**Supplement**

**Additional Participant Information**

***Recruitment***

Youth adopted from domestic foster care (AFC) were recruited from two adoption-related programs to participate in a study examining neurobiological and behavioral mechanisms underlying sensory processing challenges following ECA. Importantly, youth were not recruited based on the presence of sensory processing challenges. Study staff contacted AFC participants and their families by providing flyers to clinicians working with adopted children, presenting to adoptive families and clinicians, and posting on social media outlets. Non-adopted comparison participants in this sample were recruited through flyers posted throughout the community (schools, university campus, and around the metropolitan area), on social media, and from an active waiting list of families interested in participating in research. These comparison participants were initially recruited for a study examining sensory processing challenges in youth with autism spectrum disorders. Given that autism is most prevalent in individuals assigned male at birth, youth assigned male at birth were oversampled in this comparison group. Participants were between the ages of 8-17 years and had no known history of early caregiving adversity.

Internationally adopted previously institutionalized (PI) youth were originally recruited from adoption-related programs. The data used in this analysis was collected from PI and non-adopted PI-comparison youth as part of the fourth wave of an ongoing longitudinal study. These participants were originally recruited through a combination of flyers and word of mouth in various targeted communities, including international adoption family networks, online adoption family support groups, and adoption agencies. In addition, participants were recruited from local early childhood education centers, the campus, local public posting areas in the metropolitan area, and varied community institutions, including schools, religious organizations, community centers, professional offices, after-school facilities, community gatherings, and activity fairs.

The two comparison groups (from the AFC and PI studies, respectively) were equivalent on all demographic variables except for sex assigned at birth (in part because of over-recruitment of males in the AFC comparison sample) and were therefore combined to yield one joint comparison group prior to all analyses.

***Pre-Adoption Experiences***

Overall, AFC youth in this sample were adopted much later than PI youth and had a larger number of placements. For example, AFC youth had an average of 7 placements prior to arrival in their final adoptive home. In contrast, to our knowledge 86% of PI participants were placed in an institution within the first 18 months of life (> 50% within the first month) and adopted directly from the institution. Nearly all PI participants had only 1-2 placements (including the institution) prior to final adoption.

**AFC:**

We do not have information about why AFC participants were removed from their initial homes. However, a subset (N = 25) of AFC participants had their parents report additional detail about experiences of ECA prior to adoption, while 21 reported on the number of foster care placements. It should be noted that parents often do not have full information on their adopted children, so the below statistics should be considered examples of the types of adversity commonly experienced by this population but the percentages are likely not representative. For example, of the 65% who did not report prenatal exposure to substances, it does not mean these children were *not* exposed, but just that the adoptive parents lack this information:

Supplemental Table 1. Parent reported pre-adoption ECA for a subset of AFC youth

|  |  |  |
| --- | --- | --- |
| **Type of ECA Experience** | **N (Total = 25)** | **% (of subset)** |
| Neglect | 16 | 70 |
| Prenatal Exposure to Substances | 8 | 35 |
| Physical Abuse | 4 | 17 |
| Witnessing Violence in the Home | 6 | 26 |
| Sexual Abuse | 13 | 57 |
| Other | Experienced homelessness = 3Malnutrition = 1Failed finalized adoption = 1 | 22 |
|  | **M (SD)** | **Range** |
| Mean Number of ECA Experienced | 2.09 (1.44) | 1-5 |
| Mean Number of Foster Care Placements | 1.52 (1.72) | 0-7 |

*Abbreviations:* Early Caregiving Adversity (ECA)

**PI:**

The countries that the PI youth in this study were adopted from are listed in the table below for all participants. In addition, 91.2% (N = 31) of parents reported having visited the institutions their children were living in, and provided their subjective impressions of the building quality, facility cleanliness, quantity of caregiving, and quality of caregiving in the institutions also reported below. In general, most parents reported moderate to high building quality and facility cleanliness. Average reports of quantity and quality of caregiving were middling, with a high degree of variability. Lastly, 62% (N = 21) of PI adoptive parents said they were told their child had a special relationship with a caregiver prior to adoption.

