Supplementary Materials

SM1.1 Further information on the COMQ and SADS.

The COMQ (Sarason, Sarason, Hacker & Basham, 1985) includes ten statements concerning social comfort that are rated on a scale of 1 to 4 from 'not at all like me' to 'a great deal like me'. Statements to be rated include (*indicates reverse scoring): (A)'Start a conversation with someone I don't know well but would like to get to known better'; (B)' Seek out social encounters because I enjoy being with other people'; (C) *'Feel uncomfortable looking at other people directly'; (D) 'Enjoy social gatherings just to be with people'.

The SADS (Watson & Friend, 1969) consists of 28 true/false statements that ask about facets of social avoidance and distress. Statements to be rated include (*indicates reverse scoring): (A) *I have no particular desire to avoid people; (B) I often want to get away from people; (C)I often think up excuses in order to avoid social engagements; (D)I tend to withdraw from people.

SM1.2. Do parental anxiety or depression confound the present results?

To test whether our results might reflect a more generalized effect of parental depression and anxiety on infants, we also collected the Brief Symptom Inventory (BSI) from parents in the study (Derogatis & Melisaratos, 1983). The BSI is a 53-item self-report inventory in which participants rate the extent to which they have been bothered in the past week by a list of symptoms. Higher scores represent greater degrees of bother. The BSI has nine subscales, including anxiety and depression.

We conducted the same statistical models used in the present manuscript but with BSI anxiety and depression as the dependent variables. This showed no significant relations with infant social attention measures (see first column of Table S1). Further, we ran the MANOVAs described in the main text with COMQ and SADS as dependent measures, Age (6 vs 12 months) as a between-subject effect, the social attention measure as a covariate predictor, and BSI anxiety and depression scores as additional covariates. This showed significant relations for the parental social motivation measures (see SM Table 1). Thus, these analyses indicate that our results do not reflect general influences of caregiver depression and anxiety.

SM1.3. Could the present results be related to general aspects of infant temperament?

To assess whether our results could reflect more generalized aspects of infant temperament, we analysed data from the Infant Behavior Questionnaire (IBQ), completed by the primary caregiver. The IBQ (Gartstein & Rothbart, 2003; Rothbart, 1981) is a parent report questionnaire designed to measure temperament in infants between the ages of 3 and 12 months. The items on the IBQ ask parents to rate the frequency of specific temperament-related behaviors observed over the past week or fortnight. This measure takes approximately 30 to 45 minutes. Typically, scores are aggregated to produce domain scores corresponding to surgency, negativity, and regulatory control. Analysis of the IBQ data indicates no significant relations between the three domain scores and the infant social attention measures (see SM Table 2). Thus, it is unlikely that our results reflect generalized aspects of infant temperament.

SM1.4. Attrition rate for the ERP paradigm.

In SM Table S3, data are provided based on children who (A) missed the data collection visit ("missing data"); (B) attended, participated in the ERP paradigm ("collected data") and whose parents had filled out the parental questionnaires; (C) failed to wear the net at the testing session ("fail to wear net"); (D) who did not attend to enough trials during data collection ("poor visual attention"); (E) had significant artifact during attended trials ("data quality poor"). Means and standard deviations for number of trials attended (average number of trials visually fixated by all children who participated in the ERP procedure) and number of attended trials *with artifact free data* are presented.

Covarying number of valid trials did not significantly affect our analyses. Specifically, we ran an analysis identical to that reported on in "Results/ERP" of the main text, but additionally including number of trials for faces and objects as covariates. In the multivariate ANOVA, P400 amplitude "face/object difference" was significantly related to parental social motivation in interaction with Age ($F(2,85)= 3.90$, $p= 0.024$, eta = 0.084). This effect was individually significant for the COM-Q ($F(1,86)= 7.55$, $p= 0.007$, eta = 0.081) and marginally significant for the SADS ($F(1,86)= 3.03$, $p= 0.085$, eta = 0.034). P400 latency "face/object difference" was significantly related to parental social motivation in interaction with Age ($F(2,85)= 3.09$, $p= 0.05$, eta = 0.068). This effect was individually significant for the COM-Q ($F(1,86)= 6.25$, $p= 0.014$, eta = 0.068) and marginally significant for the SADS ($F(1,86)= 3.87$, $p= 0.052$, eta = 0.043).

SM1.5. Relation between parental social motivation and EEG power in response to a dynamic nonsocial video.

Relations were observed between parental social motivation and EEG power responses during nonsocial attention in the live naturalistic paradigm at a trend level. This could be because 'nonsocial attention' in this paradigm involved the infant looking at objects whilst the experimenter continued to sing. The residual effects of this social context could be driving these relations. To assess this possibility, we examined data from a comparable paradigm collected with the same cohort of infants (Jones et al., 2015). During the EEG session, children

were presented with two movies of 1-minute duration repeated twice during the session; order of presentation was counterbalanced. Movies were (a) Social: two women telling nursery rhymes with gestures; (b) Non-Social: child-appropriate dynamic toys (e.g. balls dropping down a chute). Similar stimuli have been used in previous studies of the effects of socioeconomic status on brain activity (Tomalski et al., 2013) and connectivity in infants with older siblings with ASD (Orekhova et al., 2014). EEG procedures were identical to those reported for the Live Action paradigm reported in the main text. To examine whether there were relations between parental social motivation and EEG theta power in a nonsocial context, we analysed data from the NonSocial movie presentations. Theta and alpha power were computed exactly as described in the main text.

