Supplement 1: Additional Methods

Mobile eye-tracking system specifications

For the PUPIL binocular system, eye cameras capture binocular eye images at a resolution of 640×480 pixels, a frame rate of 60 frames per second (fps), and a sampling rate of 60Hz. The world camera captures the first-person view of the environment with a 90° diagonal field of view at a resolution of 1280×720 pixels, a frame of 60fps and a 30Hz sampling rate. The eye-tracking system has an average gaze estimation accuracy of 0.6° visual angle, and 0.08° precision (Kassner, Patera, Bulling, 2014).

Mobile eye-tracking calibration and validation procedures

To ensure that the calibration distance was comparable to the distance that the naturalistic task stimulus appeared (Franchak, 2017), we used an overhead projector for calibration. First, the experimenter placed the headset and asked the child to stand in front of a projector screen on a stable three-level staircase. We used the staircase to adjust the child's height, so that the child's eye level could be aligned with the center of the screen. Next, the experimenter adjusted the world and eye cameras to make sure that they were in focus and could capture the child's field of view and pupils, respectively (Figure 1a, Main Text). The distance between the child and the screen during calibration (85-104 inches) was comparable to the distance of the social stimulus encountered during the task.

For calibration, the child was asked to stand still and fixate their gaze at the center of a target that appeared at 5 different locations on the screen. To inspect the calibration quality, the child was asked to follow the experimenter's hand that were moving across the screen. Calibration was repeated if a second experimenter deemed that the fixation point could not reliably indicate the child's eye gaze locations. Lastly, we conducted a validation procedure prior to the study task. The experimenter was seated 97 inches in front of the child (the same distance of the key stimulus encountered in the task) and held a target board. The child was directed to fixate on 5 different locations on the target (Figure 1b, Main Text). The validation procedure is important for post-experiment inspection of calibration accuracy and gaze data processing.

Stranger Approach Protocol

In the *Stranger Approach* episode (Figures 1 and 3, Main Text), a stranger (i.e., a research assistant that the child has never met) knocked on the door, entered the room, and stood by the door while saying "Hi". He paused for 2 seconds and then asked "Have you ever been here before?". The stranger waited a maximum of 30 seconds if the child started responding, followed by a 10-second pause after the child finished speaking (a maximum 40-second interval between the stranger's prompts). He walked towards the child, stood in front of a chair that was placed opposite to the child at a distance of 97 inches, and asked "Are you having a good time here today?". After a 10-second pause (40-second maximum if the child responded), he sat down and asked, "Do you have a lot of toys?", followed by another 10-second pause (40-second maximum if the child responded). Then the stranger asked, "What is your favorite toy?", timed 30 seconds if the child started talking, and immediately responded, "I like (the toy that the child mentioned) too". After a 10-second pause, the stranger said, "I came to pick up some papers from (the experimenter's name), do you know where s/he is?" Following the child's response, the stranger said, "I'll go look in the hall". He then walked out the room.

Stationary eye-tracking data exclusion

We first examined calibration accuracy using the X-Y coordinates of the child's eye gaze relative to the location of the five calibration points. Based on previous infant eye-tracking studies that used the face stimuli (e.g. Pérez-Edgar et al., 2017), a block of trials was excluded if the deviation of either the X- or Y-coordinate was greater than 4° from the calibration points for the particular block. Eye-tracking face fixation data were then inspected at the trial level for each subject. Because of the short face presentation time (500ms), no participant fixated on more than one of the two faces on any one trial. However, participants could make multiple fixations to the same face on any one trial. Face fixations that were "too fast", defined as fixation latency smaller than 2*SDs* of the individual child's mean (derived from face fixation latency in included trials), were excluded. This was done to reduce the possibility of fixations preceding face onsets, rather than in response to face presentations.

Processing of Mobile Eye-Tracking Recording

First, the eye camera recordings were overlaid on the recording from the world camera (Figure 1, Main Text). Next, three concentric circles were displayed to indicate the point of gaze. The radius of each circle was proportional to the screen resolution (red: 2%; yellow: 5%; green: 8%). Two coders independently assessed calibration accuracy. Calibration was deemed satisfactory, if the red circle aligned with all points on the target where the child was instructed to direct their gaze. If validation was not satisfactory, but the deviations between the red circle and the actual gaze location were consistently displaced on the x- and y-axis directions, a manual gaze correction procedure was performed using an algorithm in Pupil Player. Manual correction was applied until that the red circle became a reliable indication of the child's actual gaze location (Figure 1b, Main Text).