Supplemental Table 2. Parent reported caregiving history for PI youth

|  |  |
| --- | --- |
| **Country Adopted from:***Azerbaijan* *China**Kazakhstan**Russia**South Korea* | 1127131 |
| **Parental Impressions of Institution (1-10):***Building Quality (1 = poor, 10 = nice)**Facility Cleanliness (1 = poor, 10 = excellent)**Quantity of Caregiving (1 = too few caregivers, 10 = many caregivers)**Quality of Caregiving (1 = very poor, 10 = very good)* | 6.73 (2.72; 1-10)8.05 (1.63; 4.5-10)5.98 (3.09;1-10)6.50 (3.11, 1-10) |
| Parent Reported Placement History*Caregiving Institution Only*Placed in institution 0-1 months after birth, adopted from institutionPlaced in institution 2-6 months after birth, adopted from institutionPlaced in institution 7-18 months after birth, adopted from institutionPlaced in institution >18 months after birth, adopted from institution*Caregiving Institution + Other Out of Home Placements*Placed in institution , 6-9 months after birth, after extended hospital stay Adopted from institutionPlaced in institution < 6 months after birth, in foster care for some period\*  | 1844323 |

**\*** one of these children also had an extended hospital stay (age 0-3 months)

*Note:* While all parents reported country of origin and a brief placement history (N = 34), parental impressions of the institution were available for 31/34 participants (91.2%)

**Additional Information regarding Study Measures**

***Measure Selection***

We included analysis of both the Short Sensory Profile and the SP3D checklist to provide a more complete assessment of links between ECA and sensory development. While there are some similarities between “sensitivity” items on the SSP and SOR items on the SP3D checklist, they assess these symptoms using different (but complementary) approaches.

The SSP provides a general measure of sensory issues across multiple aspects of functioning, including sensory seeking, sensory under-responsivity, and difficulty filtering sensory information, as well as SOR. In addition, the SSP has been extensively validated and is the measure most commonly used in developmental research on sensory processing challenges (including work on early adversity). This measure therefore provides a helpful point of comparison with other relevant work. Importantly, the SSP focuses primarily on affective expressions of responses to sensory stimuli, asking parents to report on patterns of behavior and including both physical and social stimuli (e.g., grooming, being touched, responding to name).

We administered the SP3D checklist as a more tailored estimate of SOR. We were most interested in SOR a priori because we felt SOR was most likely to be impacted in youth with histories of ECA given the neurodevelopmental mechanisms we believe underlie the emergence of sensory differences in this population, and because SOR symptoms have been most clearly linked to mental health outcomes. We therefore selected the SP3D because it was developed with the primary goal of providing more specific assessment of a child’s response to their regular sensory environment, with an explicit focus on assessing SOR from the perspective of multiple sensory modalities. As a result, it was designed in a checklist format, with parents asked to what extent their children were bothered by commonly encountered stimuli.

**Supplemental Analyses**

Descriptions of supplemental analyses conducted as part of this study are included below. Unless otherwise noted, these analyses were included in the original pre-registration.

***Correspondence Between Measures of Sensory Over-Responsivity***

To examine consistency across measures, an SSP SOR composite score (intended as a parallel to the SP3D SOR measure) was calculated using the Tactile Sensitivity and Visual/Auditory Sensitivity subscales. In addition, to examine whether observed differences in general processing challenges on the SSP were solely the result of overlap between SOR items across measures, we also calculated an SSP total score that omitted items from the two SSP subscales with overlap with the SP3D (the SSP Tactile Sensitivity and Visual/Auditory Sensitivity subscales). Neither of these composite scores were used in any primary analyses.

We conducted a series of linear regressions to examine concordance between different measures of sensory over-responsivity (the SSP and SP3D) across sensory modalities. Specifically, we compared a composite measure of the SSP Tactile and Visual/Auditory sensitivity scales to the SP3D total score, a measure of tactile, visual, and auditory SOR. In addition, we compared symptoms reported on the SSP and SP3D subscales for each of these sensory modalities. As expected, we found high correspondence between all SP3D measures and analogous SSP scores, as shown in *Supplemental Table 3*.

