SUPPLEMENTARY MATERIAL

Supplemental Methods

Participant recruitment strategy

A total of 46 right-handed mothers, most of whom were poorly educated and unemployed, participated in the data collection. Data from 44 of these mothers were retained for analyses (2 were discarded because of technical problems). All mothers in the neglectful group exhibited the three main subtypes of neglect and scored positively on all indicators: physical neglect (inadequate food, hygiene, clothing, and medical care), lack of supervision (child is left alone or in the care of an unreliable caregiver) and educational neglect (lack of cognitive and socioemotional stimulation and lack of attention to child's education), according to the Maltreatment Classification System (Barnett, Manly, & Cicchetti, 1993). None of the control mothers scored positively on any of the indicators for the three subtypes of neglect. Before the scan, a separate session was performed at home to videotape the play task. In the second session, performed at the laboratories of the Magnetic Resonance Service of the University of La Laguna, participants were paid for transportation and participation, and a research assistant was available to take care of their children upon their arrival at the lab.

Characteristics and risk profile

Characteristics of mothers and risk profile are in **Table S1**. Most mothers in the neglectful group compared to the control group scored positively in all risk factors, with the exception of partner conflict and chronic physical illness.

Table S1. Characteristics of Mothers in Neglectful and Control Groups

	Neglectful group (n = 22) M (SD) or %	Control group (n =22) M (SD) or %	$F(1,42)$/ χ^2

Mean age of mother	28.6 (7.1)	33.5 (3.4)	8.31**
Number of children	2.04 (0.8)	1.7 (0.6)	2.57
Mean age of the target child	2.5 (1.3)	2.3 (1.7)	0.35
Rural areas (%)	13.6	22.7	0.61
Level of education (%):			4.20
Primary	77.3	50.0	
Secondary school	9.1	31.8	
> Secondary school	13.6	18.2	
Unemployed (%)	90.5	68.2	6.25
History maltreatment/neglect (%)	76	19	11.55***
Intimate partner conflict (%)	4	0	2.70
Chronic physical illness (%)	4	0	2.70
Poor household management (%)	83.3	0	23.28***
Disregard health/education needs (%)	56	0	11.78***
Disregard emotion/cognitive needs (%)	89	0	26.24***
Rigid/inconsistent norms (%)	72	0	18.10***

**p<.01; ***p<.001.

Comparison on behavioral measures

Psychopathological conditions, cognitive integrity and emotional availability scores are outlined in **Table S2.** Higher scores in many psychiatric conditions and lower cognitive integrity were significantly found in the neglectful group.

Table S2. Psychopathological and Cognitive conditions and Dyadic Emotional Availability stratified by Group

	Neglectful group (n = 22) M (SD)	Control group (n = 22) M (SD)	t(42)	Effect size δ
Major Depressive Episode	1.9 (2.5)	0.2 (0.4)	2.88**	0.87
Dysthymia	1.9 (2.5)	0.2 (0.4)	3.04**	0.92
Suicidality	0.5 (0.8)	0	2.69*	0.81

Hypo/Manic Episode	2.2 (2.3)	0.2 (0.4)	3.73**	1.12
General Panic Disorder	6.7 (5.7)	0.2 (0.6)	4.70***	1.43
Agoraphobia	0.7 (1)	0.2 (0.4)	2.33*	0.70
Social Phobia	0.6 (1)	0	2.50*	0.75
Obsessive-Compulsive	1.2 (1.6)	0.2 (0.6)	2.46*	0.74
Post-traumatic Stress Disorder	1.6 (2.6)	0.9 (1.8)	0.96	0.29
Alcohol Dependence/Abuse	0.1 (0.2)	0.2 (0.5)	0.78	0.23
Drug Dependence/Abuse	0.2 (0.4)	0	1.89	0.57
Psychotic Disorders	0.7 (1.4)	0.2 (0.5)	1.68	0.49
Anorexia Nervosa	0	0	-	-
Bulimia Nervosa	0.1 (0.2)	0	1	0.29
Generalized Anxiety Disorder	3.0 (3.3)	0.6 (1)	2.95**	0.89
Antisocial Personality	1.4 (1.3)	0.2 (0.4)	4.06***	1.22
Cognitive Integrity	25.9 (1.4)	28.7 (1.4)	-5.05***	1.52
Emotional Availability	-0.64 (0.93)	0.64 (0.55)	-5.55***	1.67

*$p \leq 05$; **$p \leq .01$; ***$p \leq .001$;

