Appendix A

Covariates

Psychopathology. We administered the 112-item Youth Self Report (YSR; Achenbach & Edelbrock, 1989) to assess adolescents' psychopathological symptoms. The internalizing and externalizing symptom scales were applied to characterize our sample. The total behavior problem score was employed to control for psychopathological symptoms in maltreatment and age analyses.

Intelligence. The working memory (digit span, arithmetic) and processing speed (symbol search, cancellation) subscales of the Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV; Wechsler, 2003) or the Wechsler Adult Intelligence Scale – Fourth Edition (WAIS-IV; Wechsler, 2008) were employed to assess participants' IQ (WISC-IV for ages 12-15 and WAIS-IV for ages 16-17, respectively). A composite score was computed using the mean of the two subscale IQ scores of the respective test.

Fetal alcohol syndrome. To rule out any effect of fetal alcohol syndrome (FAS) on brain function and structure, we screened all participants for the FAS facial phenotype using the FAS Facial Photographic Analysis Software, Version 2.1.0 (Astley, 2016). Based on three photos of each participant, FAS features were coded on the 4-Digit Diagnostic Code for facial phenotype rank as being absent, mild, moderate or severe (1 to 4; Astley & Clarren, 2000). In a foster care population, the performance of the FAS facial photographic screening tool was highly accurate (Astley, Stachowiak, Clarren, & Clausen, 2002). However, only severe FAS features (rank 4) have been associated with a sufficiently positive predictive value and specificity to diagnose FAS if maternal alcohol exposure during pregnancy is unknown (Astley Hemingway, 2020).

Puberty status. We assessed participants' puberty status using the Tanner Scales (Marshall & Tanner, 1969, 1970). This picture-based, sex-specific questionnaire is composed

of three questions regarding onset and current status of physical development of external primary (breast/scrotum) and secondary (pubic hair) sex characteristics (five-point scale from 0 to 4 indicating the stage of development). Responses to questions about current status (1) of primary sex characteristics and (2) of secondary sex characteristics were averaged.

Socioeconomic status. Socioeconomic status (SES) was operationalized via educational status of the mother (or other primary caregiver), as indexed by the mother's highest school qualification.

Procedure

The study took place across two sessions of about 3-hours each with trained testing staff. During the first appointment at the Child and Adolescent Psychiatry of the University Clinic in Leipzig, adolescents participated in the WISC-IV or WAIS-IV assessment and the photo session for FAS evaluation. Separately, we conducted the Maternal Maltreatment Classification Interview (MMCI; Cicchetti, Toth, & Manly, 2003) with the caregiver, who also completed several questionnaires. Finally, adolescents undertook a 20-minute mock scanning session at the Max Planck Institute for Human Cognitive and Brain Sciences (MPI CBS) in preparation for the actual MRI scan to minimize motion artefacts related to nervousness and anxiety. For the mock scanning session, participants were first familiarized with the scanning procedure (i.e., explaining why to remove any metal items, showing them all devices, telling them about the different scanner noises, as well as the importance of remaining as still as possible during scanning). In the mock scanner, participants watched a 10-minute animal documentary while receiving behavioral feedback regarding their head motion (measured with a motion sensor attached to their forehead) throughout the movie (i.e., the movie briefly froze when participants moved to provide feedback). This procedure not only ensured that participants remained as motionless as possible during the actual scan, but

also served to screen out participants due to excessive movement (*n*=1) before the actual scan.

During the second appointment at the MPI CBS, adolescents were first instructed about the Cyberball paradigm outside the scanner. They subsequently played a short practice sequence in the scanner before functional MRI scans were obtained. Furthermore, we administered a structural scanning sequence between Cyberball and an additional reversal learning task not further considered here.[1] Participants spent about 60 minutes in total in the scanner. After scanning, children completed questionnaires.

Analyses of Age, Maltreatment, and Maltreatment X Age Effects

Analyses of sample characteristics. Maltreated and nonmaltreated groups were compared on relevant sample characteristics across all participants as well as within the early and mid-adolescent groups using one-way ANOVAs, Mann-Whitney *U,* and Chi-squared (χ^2) tests. Similarly, each exposure group (i.e., abused/neglected/emotionally maltreated) was compared to the nonmaltreated group to test whether matching was preserved for these subgroups. Additional one-way ANOVAs were conducted to test whether the early adolescent vs. mid-adolescent maltreated groups significantly differed in maltreatment characteristics.