Supplemental Table 3. Concordance between SSP and SP3D Subscales

|  |  |  |  |
| --- | --- | --- | --- |
| **Scales** | **β** | ***t*** | ***p*** |
| SSP Tactile Sensitivity vs SP3D Tactile SOR | -.45 | -6.78 | < .001 |
| SSP Visual/Auditory Sensitivity vs SP3D Auditory SOR | -.62 | -10.55 | < .001 |
| SSP Visual/Auditory Sensitivity vs SP3D Visual SOR | -.29 | -4.00 | < .001 |
| SSP SOR Composite (Tactile + Vis/Aud) vs. SOR SP3D Total | -.60 | -10.07 | < .001 |
| SSP Total vs. SOR SP3D Total | -.53 | -8.47 | < .001 |

*Note*: Concordance was assessed in the whole sample (N = 183). The SSP sensitivity score was derived using the Tactile Sensitivity and Visual/Auditory Sensitivity subscales to create a comparable score to the SP3D total.

*Abbreviations:* Short Sensory Profile (SSP); Sensory Processing 3-Dimensions Checklist (SP3D); Sensory Over-Responsivity (SOR)

An unregistered exploratory analysis of the SSP that excluded the two subscales with overlap with the SP3D (the SSP tactile sensitivity and visual/auditory sensitivity subscales) revealed very similar results to the SSP findings reported in the main text (although with decreased effect sizes). There were still group differences between the AFC and PI groups on total non-SOR SSP score (*F*(3,71) = 9.71 *p* = .003), so we again analyzed the two ECA groups separately. Consistent with this finding, youth in both the PI $(a\_{PI\\_SSP} = $-7.57, *SE* = 2.22, *t* =

-3.42, 95% CI [ -11.95, -3.20], *p* < .001) and AFC $(a\_{AFC\\_SSP}$ = -21.29, *SE* = 2.11, *t* = -10.08 , 95% CI [-25.45, -17.12], *p* < .001) groups had significantly heightened general sensory processing challenges on the SSP (lower scores), relative to non-adopted comparison youth. In a model that examined general sensory processing challenges as a link between ECA and internalizing symptoms, we again found significant indirect effects through non-SOR general sensory processing challenges for both PI $(ab\_{PI\\_SSP\\_INT} = $1.51, 95% CI [0.57-2.81]) and AFC participants$(ab\_{AFC\\_SSP\\_INT} = $4.24, 95% CI [2.26-6.53]), relative to comparison youth. Similarly, we found a significant indirect effect of ECA on externalizing symptoms through non-SOR sensory processing challenges (PI: $ab\_{PI\\_SSP\\_EXT} = $1.73, 95% CI [0.62-3.31]; AFC: $ab\_{AFC\\_SSP\\_EXT} = $4.86, 95% CI [2.48-7.78]).

These findings suggest that the general sensory processing challenges reported in the main text are not purely driven by SOR items.

***Sensory Measure Subscales by Group***

Sensory measure subscale score distributions for each group are documented in *Supplemental Table 4* and *Supplemental Table 5*.

Supplemental Table 4. SP3D subscale scores for total, auditory, visual, and tactile domains in comparison, PI, and AFC participants.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SP3D Subscales** | ***Comparison******N = 112*** | ***PI******N = 34*** | ***AFC******N = 37*** | ***p*** |
| **Total Score** | 48.22 (7.97)Range: 42 - 86 | 58.35 (15.3)aRange: 42 - 98 | 58.24 (19.26)bRange: 42 - 112 | < .001 |
|  |
| **Tactile SOR** | 20.77 (4.76)Range: 17 - 42 | 25.09 (8.04)aRange: 17 - 49 | 24.51 (10.06)bRange: 17 - 61 | < .001 |
|  |
| **Visual SOR** | 5.34 (1.02)Range: 5 - 11 | 6.15 (2.87)aRange: 5 - 18 | 6.24 (2.49)bRange: 5 - 15 | .01 |
|  |
| **Auditory SOR** | 22.12 (3.84)Range: 20 - 45 | 27.12 (9.63)aRange: 20 - 63 | 27.49 (10.73)bRange: 20 - 68 | < .001 |
|  |

ANOVA was used to explore group differences in subscale scores, and associated p values are reported in the table. Pairwise group differences were then probed using t-tests:

a Denotes that the PI group has higher scores (higher SOR) than the Comparison group.

b Denotes that the AFC group has higher scores (higher SOR) than the Comparison group.