In cases where optimal spatial resolution was not possible with these procedures but the coders were able to reliably align the gaze location with the lower resolution 'yellow' circles, calibration was deemed usable but not optimal. Hence, we allowed for a margin of error by using the yellow circle to determine gaze locations in children with less optimal calibration. Recordings were deemed to have poor calibrations and excluded if the deviations were so large that the yellow circle could not reliably indicate actual gaze locations. The gaze correction coordinates were compared and discussed between the two coders to ensure any disagreement was within 0.03 units in the x and y coordinates. Lastly, once agreement was achieved, the processed recording was exported from Pupil Player.

Supplement 2: Additional Results

The effect of BI level on stationary attention bias scores

For reaction time (RT) attention bias scores, a mixed-effects model examining the effect of Emotion (angry vs. happy), BI level (continuous), and their interaction effect revealed no significant main effects (Emotion: $F(1, 69)=0.04$, $p=.85$, $\eta_{p2}=.001$; BI level: $F(1, 69)=1.18$, $p=.28$, $\eta_{p2}=.017$) or interaction effect, $F(1, 69)=0.33$, $p=.57$, $\eta_{p2}= .005$.

For attention bias indexed by face fixation latency, a mixed-effects model indicated no significant main effect of Emotion, $F(1, 71)=0.2$, $p=.66$, $\eta_{p2}=.003$, BI level, $F(1, 69)=0.02$, $p=.89$, $\eta_{p2}<.001$, or Emotion-by-BI-level interaction effect, $F(1, 71)=0.08$, $p=.78$, $\eta_{p2}=.001$.

For face dwell time attention bias, there was no significant main effect of Emotion, $F(1, 71)=0.04$, $p=.84$, $\eta_{p2}<.001$, or BI level, $F(1, 70)=0.68$, $p=.41$, $\eta_{p2}=.01$. The Emotion-by-BI-level interaction was not significant, $F(1, 71)=0.20$, $p=.65$, $\eta_{p2}=.003$.

Lastly, for attention bias indexed by face fixation frequency, there was no significant main effect of Emotion, $F(1, 71)=1.26$, $p=.27$, $\eta_{p2}=.017$. The effect of BI level approached significance, *F*(1, 71)=4.00, *p*=.05, η_p^2=.053. The interaction effect was not significant, *F*(1, 71)=1.81, *p*=.18, η_p^2=.025.

<u>The effect of BI level on ambulatory attention patterns towards the stranger</u>

Linear regression models revealed that after controlling for total coded episode duration, *B*=0.01, *ß*=0.02, *t*=0.12, *p*=.91, and the coding method, *B*=7.13, *ß*=0.31, *t*=1.87, *p*=.07, BI level did not significantly predict gaze visits to the stranger, *B*=-0.13, *ß*=-0.3, *t*=-1.88, *p*=.07, R^2=.21, mean latency of gaze reengagement towards the stranger, *B*=0.004, *ß*=0.28, *t*=1.94, *p*=.06, R^2=.35, mean visit duration, *B*=0.001, *ß*=0.06, *t*=0.35, *p*=.73, R^2=.04, or proportion of time looking at the stranger, *B*=-0.12, *ß*=-13, *t*=-0.77, *p*=.45, R^2=.16.

<u>The moderating effect of BI level in the relation between ambulatory attention and stationary attention patterns</u>

The linear regression model revealed a significant visit number × BI level effect on the stationary eye-tracking angry bias index, *B*=0.01, *ß*=0.45, *t*=2.94, *p*=.01, R^2=.24. For children at high levels of BI (mean BI score +1*SD*), more frequent gaze visits to the stranger was related to greater stationary eye-tracking angry bias, *B*=0.27, *ß*=0.68, *t*=2.74, *p*=.01. However, the association was not significant for children with low levels of BI (mean BI score - 1*SD*), *B*=-0.14, *ß*=-0.37, *t*=-1.58, *p*=.12.

The gaze visit number × BI level effect was also significant for the stationary happy bias index, *B*=0.01, *ß*=0.34, *t*=2.12, *p*=.04, R^2=.18. While gaze visit to the stranger was not significantly related to happy bias at either the high, *B*=0.15, *ß*=0.38, *t*=1.48, *p*=.15, or low, *B*=-

0.16, *ß*=-0.41 *t*=-1.67, *p*=.10, level of BI, the direction of the association differed depending on BI level.

References

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