Based on the results of the aforementioned between-group analyses of sample characteristics (see **Sample Characteristics** in **Appendix B**), all significant maltreatment and age analyses (described below) were conducted with and without two participants showing moderate FAS features to control for any influence of fetal alcohol exposure on our findings. We further controlled all significant effects for psychopathological symptoms by applying the YSR total behavior problem score in ANCOVAs or multiple regressions to account for differences in psychopathology between maltreated and nonmaltreated

[1] The order of the paradigms was counterbalanced and evenly distributed between the maltreated and nonmaltreated group.

participants. In multiple regressions assessing effects of maltreatment dimensions, we also included age to control its potentially confounding effect. Finally, significant between-group analyses of maltreatment subtypes were controlled for differences in SES as matching regarding SES was not preserved for the comparison of these subgroups to the nonmaltreated controls.

Analyses of categorical age and maltreatment variables. Main effects of age and differential maltreatment exposures (i.e., abuse, neglect, and EM) as well as their interaction effects on activation differences in the whole-brain derived clusters were assessed using one-way and two-way ANOVAs, respectively.[2] To this end, we first assessed the main effect of age across the full sample. In a second step, we tested main and interaction effects of age and each maltreatment exposure comparing participants with the respective exposure (n=19 physically/sexually abused; n=34 physically neglected; n=49 emotionally maltreated) to nonmaltreated controls (n=40). Analyses were controlled for multiple comparisons (i.e., the number of clusters per contrast). Thus, cut-off p-values were adjusted to q<.0167 for rejection > not-my-turn contrast, q<.0045 for rejection > acceptance contrast, as well as q<.0083 for the contrast acceptance > rejection. For the contrast not-my-turn > rejection the p<.05 cut-off was applied, as only activation differences from one cluster were tested. Following up significant interaction effects, we tested between-group effects for (a) maltreatment-exposed (i.e., abused, neglected, or emotionally maltreated) vs. nonmaltreated participants within the early vs. mid-adolescent groups, as well as (b) early vs. mid-adolescent groups within maltreatment-exposed vs. nonmaltreated participants using one-way ANOVAs. Finally, we conducted three-way ANOVAs separately within the two age bands to examine specific associations of the maltreatment subtypes abuse, neglect, as well as emotional maltreatment (present vs. absent) with activation differences across the whole sample.

[2] Data were checked for outliers (i.e., residuals ± 3 SDs from the mean). Five identified outliers on five variables were winsorized (set to the next boundary value within 3 SDs). Analyses were conducted with and without winsorized values, yielding comparable results. Reported results are based on effects with winsorized values.

To examine global maltreatment effects, we repeated the age x maltreatment analyses (including follow-up tests) without distinguishing between different maltreatment exposures. If the assumption of variance homogeneity was not met in any between-group analysis, we tested the respective effect using Welch's *F* test. If the residuals of any between-group analysis were not normally distributed, we tested the respective effect using the Mann-Whitney *U* test.

Analyses of maltreatment dimensions. We examined dose-dependent effects of dimensional maltreatment exposures (continuous aggregate scores using factor values from structural equation modeling) and activation differences within the respective whole-brain derived clusters using multiple regressions. To correct for multiple comparisons, we applied the same corrected *p*-values as for the between-group analyses described in the previous section. In the first step, multiple regressions were conducted for each maltreatment exposure dimension (i.e., abuse, neglect, and emotional maltreatment) predicting activation differences for each cluster, separately within each of the exposure subgroups (either abused, neglected, or emotionally maltreated participants). Following up on significant effects of one exposure dimension, we included the respective other exposure dimensions in the model. For all significant regression analyses, if residuals were not normally distributed, bootstrapping was conducted (5000 bootstrapped samples drawn with replacement from the original dataset providing bias-corrected and accelerated (BCa) 95% CIs).

Appendix B

Sample Characteristics

In preliminary analyses, we examined whether maltreated and nonmaltreated participants significantly differed in important sample characteristics. In **Table B1**, we show that there were no significant between-group differences in age, gender, handedness, SES, IQ score, as well as puberty status (i.e., the mean Tanner score). However, on average, the maltreated group had a significantly higher FAS score. This difference was primarily attributable to two participants, both in the maltreated group, who scored a 3 on the FAS scale (1=absent, 2=mild, 3=moderate, and 4=severe). After excluding these two participants, FAS scores did not differ between groups any longer ($F(1, 89.65)=2.38$, $p=.126$). To rule out any influence of fetal alcohol exposure on our findings, all analyses yielding significant maltreatment (subtype), age and/or maltreatment (subtype) by age effects were repeated while excluding these two participants. As analyses yielded comparable effects, the final results reported in this manuscript are based on the full maltreated sample. As expected, the maltreated group displayed significantly more internalizing and externalizing symptoms in the YSR (Achenbach & Edelbrock, 1989) than the nonmaltreated group (as noted above psychopathological symptoms were therefore controlled in an additional analytic step).