*Abbreviations:* Sensory Processing 3-Dimensions Checklist (SP3D); Sensory Over-Responsivity (SOR); Previously Institutionalized (PI); Adopted from Foster Care (AFC)

Supplemental Table 5. Mean SSP subscale scores for total, tactile sensitivity, auditory filtering, movement sensitivity, visual/auditory sensitivity, taste sensitivity, sensory under-responsivity, and low energy/weakness domains among comparison, PI, and AFC participants.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SSP Subscales** | ***Comparison******N = 112*** | ***PI******N = 34*** | ***AFC******N = 37*** | ***p*** |
| **Total Score** | 178.99 (11.79)Range: 190 - 132 | 169.76 (14.1)aRange: 189 - 131 | 147.54 (23.71)bcRange: 190 - 103 | < .001 |
| **Tactile Sensitivity** | 28.16 (5.59)Range: 35 - 18 | 33.48 (3.13)Range: 35 - 7 | 32.35 (2.6) bcRange: 35 - 27 | < .001 |
| **Visual Auditory Sensitivity** | 24.19 (1.67)Range: 25 - 16 | 22.12 (3.83)aRange: 25 - 13 | 19.59 (5.21) bcRange: 25 - 9 | < .001 |
| **Sensory Underresponsivity** | 32.83 (3.47)Range: 35 - 19 | 31.24 (4.95)aRange: 35 - 12 | 25.59 (7.03)bcRange: 35 - 12 | < .001 |
| **Taste Sensitivity** | 18.14 (3.33)Range: 20 - 4 | 17.91 (3.21)Range: 20 - 5 | 16.38 (3.74)Range: 20 - 8 | .018 |
| **Auditory Filtering** | 26.87 (3.13)Range: 30 - 18 | 23.53 (4.16)aRange: 30 - 11 | 19.03 (4.82) bcRange: 30 - 10 | < .001 |
| **Movement Sensitivity** | 14.27 (1.62)Range: 15 - 3 | 14.21 (1.39)Range: 15 - 9 | 13.05 (2.11) bcRange: 15 - 9 | < .001 |
| **Low Energy** | 29.21 (2.24)Range: 30 - 17 | 28.41 (3.2)Range: 30 - 15 | 25.73 (5.6) bcRange: 30 - 13 | < .001 |
| **SOR Composite** **(Tactile + Vis/Aud Sensitivity)** | 57.67 (3.84)Range: 60 - 32 | 54.47 (5.55)aRange: 60 - 40 | 47.76 (10.01)bcRange: 60 – 27 | < .001 |

ANOVA was used to explore group differences in subscale scores, and associated p values are reported in the table. Pairwise group differences were then probed using t-tests:

a Denotes that the PI group has lower scores (greater general sensory processing challenges) than the Comparison group

b Denotes that the AFC group has lower scores (greater general sensory processing challenges) than the Comparison group, suggesting more sensory symptoms.

c Denotes that AFC group has lower scores (greater general sensory processing challenges) than the PI group

*Abbreviations:* Short Sensory Profile (SSP); Sensory Over-Responsivity (SOR); Previously Institutionalized (PI); Adopted from Foster Care (AFC)

***SSP Categories by Group***

Supplemental Table 6. Sample SSP Clinical Categories by Group

|  |  |  |  |
| --- | --- | --- | --- |
| **ECA Group** | **Typical** | **Probable Sensory Processing Challenges** | **Definite** **Sensory Processing Challenges** |
| **Comparison****N = 112** | 92.86% | 5.36% | 1.79% |
| **PI****N = 34** | 82.35% | 14.7% | 2.94% |
| **AFC****N = 37** | 40.54% | 18.9% | 40.54% |

*Note:* Probable Sensory Processing Challenges and Definite Sensory Processing Challenges categories correspond to the Probable and Definite Difference categories from the SSP

*Abbreviations:* Early Caregiving Adversity (ECA); Short Sensory Profile (SSP); Previously Institutionalized (PI); Adopted from Foster Care (AFC)

