parent report on the KSADS for DSM-5 PTSD module (5). Parents were asked if their children had ever been touched inappropriately by or forced to engage in sexual behavior by a family member, non-family member, or peer. Parent endorsement on any of these items resulted in a point added to child's overall ACEs risk score.

Domestic Violence

A child witnessing violence in the home was assessed through parent report on the KSADS for DSM-5 PTSD module (5). Parents were asked if their children had ever seen adults physically abuse (e.g., hit or shove) one another. A yes on this question contributed an additional point to the ACEs risk score.

Traumatic Grief

Assessing traumatic grief was based on parental report of their child experiencing sudden loss of a love one in their life on the KSADS for DSM-5 PTSD module (5). A yes on this question contributed an additional point to the ACEs risk score.

Community Violence

Community violence was measured based on parent report on the KSADS for DSM-5 PTSD module (5). Parents were asked if their child had ever witnessed a shooting or stabbing in their community. Parental endorsement on this question added an additional point to the ACEs risk score.

Natural Disaster

On the KSADS for DSM-5 PTSD module (5), parents were asked if their child had witnessed or been in a natural disaster that caused physical or material harm. A yes on this question provided an additional point to the ACEs risk score.

Fire

On the KSADS for DSM-5 PTSD module (5), parents were asked if their child had witnessed or been in a fire that caused physical or material harm. Parental endorsement on this question contributed an additional point to the ACEs risk score.

Experience of War Zone or Terrorism

On the KSADS for DSM-5 PTSD module (5), parents were asked if their child had seen death or significant destruction while in a war zone and if their child had ever witnessed or been present during terrorism acts. Parent endorsement on the question related to child's experiences in a war zone or act of terrorism added an individual point to the corresponding category.

Car Accident or Other Significant Accident

On the KSADS for DSM-5 PTSD module (5), parents were asked if their child had ever been in a car accident where medical attention was necessary for them or a passenger and if their child had ever been in any other significant accident that required medical treatment. Parent saying yes to either scenario provided an individual point to the corresponding category.

Bullying

On the KSADS Background survey (5), parents were asked if their child experienced bullying at school or in their neighborhood. A yes on this question contributed a point to the ACE risk score.

Physical Neglect

The Parental Monitoring scale was used as a proxy for physical neglect (6). This measure assesses children's perceptions of parental knowledge of whereabouts and parental involvement in day-to-day activities. For assessment of physical neglect, questions related to parent knowledge of their child's whereabouts and who their child spends time with, and child's ability to reach parent when separated from them were included. Responses on this measure were reported on a 5-point Likert scale ranging from 1="never" to 5="almost always." To create a dichotomous variable, responses from 3-5 were coded as 0 (not meeting criteria for physical neglect) and responses of a 1 or 2 were coded as 1 (meeting criteria for physical neglect). Using the new coding system, if a child had a 1 on any of the three questions, they received a point on the risk score.

Emotional Neglect

While more explicit accounts of emotional neglect were not assessed, youth report on the Child Report of Parent Behaviors Inventory (CRPBI) was used as a proxy for emotional neglect (7). The CRPBI measures children's perceptions of their primary and secondary caregiver's level of warmth and ability to comfort them. Responses reflected how much children agreed that the statements reflected their caregivers' behaviors and were recorded on a 3-point Likert scale with 1="not like them" to 3="a lot like them." To create a dichotomous variable, responses of 2 and 3

on the original measure were coded as 0 (not meeting criteria for emotional neglect) and original responses of 1 were re-coded as a 1 in the new coding system (meeting criteria). To receive a point on the ACEs score, 2 of the child's responses (across any of the 5 questions) would have to be coded as a 1.