Focusing on the specific exposure subgroups, the abused, neglected, and emotionally maltreated groups did not differ significantly from the nonmaltreated group on age, gender, handedness, IQ score, as well as pubertal status ($ps>.05$). However, the SES score was significantly lower for the abused, neglected, and emotionally maltreated groups ($ps<.05$). Thus, we controlled for this covariate in all exposure-specific between-group analyses.

When examining sample characteristics for maltreated vs. nonmaltreated participants separately within early and mid-adolescent groups, more internalizing symptoms were only reported by maltreated vs. non-maltreated youth in the mid-adolescent group ($F(1, 46)=4.11$,

p=.048), but not in the early adolescent group. Yet, we found no significant differences for any of the other sample characteristics (*p*s>.05). Early and mid-adolescent maltreated participants also did not differ in their maltreatment exposure (see **Table B2**).

Table B1

Sample Characteristics of Maltreated and Nonmaltreated Adolescents

	Maltreated group (*n* = 58)	Nonmaltreated group (*n* = 40)	Between-group comparison	
Sample characteristics			**Test-statistic**	***p***
Mean participant age in years (*SD*)	14.88 (2.07)	14.35 (1.82)	$F(1, 90.41) = 1.79$	.184[a]
% females	44.83	57.50	$\chi^2(1) = 1.52$	.218
% left handedness	12.50	10.35	$\chi^2(1) = 0.11$	.740
Median maternal school education	High school diploma	General qualification for university entrance	$U = 937.50$	.078
Mean IQ score (*SD*)	97.21 (8.52)	98.68 (7.50)	$F(1, 96) = 0.77$	.381
Mean Tanner score (*SD*)	2.65 (0.94)[b]	2.54 (0.91)	$F(1, 95) = 0.32$	.575
Mean FAS score (*SD*)	1.43 (0.57)	1.23 (0.42)[c]	$F(1, 93.81) = 4.05$	.047[a]
Mean YSR internalizing symptoms (*SD*)	13.85 (8.85)	9.48 (7.88)	$F(1, 96) = 6.30$	.014
Mean YSR externalizing symptoms (*SD*)	11.04 (6.49)	7.68 (4.72)	$F(1, 96) = 7.85$	.006

Note. FAS=Fetal Alcohol Syndrome; YSR=Youth Self Report.

[a] If the assumption of variance homogeneity was not met, Welch's *F* test was used to examine differences between groups. [b] *n* = 56. [c] *n* = 39.

Table B2

Maltreatment Characteristics within the Maltreated Sample (n = 58) for Early vs. Mid-Adolescence

	Early adolescence (≤ 13.5 years; *n* = 28)	Mid-adolescence (> 13.5 years; *n* = 30)	Between-group comparison	
Maltreatment characteristics	***M (SD)***	***M (SD)***	**Test-statistic**	***p***
Chronicity (% of affected developmental periods; 1-100%)	59.76 (28.54)	54.33 (29.31)	$F(1, 56) = 0.51$	.478
Maximum severity (1-5)	2.89 (1.13)	2.83 (1.29)	$F(1, 56) = 0.04$	.853
Number of subtypes (1-6)	2.11 (1.33)	1.90 (0.80)	$F(1, 48.39) = 0.64$	.429[a]
Extent of abuse (factor value)	0.05 (0.11)	0.03 (0.10)	$F(1, 56) = 0.70$	.406
Abuse - chronicity (% of affected developmental periods; 0-100%)	7.68 (10.69)	4.28 (8.02)	$F(1, 49.96) = 1.86$	.179[a]
Abuse - maximum severity (0-5)	0.46 (0.69)	0.40 (0.86)	$F(1, 56) = 0.10$	.755
Abuse - number of subtypes (0-2)	0.43 (0.57)	0.30 (0.53)	$F(1, 56) = 0.78$	.380
Extent of neglect (factor value)	0.08 (0.13)	0.08 (0.13)	$F(1, 56) = 0.00$	.963
Neglect - chronicity (% of affected developmental periods; 0-100%)	13.90 (17.17)	9.94 (12.93)	$F(1, 56) = 0.99$	.324
Neglect - maximum severity (0-5)	1.39 (1.37)	1.67 (1.71)	$F(1, 56) = 0.45$	.505
Neglect - number of subtypes (0-2)	0.68 (0.61)	0.70 (0.65)	$F(1, 56) = 0.02$	.898
Extent of EM (factor value)	0.25 (0.20)	0.22 (0.17)	$F(1, 56) = 0.40$	.531
EM - chronicity (% of affected developmental periods; 0-100%)	32.86 (21.25)	27.89 (23.56)	$F(1, 56) = 0.71$	.404

EM - maximum severity (0-5)	2.46 (1.48)	2.07 (1.36)	$F(1, 56) = 1.14$	.291
EM - number of subtypes (0-2)	1.21 (0.74)	1.23 (0.68)	$F(1, 56) = 0.01$	.919

Note. EM=emotional maltreatment.