***Descriptive Statistics for CBCL T-Scores by Group***

Descriptive statistics for CBCL T-scores are provided in *Supplemental Table 7* and visualized in *Supplemental Figure 1* and *Supplemental Figure 2.*

Supplemental Table 7. Sample Clinical Descriptive Statistics

|  |  |  |  |
| --- | --- | --- | --- |
| **Scales** | ***Comparison******N = 112******Mean (Median; SD)*** | ***PI******N = 34******Mean (Median; SD)*** | ***AFC******N = 37******Mean (Median; SD)*** |
| CBCL Internalizing T-ScoresRange: 33 - 100 | 47.24 (9.74)Range: 33-71 | 57.76 (10.84)Range: 33-76 | 59.78 (11.57)Range: 33-84 |
| CBCL Externalizing T-ScoresRange: 33 - 100 | 43.03 (8.52)Range: 33-63 | 50.76 (9.43)Range: 34-66 | 60.43 (12.38)Range: 34-86 |

*Note*: CBCL internalizing T-scores in this sample may underestimate symptoms, because raw scores were calculated without question 91. Internalizing and externalizing T-scores above 70 are considered to be in the clinical range; scores between 65 and 70 are considered to be in the borderline clinical range.

*Abbreviations:* Child Behavior Checklist (CBCL); Previously Institutionalized (PI); Adopted from Foster Care (AFC)

Supplemental Figure 1. Visual representation of CBCL internalizing and externalizing scores for comparison, PI, and AFC participants.

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*Supplemental Figure 2.* Visual representation of CBCL internalizing and externalizing scores with clinical cutoffs for comparison, PI, and AFC participants. T-scores above 70 are considered to be in the clinical range; scores between 65 and 70 are considered to be in the borderline clinical range.

**

***Zero-Order Correlations Between Sensory Symptoms and Psychopathology***

*Supplemental Table 8.* Zero-Order Correlations Between Sensory Symptoms and Psychopathology

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Whole Sample****(N = 183)** | **Comparison****(N = 112)** | **PI****(N = 34)** | **AFC****(N = 37)** |
| **SP3D-INT*****R (Beta)******t******p*** | .365.21<.001 | .333.69<.001 | .17.96.34 | .201.21.23 |
| **SP3D-EXT*****R (Beta)******t******p*** | .365.14<.001 | .22.08.04 | .11.65.52 | .31.84.08 |
| **INT-EXT*****R (Beta)******t******p*** | .6010.08<.001 | .495.84<.001 | .573.93<.001 | .513.53.001 |
| **SSP-INT*****R (Beta)******t******p*** | -.47-7.23<.001 | -.25-2.71.008 | -.54-3.59.001 | -.26-1.62.114 |
| **SSP-EXT*****R (Beta)******t******p*** | -.64-11.25< .001 | -.38-4.26< .001 | -.56-3.78< .001 | -.43-2.81.008 |
| **SSP-SP3D*****R (Beta)******t******p*** | -.53-8.47< .001 | -.33-3.60< .001 | -.48-2.82.008 | -.59-4.36.001 |

*Abbreviations:* Previously Institutionalized (PI); Adopted from Foster Care (AFC)

***Early Caregiving Adversity, Age, and Sensory Processing Challenges***

Based on previous findings, we predicted that sensory processing challenges would decrease with age. With this in mind, we pre-registered an analysis of age-SOR associations within the larger ECA group (AFC +PI). We chose not to conduct a moderation analysis given we predicted the same (negative) relationship between age and symptoms in the two ECA groups. Instead, we performed a planned linear regression examining the relationship between age and SOR symptoms within the overall ECA group (PI and AFC). Given age differences between the AFC and PI groups in the updated sample, we performed a post-hoc linear regression within each of the individual ECA groups.

SOR symptoms in PI and AFC youth were not correlated with age, covarying for sex assigned at birth $(B\_{Age}$ = -0.68, *t*(70) = -0.93, 95% CI [-2.14-0.78], *p =* .36). Post-hoc exploratory follow-up analyses showed no association between age and SOR in either the PI $(B\_{Age\\_PI}$ = 0.23, *t*(33) = 0.15, 95% CI [-2.92-3.37], *p =* .89) or AFC groups $(B\_{Age\\_AFC}$ = -1.54, *t*(36) = -1.42,95% CI [-3.74 -0.67], *p =* .17).