Household Substance Use

To receive an ACE score point, a parent or child endorsement of household substance use on any of the following measures would be sufficient. A modified version of the Family History Assessment Module Screener (8, 9) was used to assess for presence or absence of psychopathology in first and second-degree relatives. Parental report of any first-degree relatives (i.e., either parent or full or half siblings) with a substance use disorder would fit criteria for household substance use. The Adult Self Report (ASR) (10) provides parent self-report of psychopathology in the last 6 months on a 3-point Likert scale 0="not true" to 2="very true/often true," which includes assessment of household substance use. If a parent reported drinking too much alcohol or using another substance for nonmedical purposes, either responses contributed to a point on ACEs score for household substance use. Both parent and child report on the Adverse Life Events survey (ALE) (11,12), which assesses exposure to various traumatic experiences, was used to assess for presence of family member substance use. If either parent or child reported that a family member had a substance use problem, either responses could have contributed to the ACEs score.

Mental Illness in Household

Mental illness in the household was assessed based on parent or child endorsement on any of the following measures. Based on the Family History Assessment Module Screener (8, 9),

if a parent reported a first degree relative (i.e., either parent or full or half siblings) with any of the following mental health disorders would meet criteria: depression, mania or anxiety, psychotic, or conduct disorder/antisocial personality disorder symptoms. In addition, other questions such as a first-degree relative seeking out-patient help, hospitalization for a mental health disorder, or dying by suicide would meet criteria. On the ASR (10), parent report of clinically elevated scores ($t > 63$) on any of the following scales contributed a point to the ACEs score: depression, anxiety, somatic, avoidant, ADHD, or antisocial. Finally, on the ALE survey (11, 12), if parents or children self-report that there they have a family member with a mental health problem, either responses would meet criteria for household mental illness.

Parental Separation/Divorce

To gather information about parental separation or divorce, parent's responses of separate or divorced on the marital status question within the demographic survey (13) would result in a point towards the overall ACE risk score. In addition, a point could be earned if either parent or child endorsed parental separation/divorce on the ALE survey (11, 12).

Family Member Involved in Criminal Justice System

An individual assessment of family member incarceration was not included. To assess for involvement of a family member in the justice system, parent and child were asked on the ALE survey (11, 12) whether they had a family member that was arrested, in trouble with the law, or went to jail. Parent or child endorsement would qualify for a point towards the overall ACE risk score.

Racial or Ethnic Discrimination

The experience of racial discrimination was assessed using the Youth Discrimination measure, which assesses for discrimination due to racial-ethnic background, sexual orientation, immigrant status, or weight and assessed how accepted the child feels in American culture. Questions strictly related to the experience of racial or ethnic discrimination were included in the current analyses and included the following questions: whether they had felt discriminated in the last year due to their race, ethnicity, or color of their skin, how often they felt teachers, other adults, or other students treated them unfairly due to their background, and whether they felt others behave negatively towards their racial/ethnic group. Responses on this measure were on a 5-point Likert scale ranging from 1=“almost never” to 5= “very often.” Original responses were recoded to be a dichotomous outcome where a response of 1 (almost never) or 2 (rarely) were coded as 0 and a response of 3-5 (sometimes to very often) were coded as a 1 for experiencing discrimination. Based on the newly coded responses, if someone received a 1 on the question asking whether they felt discriminated against due to their racial-ethnic background and provided an answer that would receive a 1 on any of the other questions (how often they feel other people treat them unfairly or whether they feel others treat their group negatively), then they received a point on the ACEs score.

Financial Adversity

From the demographics survey, information was gathered from parents about various forms of financial adversity they or someone in the immediate family may have experienced in the last year (14). If any of the following questions were endorsed by parents, then this category received a point for the overall ACE risk score: needed food but could not afford to buy it or get it, did not pay the full rent/mortgage because they could not afford it, they were evicted from the

home due to not paying rent or mortgage, they had power utilities turned off due to bills not being paid, or needed to see the doctor or go to the hospital but didn't go because they could not afford it.