[a] If the assumption of variance homogeneity was not met, Welch's *F* test was used to examine differences between groups.

Table B3

Rejection versus Not-my-turn

Rejection > Not-my-turn						
Anatomical region	**Hemi-sphere**	**x, y, z**	***t***	***z***	***k***	***p***
Precuneus/posterior cingulate cortex	L	-8, -38, 40	5.76	5.33	37	.001
Superior temporal gyrus	L	-44, -32, 6	5.45	5.08	30	.005
Precuneus/posterior cingulate cortex	L	-10, -58, 8	5.04	4.74	21	.021
Not-my-turn > Rejection						
Anatomical region	**Hemi-sphere**	**x, y, z**	***t***	***z***	***k***	***p***
Premotor cortex/supplementary motor area	L	-26, -6, 64	6.41	5.84	206	<.001
Postcentral gyrus	L	-34, -36, 52	5.19	4.87	28	.012

Note. Clusters listed are significant in a whole-brain analysis ($p < 0.05$ FWE-corrected at voxel level, $k > 20$ voxels). x, y, z refer to MNI coordinates. T refers to the t-score and z to

the z-score at those coordinates (local maxima). K refers to the number of voxels in each significant cluster.

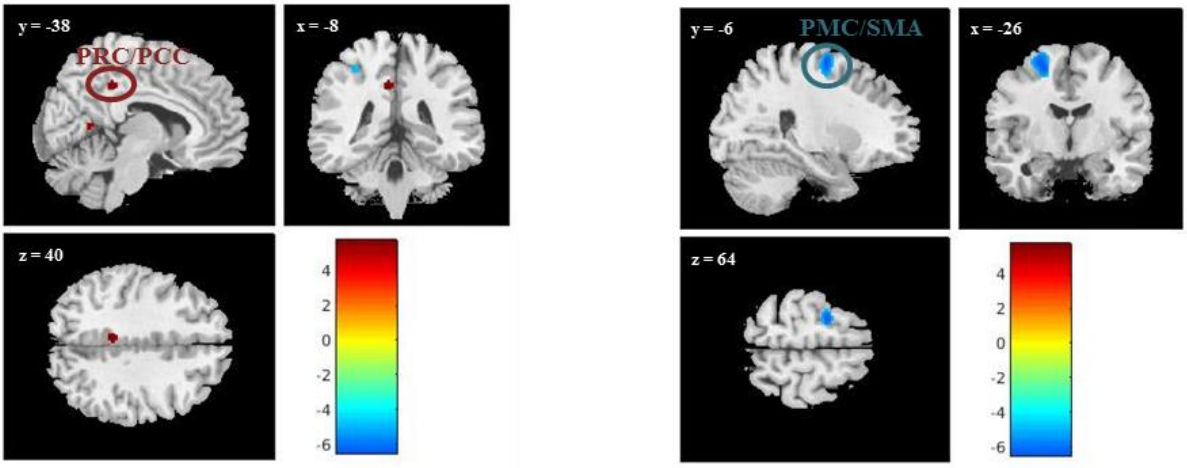

Figure B1. Rejection versus Not-my-turn. The figure displays a selection of significant clusters for the contrast rejection > not-my-turn (positive values; yellow to red) and not-my-turn > rejection (negative values; green to blue). For a complete list, please refer to **Table B3**. Shown clusters are significant in a whole-brain analysis ($p < 0.05$ FWE-corrected at the voxel level, $k > 20$ voxels). x, y, z refer to MNI coordinates. PRC/PCC=precuneus/posterior cingulate cortex; PMC/SMA=premotor cortex/supplementary motor area.