***Post-Hoc Exclusion of Outliers and Reanalysis***

We made the decision when pre-registering our exclusion criteria to not exclude outliers, in order to preserve statistical power in a relatively small sample for a hard to recruit population that has documented high inter-individual variability (Tottenham, 2012). All primary analyses were conducted using bootstrap resampling to provide greater confidence in our estimate of the examined effect sizes.

To provide additional confidence that our findings were not the result of influential outliers, all SP3D SOR analyses were re-run (post-hoc), excluding participants with SP3D SOR total scores greater than (or less than) 3 SDs from the overall sample mean of 49.23 (SD = 8.83).

The remaining sample (N = 145) included 33 AFC participants (4 excluded), 32 PI participants (2 excluded) and 112 comparison participants (0 excluded).

All SP3D SOR analyses remained significant in the direction of the original results. Specifically:

- As before, we found no differences between ECA groups on SP3D scores (*F*(3, 64) = 1.95, *p* = .168). Again, the AFC group had significantly more sensory processing challenges on the SSP than the PI group (*F* (3, 64) = 10.5, *p* = .002).

- Youth in the PI $(a\_{PI\\_SP3D}$ = 7.87, *SE =* 1.97, *t* = 4.00, *p* < .001, 95% CI [3.97-11.75]) and AFC $(a\_{AFC\\_SP3D}$ = 4.82, *SE* = 1.90, *t* = 2.53, *p* = .01, 95% CI [1.07-8.58]) groups had higher SP3D scores (higher SOR) than the non-adopted comparison group, covarying for age and sex

- Covarying for age and sex assigned at birth, we found significant indirect effects of ECA on elevated internalizing symptoms through SOR, for both PI $(ab\_{PI\\_SP3D\\_INT} = 1.38 ,SE = 0$.55, 95% CI [0.37- 2.51]) and AFC $(ab\_{AFC\\_SP3D\\_INT} = 0.85, SE = 0$.46, 95% CI [0.08-1.86]) youth.

- We found significant indirect effects of PI and AFC status on externalizing symptoms through SOR (PI: $ab\_{PI\\_SP3D\\_EXT} = $ 1.16, SE = 0.54, 95% CI [0.29, 2.41]; AFC:$ ab\_{AFC\\_SP3D\\_EXT} = 0.71, SE = 0.43, $95% CI [0.07 , 1.72 ]).

Likewise, all SSP analyses were re-run (post-hoc), excluding participants with SSP total scores less than (or greater than) 3 SDs from the overall sample mean of 170.92 (SD = 19.58).

The remaining sample (N = 180) included 34 AFC participants (3 excluded), 34 PI participants (0 excluded) and 112 comparison participants (0 excluded).

Specifically:

- As before, we found no differences between ECA groups on SP3D scores (*F*(3,67) = 1.08, *p* = .30). Again, the AFC group had significantly more sensory processing challenges on the SSP than the PI group (*F* (3,67) = 9.69, *p* = .003).

- Youth in the PI $(a\_{PI\\_SP3D}$ = 10.12, *SE =* 2.36, *t* = 4.29, *p* < .001,95% CI [5.47-14.78]) and AFC $(a\_{AFC\\_SP3D}$ = 7.32 , *SE* = 2.31, *t* = 3.17, *p*  = .002, 95% CI [2.77-11.87]) groups had higher SP3D scores (higher SOR) than the non-adopted comparison group, covarying for age and sex. Consistent with this finding, youth in both the PI $(a\_{PI\\_SSP} = $-10.63, *SE* = 2.93, *t* = -3.63, 95% CI [ -16.40, -4.85], *p* < .001) and AFC $(a\_{AFC\\_SSP}$ = -27.94, *SE* = 2.86, *t* = -9.77, 95% CI [-33.59, -22.3], *p* < .001) groups had significantly heightened general sensory processing challenges on the SSP (lower scores), relative to non-adopted comparison youth.