For the emotional availability, the mother-child interaction was videotaped at home, in the context of mother-child free play, at the moment when the family received a toy as a gift for participation in the study. Mothers were instructed to use the toy and play with the child as they usually do. Ratings from the videos were based on the Emotional availability Scale that operationalizes four aspects of parental behavior: Sensitivity (9 points) - the parent's contingent responsiveness to child signals; Structuring (5 points) - the parent appropriately facilitates the child's play; Nonintrusiveness (5 points) - the parent is able to support the child's play without being overdirective, and/or interfering; Nonhostility (5 points) - the parent is able to behave with the child in a way that is not rejecting, or antagonistic; the scale also measures two aspects of child behavior: Responsiveness (7 points) - the child's ability and interest in exploring on his or her own and in responding to the parent's bids; Involvement (9 points) - the child's ability and willingness to engage the

parent in interaction. A Principal Component Analysis performed with the six standardized scales yielded a single factor structure, being the coefficient scores in this factor lower on Emotional Availability (EA) in neglectful dyads than in control dyads **(Table S2)**.

Supplemental Results

Anomalies in white matter tracts predict mother-child interaction in neglectful mothers

Significant tract interactions of ILF-R x IFO-R and ILF-R x IFO-L were obtained in the regression model **(Table 3)**, showing that the positive contribution of ILF to EA was differently modulated by IFO-L and IFO-R. **Fig. S1** shows an illustration of these effects, where each value of ILF-R was used to predict the EA values linearly estimated for the minimum (blue line) and the maximum (red line) values of the IFO-L (left) and the IFO-R (right). The higher the values in ILF-R the better EA was for the maximum category of IFO-L tract (positive slope), and the worse EA was for the minimum category of IFO-L (negative slope). By contrast, the higher the values in ILF-R the better EA was for the minimum category of IFO-R tract (positive slope), and the worse EA was for the maximum category of ILF-R (negative slope). Larger number of streamlines in both ILF-R and IFO-L predicted more positive mother-child interactions, whereas larger number of streamlines in both ILF-R and IFO-R predicted less positive mother-child interactions.

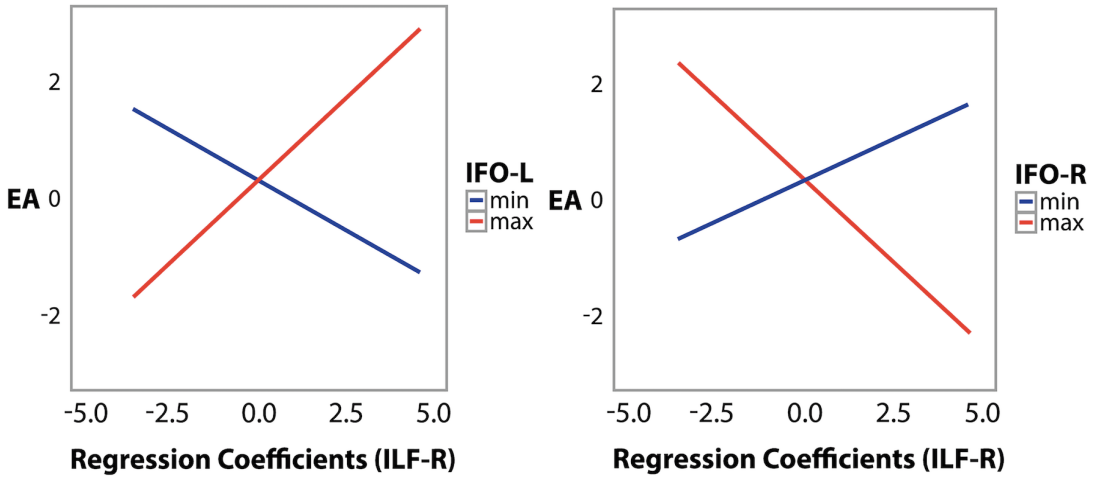

Fig. S1. The positive contribution of increased volume in ILF-R, indexed by number of streamlines, to mother-child emotional availability (EA) was differently modulated by IFO-L and IFO-R. Each value of the regression coefficients of ILF-R has been used to predict the EA values linearly estimated for the minimum (<25%, blue line) and the maximum (>75%, red line) values of the IFO-L (left) and the IFO-R (right), $B_{IFO\text{-}L} = 4.214$, 95% CI [1.12, 7.29]; $B_{IFO\text{-}R} = -3.462$, 95% CI [-6.12, -0.80].

WM alterations in mothers with childhood maltreatment predict mother-child interactions

A linear discriminant analysis (LDA) was used to determine the linear combination of WM tracts (extracted from the 18 major WM tracts) that reliably distinguished between maltreated and non-maltreated mothers (**Table S3**). The adjusted number of streamlines (NS) for each tract was measured as an index of tract volume. A significant function was obtained (*Wilks' lambda* = 0.70, $F_{1,40} = 16.9$, $P < .001$) that helps to correctly classify 75% of the maltreated group and 60% of the non-maltreated group. Cross validation (Efron & Gong, 1983) yielded the same results. Results showed robust and stable results for the ILF-R, IFO-L and the Fmj intercomissural tract. However, only the ILF-R and IFO-L were

included in the next analyses, since these tracts overlap the ones that distinguished neglectful and control mothers.