Table B4

Rejection versus Acceptance

Rejection > Acceptance						
Anatomical region	**Hemi-sphere**	**x, y, z**	***t***	***z***	***k***	***p***
Primary visual cortex	R	12, -90, -2	18.68	Inf	7422	<.001
Lingual gyrus	L	-12, -88, -8	15.43	Inf		<.001

Visual association area	R	14, -80, 24	8.29	7.19		<.001
Extrastriate cortex	R	16, -86, 32	8.10	7.06		<.001
Precuneus/posterior cingulate cortex (PRC/PCC)	L	-8, -54, 12	7.84	6.88		<.001
Visual association area	L	-8, -78, 22	7.66	6.76		<.001
Cuneus	R	6, -90, 26	7.40	6.57		<.001
Extrastriate cortex	R	6, -86, 34	7.16	6.40		<.001
Lingual gyrus	L	-18, -50, 12	6.77	6.11		<.001
PRC/PCC	R	12, -52, 14	6.70	6.06		<.001
PRC/PCC	L	-18, -68, 14	6.11	5.60		<.001
PRC/PCC	R	24, -58, 12	5.92	5.46		.001
Cerebellum - Tuber	R	38, -74, -32	5.75	5.32		.002
Cerebellum - Pyramis	R	26, -70, -36	5.31	4.96		.009
Precentral gyrus	R	38, -14, 40	9.33	Inf	1281	<.001
Precentral gyrus	R	18, -26, 68	8.90	7.59	1699	<.001
Precentral gyrus	L	-40, -14, 38	8.69	7.46	706	<.001
PCC	L	-6, -38, 42	8.53	7.35	312	<.001
Inferior frontal gyrus	L	-54, 26, 22	8.27	7.18	1119	<.001
Superior temporal gyrus	L	-48, -34, 6	7.18	6.42	732	<.001
Orbitofrontal area	R	36, 38, -12	6.36	5.80	86	<.001

Dorsolateral prefrontal cortex (PFC)	R	48, 30, 20	6.35	5.79	213	<.001
Superior temporal gyrus	L	-48, -16, -4	6.29	5.75	557	<.001
Parahippocampal gyrus	L	-28, -28, -20	6.14	5.63	113	<.001
Inferior parietal lobule	L	-44, -72, 38	6.13	5.62	215	<.001
Superior frontal gyrus	L	-24, 24, 52	5.55	5.16	55	.004
Hippocampus	R	32, -34, 4	5.54	5.15	23	.004
Parahippocampal gyrus	L	-20, -42, -6	5.27	4.93	22	.010
Anterior insular cortex	R	42, 8, -12	5.25	4.91	28	.011
Parahippocampal gyrus	R	34, -40, -4	5.22	4.89	22	.013
Parahippocampal gyrus	L	-24, -18, -16	5.08	4.77	21	.020

Acceptance > Rejection

Anatomical region	**Hemi-sphere**	**x, y, z**	***t***	***z***	***k***	***p***
Dorsal anterior cingulate cortex (dACC)/pre-supplementary motor area	L	-6, 4, 50	12.93	Inf	7797	<.001
Primary somatosensory cortex	L	-38, -26, 54	12.74	Inf		<.001
Premotor cortex/supplementary motor area	L	-30, -10, 60	12.34	Inf		<.001
Precentral gyrus	R	32, -8, 56	8.28	7.19		<.001
Superior frontal gyrus	R	12, 4, 62	8.15	7.10		<.001

DACC	R	10, 22, 32	7.99	6.99		<.001
Paracentral lobule	L	-10, -22, 46	7.36	6.54		<.001
DACC	L	-10, 18, 32	7.24	6.46		<.001
Postcentral gyrus	L	-48, -22, 22	6.52	5.92		<.001
DACC	L	-8, 30, 28	6.48	5.89		<.001
Insula/putamen	L	-32, 16, 10	8.82	7.54	1035	<.001
Insula/putamen	R	34, 20, 8	8.82	7.54	665	<.001
Cerebellum - Culmen	R	24, -50, -22	8.44	7.29	251	<.001
Hypothalamus/thalamus	L	-10, -20, 0	7.81	6.86	496	<.001
Dorsolateral PFC	R	30, 36, 30	6.79	6.12	393	<.001
Middle frontal gyrus/dorsolateral PFC	L	-32, 38, 32	6.64	6.02	156	<.001
PRC	L	-12, -64, 52	5.95	5.48	112	.001
Occipital lobe	R	2, -68, 4	5.86	5.41	37	.001
Primary somatosensory cortex	R	54, -20, 44	5.69	5.27	100	.002
Cerebellum - Inferior semi-lunar lobule	R	16, -60, -50	5.59	5.19	30	.003
Postcentral gyrus	R	32, -36, 46	5.44	5.07	46	.006
Inferior frontal gyrus	R	58, 10, 20	5.41	5.04	25	.006

Note. Clusters listed are significant in a whole-brain analysis ($p < 0.05$ FWE-corrected at voxel level, $k > 20$ voxels). x, y, z refer to MNI coordinates. T refers to the t-score and z to

the z-score at those coordinates (local maxima). K refers to the number of voxels in each significant cluster.