- Covarying for age and sex assigned at birth, we found significant indirect effects of ECA on elevated internalizing and externalizing symptoms through SOR, for both PI $(ab\_{PI\\_SP3D\\_INT} = 1.56 ,SE = 0.64, $95% CI [0.38- 2.93];$ab\_{PI\\_SP3D\\_EXT} = 1.31 ,SE = 0.56,$ 95% CI [0.31- 2.52) and AFC $(ab\_{AFC\_{SP3D\_{INT}}} =1.13, SE = 0.54, $95% CI [0.20-2.32]; $ab\_{AFC\\_SP3D\\_EXT} = 0.95, SE = 0.51, $95% CI [0.14-2.13]) youth.

- Covarying for age and sex assigned at birth, we found significant indirect effects of ECA on elevated internalizing and externalizing symptoms through general sensory processing challenges, for both PI $(ab\_{PI\\_SSP\\_INT} = 1.80 ,SE = 0.70, $95% CI [0.65- 3.36];$ab\_{PI\\_SSP\\_EXT} = 2.11 ,SE = 0.82, $95% CI [0.77- 3.94) and AFC $(ab\_{AFC\_{SSP\_{INT}}}= 4.74, SE = 1.24, $95% CI [2.59-7.41]; $ab\_{AFC\\_SSP\\_EXT} = 5.55, SE = 1.56, $95% CI [2.95-9.00]) youth.

***Post-Hoc Reanalysis in an Age-Matched Sample***

To provide additional confidence that our findings were not the result of age differences between groups, all analyses were re-run (post-hoc) using only participants between ages 11 and 18. This age range ensured that the resultant sample had no differences between ages across groups, while maximizing sample size.

The remaining sample (N = 144) included 20 AFC participants (17 excluded), 34 PI participants (0 excluded) and 90 comparison participants (22 excluded). Our findings are summarized below:

**Differences in Sensory Processing Challenges Between ECA Groups:**As before, we found no differences between ECA groups on SP3D scores (*F*(3,53) = 1.93, *p* = .17). However, the AFC group had significantly more sensory processing challenges on the SSP than the PI group (*F*(3,53) = 8.52, *p* = .005). The AFC and PI groups were therefore examined separately in all analyses, with ECA dummy coded and non-adopted comparison youth as the reference group.

**Sensory Processing Challenges Following ECA:**

- As before, age-matched PI youth had higher SOR (higher SP3D scores;$ a\_{PI\\_SP3D}$ = 10.06, *SE =* 2.27, *t* = 4.44, 95% CI [5.58 -14.54], *p* < .001) and heightened general sensory processing challenges (lower SSP scores;$a\_{PI\\_SSP} = $-10.79, *SE* = 2.99, *t* = -3.61 , 95% CI [-16.70, -4.88], *p* < .001) than the non-adopted comparison group, covarying for age and sex.

- As before, age-matched AFC youth had heightened general sensory processing challenges (lower SSP scores;$a\_{AFC\\_SSP}$ = -27.31, *SE* = 3.57, *t* = -7.65, 95% CI [ -34.37, -20.25], *p* < .001) than the non-adopted comparison group, covarying for age and sex. However, although the direction of the effect remained the same, the age-matched AFC sample of AFC youth no longer had significantly elevated SOR (higher SP3D scores;$ a\_{AFC\\_SP3D}$ = 4.84, *SE* = 2.71, *t* = 1.79 , 95% CI [ -0.52 -10.19], *p =* .08) than the non-adopted comparison group, covarying for age and sex.

**Psychological Symptomatology following ECA:** As in the original analysis, there were significant total effects of ECA on both internalizing and externalizing symptoms. Both PI $(c\_{PI\\_INT} = $ 6.28, *SE* = 1.3, *t* = 44.84, 95% CI [3.71, 8.84], *p* < .001) and AFC $(c\_{AFC\\_INT} = $ 8.34, *SE =* 1.57, *t* = 5.23, 95% CI [5.22 – 11.46], *p <* .001) youth had higher internalizing symptom scores than comparison youth, covarying for age and sex. Similarly, both PI $(c\_{PI\\_EXT} = 4.30,$ *SE* = 0.91, *t =* 4.75, 95% CI [2.51, 6.1], *p* < .001) and AFC $(c\_{AFC\_{EXT}} = $ 9.99, *SE* = 1.32, *t =* 7.55, 95% CI [7.34 – 12.62], *p* < .001) youth had higher externalizing symptoms than comparison youth, covarying for age and sex.