Table S3. Typical and Structure Coefficients and Bootstrap Confidence Intervals of the Discriminant Function Analysis for the Maltreated and Non-maltreated Groups on number of streamlines.

	Typical coefficients	Structure coefficients	Lower C.I.	Upper C.I.
ILF-R	-0.672	-0.617	-6.340	-44.243
IFO-L	-0.543	-0.638	-2.259	-27.307
Fmj	0.510	0.465	18.342	0. 625

Centroids of the function: Non-maltreated group = - 0.6358; Maltreated group = 0.6358.

Regression group interaction effects on emotional availability in maltreated/non-maltreated mothers

The ILF-R x Group interaction in maltreated and non-maltreated mothers **(Table 4)** showed that the positive influence of ILF-R on EA was significantly modulated by the groups. As illustrated in **Fig. S2**, each value of ILF-R was used to predict the EA values linearly estimated for the maltreated mothers (red line) and non-maltreated mothers (green line). Higher number of streamlines in ILF-R predicted a pattern characterized by a better interactive performance in EA in maltreated mothers only, suggesting that integrity in ILF-R is critical for maltreated mothers being able to enter in a sensitive relationship with their child.

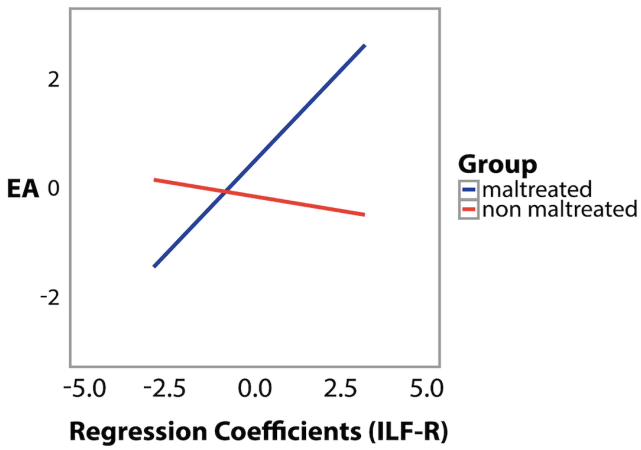

Fig. S2. Increases in the ILF-R volume, indexed by number of streamlines, predict better mother-child bonding interactions in maltreated mothers. Each value of the regression coefficients of NS values in ILF-R has been used to predict the emotional availability (EA) values linearly estimated for the maltreated/non-maltreated groups, $B_{maltreated}$ = 3.82, 95% CI [2.13, 5.50]; $B_{non\ maltreated}$ = -4.43, 95% CI [-6.60, -2.26].

Additional measures predicting EA

The next set of analyses tried to determine the extent to which a variety of psychopathological conditions (15 factors) and cognitive integrity (1 factor) would be associated with the WM anomalies and, consequently, whether they should be included in the regression model predicting dyadic EA in the neglectful and control groups. To examine which of these variables were associated with the specified tracts that distinguished neglectful and control mothers (ILF-R, IFO-L and IFO-R), a set of correlations, involving all the psychopathological conditions and cognitive integrity with the ILF-R, IFO-L and IFO-R tracts, was performed. These associations were not significant with the exception of those relating ILF-R with General Panic Disorder and Cognitive Integrity. Increases in NS in the ILF-R were negatively related to General Panic Disorder scores (r = - .4067; P = 0.0125) and positively related to higher Cognitive

Integrity scores (r = .5441; $P < 0.0001$). WM scores for the other two tracts were not related to General Panic Disorder or reduced Cognitive Integrity.

To determine the role of General Panic Disorder and Cognitive Integrity in explaining the differences in EA, a mediation analysis was run for each factor (Imai, Keele, & Tingley, 2010). The analysis with General Panic Disorder as a mediation variable (WM → PD → EA) showed that the direct effect from ILF-R on EA was significant (*ADE* = 14.6, P = 0.03), whereas the mediation effect was not significant (*ACME* = 4.12, P = 0.17). The analysis with Cognitive Integrity as a mediation variable (WM → CI → EA) showed that no direct effect was found from ILF-R on EA scores (*ADE* = 10.81, P = 0.09), whereas a mediation effect was found through Cognitive Integrity (*ACME* = 7.60, P = 0.01). Based on these results, only the Cognitive Integrity variable was included in the regression model of neglectful mothers (Table 3); however, the results showed that its effect on EA was negligible.

Suplemental References

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Efron, B., Gong, G. (1983). A leisurely look at the bootstrap, the jackknife, and cross-validation. *American Statistician*, **37**, 36-48.

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