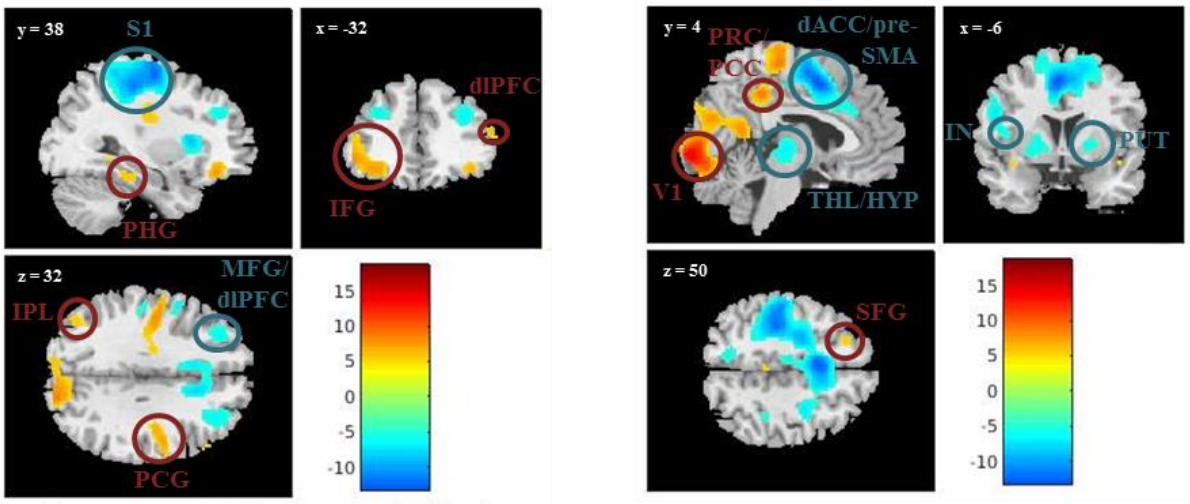

Figure B2. Rejection versus Acceptance. The figure displays a selection of significant clusters for the contrast rejection > acceptance (positive values; yellow to red) and acceptance > rejection (negative values; green to blue). For a complete list, please refer to **Table B4**. Clusters are significant in a whole-brain analysis ($p < 0.05$ FWE-corrected at the voxel level, $k > 20$ voxels). x, y, z refer to MNI coordinates. dACC/pre-SMA=dorsal anterior cingulate cortex/pre-supplementary motor area; dlPFC=dorsolateral prefrontal cortex; IFG=inferior frontal gyrus; IN=insula; IPL=inferior parietal lobule; MFG=middle frontal gyrus; PCG=precentral gyrus; PHG=parahippocampal gyrus; PRC/PCC=precuneus/posterior cingulate cortex; PUT=putamen; S1=primary somatosensory cortex; SFG=superior frontal gyrus; THL/HYP=thalamus/hypothalamus; V1=primary visual cortex.

Effects of Age, Maltreatment, and Maltreatment X Age

Main effect of maltreatment. There were no significant main effects of maltreatment for any cluster (see **Table B5**). Significant main effects of age across the whole sample are

reported in the paragraph on **Main effects of age and maltreatment subtypes** of the **Results** section.

Interaction effect of age X maltreatment. Within two clusters derived from the contrast acceptance > rejection, we found significant interaction effects of age by maltreatment, namely in a cluster with its main peak in the left dACC/pre-SMA and another cluster encompassing the left MFG/dlPFC (ps≤.003; see **Figure B3** and **Table B5**).[3] Since the dACC/pre-SMA cluster comprised over 7000 voxels, we conducted further specification analyses within a sphere with radius 5mm around the main peak at [-6, 4, 50] and four theoretically important subpeaks (defined by the selection criteria described in the **Methods** section **Analyses of age, maltreatment, and maltreatment X age effects**): (a) the primary somatosensory cortex (peak voxel at [-38, -26, 54]), (b) premotor cortex/supplementary motor area (PMC/SMA; peak voxel at [-30, -10, 60]), (c) right dACC (peak voxel at [10, 22, 32]), and (d) paracentral lobule (peak voxel at [-10, -22, 46]). Interaction effects were significant (q<.01) for the main peak sphere (left dACC/pre-SMA; F(1, 94)=9.68 , p=.002, η_p^2=.093) and two subpeak spheres, the left primary somatosensory cortex (F(1, 94)=7.42 , p=.008, η_p^2=.073) and the right dACC (F(1, 94)=10.44 , p=.002, η_p^2=.100). These interaction effects remained significant after controlling for psychopathological symptoms in the model (ps<.05). Descriptively, all significant interaction effects emerged due to a decrease in the activation difference for acceptance > rejection with increasing age for nonmaltreated