**Sensory Processing Challenges and Links to Psychological Symptomatology:**

- Age-matched PI youth: covarying for age and sex assigned at birth, we again found significant indirect effects of previous institutionalization on elevated internalizing and externalizing symptoms through SOR $(ab\_{PI\\_SP3D\\_INT} = $1.76, 95% CI [0.56-3.19]; $ab\_{PI\\_SP3D\\_EXT} = $ 1.06, 95% CI [0.14 -2.09]) and through general processing challenges $(ab\_{PI\\_SSP\\_INT} = 1.90, $95% CI [0.7-3.63]; $ab\_{PI\\_SSP\\_EXT} = $1.45, 95% CI [0.51-2.85]), relative to comparison youth.

- Age-matched AFC youth: covarying for age and sex assigned at birth, we again found significant indirect effects of AFC status on elevated internalizing and externalizing symptoms through general processing challenges $(ab\_{AFC\\_SSP\\_INT} = $4.82, 95% CI [2.45-8.01]; $ab\_{AFC\\_SSP\\_EXT} = $ 3.68, 95% CI [1.62-6.37]), but not SOR $(ab\_{AFC\_{SP3D\_{INT}}} = 0.85, $95% CI [-0.12-2.1]; $ab\_{AFC\\_SP3D\\_EXT} = 0$.51, 95% CI [-0.08 -1.51]), relative to comparison youth.

**Early Caregiving Adversity, Age, and Sensory Processing Challenges within the age matched sample:** SOR symptoms in PI and AFC youth were not correlated with age, covarying for sex assigned at birth $(B\_{Age}$ = 0.62, *t*(53) = -0.60, 95% CI [-1.44-2.67], *p* = .55). Unregistered exploratory follow-up analyses showed no association between age and SOR in either the PI $(B\_{Age\\_PI}$ = 0.23, *t*(33) = 0.15, 95% CI [-2.92-3.37], *p* = .89) or AFC groups $(B\_{Age\\_AFC}$ = 1.68, *t*(19) = -0.12, 95% CI [-2.72 – 3.06], *p* = .90).

***Examination of Sex Differences Between Groups***

Individuals assigned female at birth are often over-represented in internationally adopted previously institutionalized samples as a result of varied political and social factors that impact both circumstances leading to placement in an institution and the process of international adoption. Consistent with this, individuals assigned female at birth are disproportionately represented in our PI sample (~71%). The comparison and AFC groups have approximately even proportions of individuals assigned male and individuals assigned female at birth.

All analyses covaried for assigned sex at birth. In the primary models (which included group membership), sex was not significantly associated with SOR symptoms in (BFemale\_SOR = -1.09, *t* = -0.58, *p* = .56, CI = [ -4.85 – 2.65]). Sex was significantly associated with SSP scores in the primary models (BFemale\_SSP = 4.79, *t* = -0.86, *p* = .39, CI = [0.25 – 9.32]), indicating that individuals assigned male at birth had more elevated sensory processing challenges than individuals assigned female at birth. Given this and that limited data suggest sensory symptoms are more common in males than females in youth with and without experiences of ECA (Wilbarger et al., 2010), if anything the over-representation of females in the PI group may be resulting in underestimation of the impact of PI experiences on sensory symptoms.

***Relationship between SSP Auditory Filtering Score and ADHD Symptoms***

In addition to our focal analyses of the CBCL internalizing and externalizing subscale, we calculated ADHD subscale scores for all participants as part of our assessment of the relationship between measures. While the SSP is the most commonly used questionnaire index of sensory processing challenges in youth, critics of the measure argue that it may conflate sensory processing issues with symptoms of ADHD. In order to parse these effects in the context of ECA, we conducted an exploratory multiple regression. ADHD symptoms were significantly associated with more atypical SSP auditory filtering (β = -0.50, *t*(182) = -8.70, *p* < .001).