Post-hoc analyses: COVID-19 Racial Discrimination

COVID-19 Discrimination Results

Despite similar, or even reduced, rates of general mental health problems in Black, Asian American, and Other/Multiracial youth, COVID-19-related worry, uncertainty stress, and impact of fears on well-being were elevated in these youth. Thus, as a post-hoc analysis, we examined whether race or ethnicity predicted COVID-19-related discrimination during the pandemic. Race was significantly associated with directly experiencing discrimination related to COVID-19. Racial minority youth reported experiencing greater discrimination (Black ($b=.13$, $t(1062)=3.40$, $p<.001$; $M= 0.36$, $SD= 0.80$), Asian American ($b=.18$, $t(1113)=3.02$, $p=.003$; $M= .23$, $SD= .57$), and Other/Multiracial youth ($b=.057$, $t(1171)=2.01$, $p=.04$; $M= .21$, $SD= .63$) compared to non-Hispanic White youth ($M= 0.093$ $SD= 0.42$). While Latinx youth reported elevated COVID-19-related worry, no significant main effect of ethnicity for experiencing COVID-19-related racial discrimination was observed.

For *directly experiencing racial discrimination*, Black and Other/Multiracial youth on average reported peak racial discrimination at survey 2 [(Black youth's responses: 75.27% saying never, 13.62% rarely, 6% occasionally, 2.35% frequently, 2.19 % very frequently) and (Other/Multiracial youth's responses: 81.79% saying never, 10.60% rarely, 4.94% occasionally, 1.44% frequently, 1.23% very frequently)]. In comparison, Asian American youth on average reported greater direct experiences of discrimination at survey 1 (84.52% saying never, 6.55% rarely, 8.33 % occasionally, 0.60% frequently, and none saying very frequently). Non-Hispanic

White youths' scores remained consistent over time, and they reported the following average responses at survey 2 (92.62% saying never, 4.92% rarely, 1.55% occasionally, 0.54% frequently, 0.37% very frequently). Latinx youth's scores peaked at survey 2 (86.36% saying never, 8.30% rarely, 2.67% occasionally, 1.48% frequently, 1.19% very frequently).

Racial Discrimination and COVID-19 Worry

Since race significantly predicted experiencing racial discrimination related to COVID-19, experiencing racial discrimination was added to the COVID-19 worry model as a predictor. Experiencing greater COVID-19-related racial discrimination was significantly related to greater COVID-19 worry ($b=.14$, $t(5103)=5.78$, $p<.001$) when accounting for ACEs, demographics, COVID-19-related covariates.

Supplemental References

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Table S1*Frequency and Proportion of Each ACE Category in the ABCD COVID Substudy Sample*

ACE Category	ABCD Measure (Parent (P) or Youth(Y))	N (%) Endorsing Category
Emotional Abuse	KSADS PTSD Module (P)	90 (1.14)
Physical Abuse	KSADS PTSD Module (P)	75 (.95)
Sexual Abuse	KSADS PTSD Module (P)	145 (1.83)
Domestic Violence	KSADS PTSD Module (P)	542 (6.85)
Traumatic Grief	KSADS PTSD Module (P)	1,873 (23.68)
Community Violence	KSADS PTSD Module (P)	65 (.82)
Fire	KSADS PTSD Module (P)	175 (2.21)
Natural Disaster	KSADS PTSD Module (P)	202 (2.55)
Experience of War Zone	KSADS PTSD Module (P)	40 (.51)
Experience of Terrorism	KSADS PTSD Module (P)	30 (.38)
Car Accident	KSADS PTSD Module (P)	280 (3.54)
Other Significant Accident	KSADS PTSD Module (P)	339 (4.29)
Bullying	KSADS Background Information Survey (P)	1,119 (14.15)
Physical Neglect	Parental Monitoring Scale (Y)	665 (8.41)
Emotional Neglect	Child Report of Parent Behaviors Inventory (Y)	698 (8.83)
Household Substance Use	Family History Assessment Module Screener (P) Adult Self-Report (P) Adverse Life Events Survey (P and Y)	3,945 (49.89)
Household Mental Illness	Family History Assessment Module Screener (P) Adult Self-Report (P) Adverse Life Events Survey (P and Y)	4,804 (60.75)
Parental Separation/Divorce	Demographic Survey (P) Adverse Life Event Survey (P and Y)	1,783 (22.55)
Family Involvement in Criminal Justice System	Adverse Life Event Survey (P and Y)	1,186 (15)
Racial or Ethnic Discrimination	Perceived Discrimination Survey (Y)	181 (2.29)
Financial Adversity	Demographic Survey (P)	1,125 (14.23)