In the multivariate ANOVA**,** infant theta power during the Nonsocial video was not significantly related to parental social motivation ($F(2,167)= 0.42$, $p= 0.66$, eta = 0.005). There was no significant interaction with Age ($F(2,167)= 0.033$, $p= 0.97$, eta = 0.000). Thus, it is possible that the marginal effects observed for nonsocial attention in the naturalistic task were driven by the overarching social context.

SM1.6 Effect of number of trials to habituate.

Because our habituation paradigm involved an infant-controlled design, infants habituated in varying numbers of trials. The correlation between peak look duration to faces and trials to habituate to faces was not significant ($r(73) = -0.21$, $p = 0.073$), though there was a weak relation there in the predicted direction. Including trials to habituate as a covariate in the models used in the main text did not change the pattern of results. Specifically, there remained a significant relation between peak look to faces and social motivation ($F(2,62) = 8.09$, $p = 0.001$; COMQ: $F(1,63) = 15.16$, $p < 0.001$; SADS $F(1,63) = 4.26$, $p = 0.043$).

SM1.7 Correlations between the experimental variables.

There were no significant correlations between peak look duration to faces, P400 amplitude or latency responses to faces vs objects, and theta power during social or nonsocial attention ($rs < 0.2$, $ps > 0.2$). Theta power during social attention was highly correlated with theta power during nonsocial attention ($r(158) = 0.9$, $p < 0.001$).

SM Table 1: **Relations between social attention measures and parental anxiety and depression symptoms measured with the Brief Symptom Inventory (BSI).** Key: SA--Social Attention; Anx—Anxiety; Dep-- Depression

	Effect of SA measure on Anx & Dep in multivariate analysis	**Relation between social attention and SADS/COM-Q, controlling for age, Dep and Anx**
EEG theta/alpha (to social)	F(2,133) = 0.27, p = 0.76.	Overall: $F(2,135) = 2.86$, $p = 0.06$. COMQ: $F(1,136) = 2.39$, $p = 0.13$. SADS: $F(1,136) = 2.56$, $p = 0.019$;
Peak look (to faces)	F(2,78) = 1.15, p = 0.32.	Overall: $F(2,60) = 3.86$, $p = 0.026$. COMQ: $F(1,60) = 7.71$, $p = 0.007$. SADS: $F(1,136) = 3.09$, $p = 0.084$;
ERP P400 amp (Faces-Objects)	Overall: F(2,81) = 0.28, p = 0.75; Age by P400: $F(2,81) = 1.39$, $p = 0.25$.	Overall Age by P400: $F(2,84) = 2.73$, $p = 0.07$. COMQ: $F(1,85) = 5.50$, $p = 0.02$ SADS: $F(1,85) = 3.59$, $p = 0.06$;
ERP P400 lat (Faces-Objects)	Overall: F(2,81) = 1.17, p = 0.32; Age by P400: $F(2,81) = 0.31$, $p = 0.74$.	Overall Age by P400: $F(2,84) = 2.89$, $p = 0.06$. COMQ: $F(1,85) = 5.79$, $p = 0.018$ SADS: $F(1,85) = 3.91$, $p = 0.05$;

SM Table 2: **Relations between social attention measures and domains of infant temperament.**

	Effect of social attention measure on infant temperament in multivariate analysis	**Relation between social attention and SADS/COM-Q, controlling for age, and infant temperament**
EEG theta/alpha (social)	F(3,129) = .57, p = 0.63.	Overall: $F(2,126) = 3.44$, $p = 0.035$. COMQ: $F(1,127) = 4.82$, $p = 0.03$. SADS: $F(1,127) = 6.81$, $p = 0.01$;
Peak look (to faces)	F(3,80) = 0.36, p = 0.78.	Overall: $F(2,77) = 7.57$, $p = 0.001$. COMQ: $F(1,78) = 14.97$, $p < 0.001$. SADS: $F(1,78) = 9.23$, $p = 0.003$;
ERP P400 amp (Faces-Objects)	Overall: F(3,81) = 0.86, p = 0.46; Age by P400: $F(3,81) = .23$, $p = 0.87$.	Overall Age by P400: $F(2,79) = 3.81$, $p = 0.026$. COMQ: $F(1,80) = 7.65$, $p = 0.007$ SADS: $F(1,80) = 3.65$, $p = 0.06$;
ERP P400 late (Faces-Objects)	Overall: F(3,81) = 1.05, p = 0.38; Age by P400: $F(3,81) = 0.20$, $p = 0.89$.	Overall Age by P400: $F(2,79) = 2.78$, $p = 0.07$. COMQ: $F(1,80) = 5.64$, $p = 0.02$ SADS: $F(1,80) = 3.30$, $p = 0.07$;

SM Table 3: Summary of number of participants providing data for the event-related potential task. In the bottom two rows, figures are mean (standard error).

	6 months		12 months	
Subj w/ Collected Data and parent questionnaires	95		90	
Subj Fail to wear net	0		2	
Subj poor visual attention	14		17	
Subj Data quality poor	39		21	
Technical error	1		0	
# with good ERP data	41		50	
Mean (Standard Error) Range	**Face**	**Object**	**Face**	**Object**
# of pictures attended (all tested subjects)	35.0 (1.6), 3-72	35.3 (1.7), 1-76	35.8 (1.7), 1-57	36.2 (1.7), 2-59
#of valid trials in ERP analyses (included subjects)	18.9 (.9), 10-33	19.0 (1.0), 11-35	22.3 (1.1), 10-44	21.7 (1.0), 10-41