[3] To clarify the nature of the observed interaction effects, we conducted two post-hoc analyses for each cluster (i.e., left MFG/dlPFC and left dACC/pre-SMA sphere) in which we assessed the between-group effects of maltreatment x age for the simple contrasts of each condition: (a) rejection vs. baseline (null), and (b) acceptance vs. baseline (null). A significant between-group effect of maltreatment x age for activation during rejection, but not acceptance, emerged in the left dACC/pre-SMA sphere (F(1,94)=4.40, p=.039, η_p^2=.045). Although not significant, post-hoc comparisons for the left dACC/pre-SMA sphere indicated an increased activation to rejection in early adolescent maltreated participants, contrasted by a decreased activation in mid-adolescent maltreated participants in comparison to nonmaltreated controls. In contrast, the between-group maltreatment x age effect was significant for activation during acceptance, but not rejection events in the left MFG/dlPFC (F(1,94)=9.62, p=.003, η_p^2=.093). Post-hoc comparisons indicated an opposing pattern with decreased activation in young maltreated adolescents (p<.01) and increased activation in mid-adolescent maltreated participants when compared to nonmaltreated controls (p>.05).

adolescents, but an increase in this activation difference with increasing age for maltreated adolescents.

To further specify these age by maltreatment interactions, we tested the between-group effects for maltreated vs. nonmaltreated participants within early and mid-adolescence separately. In early adolescence, significant between-group effects emerged for the acceptance > rejection activation difference within the MFG/dlPFC cluster (F(1, 48)=10.65, p=.002, η_p^2=.182), the right dACC sphere (F(1, 48)=9.18, p=.004, η_p^2=.161), and the left dACC/pre-SMA sphere (F(1, 48)=5.04, p=.029, η_p^2=.095). In all three regions, nonmaltreated adolescents showed a larger acceptance > rejection activation difference than maltreated adolescents. In the left dACC/pre-SMA sphere, the acceptance > rejection activation difference was also significant in mid-adolescence (F(1, 46)=4.70, p=.035, η_p^2=.093), but with an opposite pattern, as maltreated adolescents showed a larger acceptance > rejection activation difference than nonmaltreated adolescents. Lastly, within the primary somatosensory cortex sphere, the acceptance > rejection activation difference was only significant in the mid-adolescence group (F(1, 46)= 6.17, p=.017, η_p^2=.118), again with maltreated adolescents showing a larger acceptance > rejection activation difference than nonmaltreated adolescents.

In a second step, we conducted between-group analyses for early vs. mid-adolescence separately within maltreated and nonmaltreated participants. For maltreated participants, we found significant between-group effects for the acceptance > rejection activation difference within the MFG/dlPFC cluster (F(1, 56)=9.85, p=.003, η_p^2=.150), the left dACC/pre-SMA sphere (F(1, 56)=13.54, p<.001, η_p^2=.195), the right dACC sphere (F(1, 56)=8.47, p=.005, η_p^2=.131), as well as the primary somatosensory cortex sphere (F(1, 56)=10.48, p=.002, η_p^2=.158). For all regions, a lower activation difference for acceptance > rejection was found in young adolescents with maltreatment experiences compared to mid-adolescent participants

with maltreatment history. In contrast, no significant between-group effects regarding early vs. mid-adolescence emerged for nonmaltreated participants (*p*s>.05).