Table S2

Additional Model Predictors of Adolescent General Mental Health Outcomes During COVID-19 Pandemic

Outcome Factors/Covariates	Survey Timepoint	Estimate	Std. Error	df	t	p-value
Sadness	Survey 1 & 3					
Age		0.05	0.01	5123.4	3.60	p<.001
Sex at birth (male)		-4.3	0.27	5307.7	-16.04	p<.001
Income						
[>=50K & <100K]		0.38	0.45	4686.4	0.85	p=0.39
[>=100K]		0.97	0.48	4519.6	2.04	p=.04
Education						
HS Diploma/GED		0.12	1.22	5219.8	0.10	p=0.92
Some College		0.17	1.14	5233.2	0.15	p=0.87
Bachelor		0.80	1.16	5195.9	0.69	p=0.49
Post Graduate		1.04	1.17	5188.9	0.89	p=0.37
CBCL Scores		0.14	0.01	5354.4	10.3	p<.001
School Status		-0.28	0.69	5869.4	-0.41	p=0.69
Family Wage Loss		0.17	0.24	7724.7	0.74	p=0.46
Positive Affect	Survey 2					
Age		-0.05	0.02	3351.2	-2.89	p=.004
Sex at birth (male)		1.01	0.36	3374.3	2.82	p=0.005
Income						
[>=50K & <100K]		-0.33	0.60	3182.6	-0.56	p=0.58
[>=100K]		-0.67	0.64	3145.7	-1.05	p=0.29
Education						
HS Diploma/GED		2.68	1.77	3392.1	1.51	p=0.13
Some College		3.01	1.66	3420.3	1.81	p=0.07
Bachelor		3.34	1.68	3417.9	1.99	p=0.05
Post Graduate		3.10	1.69	3415.2	1.84	p=0.07
CBCL Scores		-0.14	0.02	3423.8	-7.62	p<.001
School Status		0.88	1.67	3391.3	0.53	p=0.60
Family Wage Loss		0.16	0.37	3303.6	0.45	p=0.65
Fear/Worry	Survey 2					
Age		0.02	0.01	3535.0	1.61	p=0.11
Sex at birth (male)		-3.94	0.30	3876.0	-12.91	p<.001
Income						
[>=50K & <100K]		1.46	0.50	3499.7	2.93	p=.003
[>=100K]		1.30	0.53	3256.73	2.43	p=.015
Education						
HS Diploma/GED		-0.17	1.48	3806.8	-0.11	p=.091
Some College		-0.02	1.38	3841.8	-0.01	p=.099

Bachelor		0.17	1.40	3834.2	0.12	p=.090
Post Graduate		0.57	1.41	3833.9	0.41	p=.068
CBCL Scores		0.14	0.02	3769.4	8.75	p<.001
School Status		-0.08	1.10	3962.3	-0.06	p=.095
Family Wage Loss						
Anger/Frustration	Survey 1 & 3					
Age		0.001	0.001	5046	1.17	p=0.24
Sex at birth (male)		-0.28	0.03	5177	-11.3	p<.001
Income						
[>=50K & <100K]		0.06	0.04	4584	1.35	p=0.18
[>=100K]		0.11	0.04	4402	2.37	p=0.02
Education						
HS Diploma/GED		0.07	0.11	5276	0.59	p=0.55
Some College		0.14	0.11	5301	1.26	p=0.21
Bachelor		0.14	0.11	5251	1.32	p=0.19
Post Graduate		0.21	0.11	5242	1.90	p=0.06
CBCL Scores		0.01	0.001	5239	9.88	p<.001
School Status		0.06	0.07	6973	0.82	p=0.41
Family Wage Loss		.006	0.02	7078	0.26	p=0.80
Perceived Stress	Survey 1-3					
Age		0.012	0.003	5345	3.70	p<.001
Sex at birth (male)		-0.73	0.06	5448	-11.0	p<.001
Income						
[>=50K & <100K]		0.027	0.11	4794	0.24	p=0.81
[>=100K]		0.054	0.12	4654	0.45	p=0.65
Education						
HS Diploma/GED		-0.22	0.30	5532	-0.73	p=0.46
Some College		-0.36	0.28	5572	-1.3	p=0.20
Bachelor		-0.35	0.29	5522	-1.24	p=0.22
Post Graduate		-0.38	0.29	5511	-1.31	p=0.19
CBCL Scores		0.027	0.003	5518	7.80	p<.001
School Status		-0.11	0.16	9879	-0.73	p=0.47
Family Wage Loss		0.092	0.05	11020	1.69	p=0.09

Table S3

Additional Model Predictors of Adolescent COVID-19-related Mental Health Outcomes During COVID-19 Pandemic

Outcome Factors/Covariates	Survey Timepoint	Estimate	Std. Error	df	t	p-value
COVID-19 Worry	Survey 1-3					
Age		0.0001	0.001	5231	0.13	p=0.89
Sex at birth (male)		-0.22	0.02	5502	-9.32	p<.001
Income						
[>=50K & <100K]		-0.02	0.04	4843	-0.40	p=0.70
[>=100K]		0.06	0.04	4697	1.45	p=0.15
Education						
HS Diploma/GED		-0.009	0.11	5488	-0.09	p=0.93
Some College		-0.05	0.10	5512	-0.48	p=0.63
Bachelor		-0.05	0.10	5464	-0.49	p=0.62
Post Graduate		0.05	0.10	5453	0.48	p=0.63
CBCL Scores		0.005	0.001	5521	4.40	p<.001
School Status		-0.05	0.06	10050	-0.93	p=0.35
Family Wage Loss		0.07	0.02	1122	3.5	p<.001
COVID-19 Stress	Survey 2					
Age		0.003	0.002	3756	1.80	p=0.07
Sex at birth (male)		-0.23	0.03	3927	-6.84	p<.001
Income						
[>=50K & <100K]		-0.01	0.06	3569	-0.26	p=0.79
[>=100K]		0.04	0.06	3440	0.66	p=0.51
Education						
HS Diploma/GED		0.09	0.17	3813	0.56	p=0.58
Some College		0.03	0.20	3851	0.16	p=0.87
Bachelor		-0.08	0.20	3846	-0.51	p=0.61
Post Graduate		-0.0006	0.20	3843	-0.004	p=0.99
CBCL Scores		0.005	0.002	3929	3.01	p=0.003
School Status		-0.01	0.2	3981	-0.08	p=0.93
Family Wage Loss		0.09	0.03	3842	2.47	p=0.01
Impact of Virus Fears	Survey 1&3					
Age		-0.0009	0.001	4719	-0.62	p=0.54
Sex at birth (male)		-0.27	0.03	5141	-8.75	p<.001
Income						
[>=50K & <100K]		-0.03	0.05	4391	-0.67	p=0.51
[>=100K]		0.05	0.05	4096	0.83	p=0.40
Education						
HS Diploma/GED		-0.32	0.14	5088	-2.30	p=0.02
Some College		-0.32	0.13	5102	-2.42	p=0.02

Bachelor		-0.36	0.13	5041	-2.67	p=0.008
Post Graduate		-0.33	0.13	5036	-2.48	p=0.01
CBCL Scores		0.01	0.002	5105	6.82	p<.001
School Status		-0.06	0.09	7168	-0.63	p=0.53
Family Wage Loss		0.06	0.03	6477	1.91	p=0.06