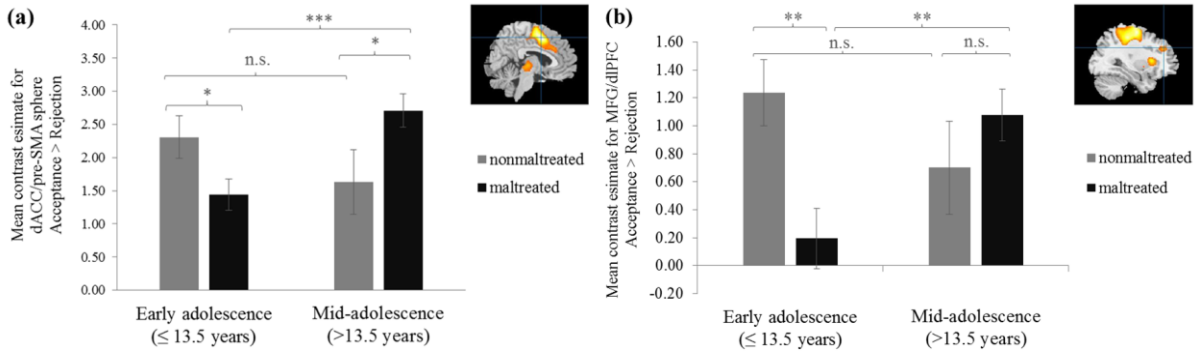

Figure B3. Age x maltreatment interactions within the dACC/pre-SMA sphere and MFG/dlPFC cluster (Acceptance > Rejection contrast). The bar graphs display the mean beta values and their standard errors for the activation difference acceptance > rejection in the (a) left dorsal anterior cingulate cortex/pre-supplementary motor area (dACC/pre-SMA; 5mm sphere at peak voxel [-6, 4, 50]) and (b) left middle frontal gyrus/dorsolateral prefrontal cortex (MFG/dlPFC; peak voxel at [-32, 38, 32]) separately for maltreated and nonmaltreated participants within the early and mid-adolescent groups. n.s. = non-significant. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table B5

Main and Interaction Effects for Age and Maltreatment

Cluster			ANOVA					
Anatomical region	x, y, z	Hemi-sphere	Age (df = 1, 96)		Group (df = 1, 96)		A x G (df = 1, 94)	
			F	η_P^2	F	η_P^2	F	η_P^2
Not-my-turn > Rejection								

Premotor cortex/supplementary motor area	-26, -6, 64	L	0.80	.008	0.66	.007	2.62	.027
Rejection > Not-my-turn								
Precuneus/posterior cingulate cortex (PRC/PCC)	-8, -38, 40	L	5.08^{+}	.050	0.03	.000	1.54	.016
Superior temporal gyrus	-44, -32, 6	L	0.67	.007	0.07	.001	1.88	.020
PRC/PCC	-10, -58, 8	L	3.06	.031	0.09	.001	0.46	.005
Rejection > Acceptance								
Primary visual cortex	12, -90, -2	R	1.79^{a}	.018	0.66	.007	5.33^{+}	.054
PCC	-6, -38, 42	L	3.26^{a}	.033	0.32	.003	1.36	.014
Inferior frontal gyrus	-54, 26, 22	L	5.83^{+b}	.057	0.96	.010	0.77	.008
Superior temporal gyrus	-48, -34, 6	L	8.82**^{a}	.084	0.33^{b}	.003	3.89	.040
Orbitofrontal area	36, 38, -12	R	7.33^{+}	.071	0.00	.000	1.30	.014
Dorsolateral prefrontal cortex (PFC)	48, 30, 20	R	8.82**	.084	1.50	.015	0.41	.004
Superior temporal gyrus	-48, -16, -4	L	0.00^{a}	.000	3.37	.034	1.28	.013
Superior frontal gyrus	-24, 24, 52	L	9.40**^{b}	.089	0.00^{b}	.000	0.06	.001
Anterior insular	42, 8, -12	R	2.75	.028	1.09	.011	0.13	.001

cortex								
Parahippocampal gyrus	-28, -28, -20	L	5.26^{+}	.052	1.59	.016	0.26	.003
Inferior parietal lobule	-44, -72, 38	L	11.53 ***	.107	0.70	.007	0.02	.000
Acceptance > Rejection								
Dorsal anterior cingulate cortex/pre-supplementary motor area	-6, 4, 50	L	1.54	.016	0.05	.001	12.86 ***	.120
Insula/putamen	-32, 16, 10	L	1.95	.020	0.98	.010	5.91^{+}	.059
Insula/putamen	34, 20, 8	R	0.82	.008	1.03	.011	4.09^{+}	.042
Hypothalamus/ thalamus	-10, -20, 0	L	0.41	.004	0.07	.001	5.24^{+}	.053
Dorsolateral PFC	30, 36, 30	R	1.41	.014	1.13	.012	6.63^{+}	.066
Middle frontal gyrus/ dorsolateral PFC	-32, 38, 32	L	1.36	.014	1.95	.020	9.01** *	.087

Note. Analyses are based on extracted and averaged raw activation values (betas) from clusters that were significant in the respective initial whole-brain analysis ($p < 0.05$ FWE-corrected at voxel level, $k > 20$ voxels). x, y, z refer to MNI coordinates.

[a] If the assumption of variance homogeneity was not met, we tested the effect with Welch's F, revealing the same results. [b] If the residuals were not normally distributed, we tested the effect with the Mann-Whitney U test, revealing the same results.

$^{+}$ $p < .05$, but not significant after correction for multiple comparisons. ** $p < .01$. *** $p < .001$.

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