Does Fetal Malnourishment Put Infants at Risk of Caregiver Neglect Because Their Faces Are Unapealling?

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35 young adults judged newborns' faces depicted in photographs. The 22 infants widely varied in the Ponderal Index (PI), a measure of soft-tissue development. In both linear and quadratic analyses of both the adults' mean judgments and the adult-by-adult data, PI proved to be unrelated to scales measuring the adults' nurturance for, aversion to, and confidence in their ability to care for the infant. The extra risk of neglect incurred by low- and high-PI infants is apparently not due to anything about their facial appearance.

The Ponderal Index (PI), a measure of soft-tissue development, has been used for decades in research on the human neonate (Lubchenco, Hansman, & Boyd, 1966; Miller & Hassanein, 1971). Infants with unusually low PIs are underweight for their length (skinny); those with unusually high PIs are overweight (plump); both extremes are at risk for morbidity and neglect by caregivers (Huntington, Hans, & Zeskind, 1990; Zeskind & Ramey, 1978, 1981; Zeskind & Lester, 1981). One explanation for the extra risk incurred by the infants with low and high PIs is that their cries are unusually aversive (Huntington, Hans, & Zeskind, 1990; Zeskind & Lester, 1981).

Also disadvantaged are infants with unattractive faces, because adults favor those whom they find "cute" (Barden, Ford, Jensen, Rogers-Salyer, & Salyer, 1989; Casey & Ritter, 1996; Field & Vega-Lahr, 1984; Karraker & Stern, 1990; Kelley, Vannostrand, Shiflett, & Chan, 1996; Langlois, Kalakanis, Rubenstein, Larson, Hallam, & Smoot, 2000; Langlois, Ritter, Casey, & Sawin, 1995).

We thus wondered whether PI covaries with the attractiveness of the infant's face. Perhaps infants with medium PIs are more visually appealing to adults, and perhaps then one reason why infants with low and high PIs are more likely to suffer neglect is that their faces are homely.

Method

Stimuli

To generate stimuli we downloaded digital pictures of newborns posted for public viewing at a Website, http://www.growingfamily.com/, which listed the heights and weights of infants photographed in the newborn nursery of various hospitals across North America. We arbitrarily selected 22 that covered a wide range of heights and weights and possessed a wide range of ponderal indices. The pictures were head-and-shoulders shots with the infant facing directly into the camera and dressed in a garment that revealed only the face and head and, in 19 of the pictures, one or both hands. The eyes were open in 18 pictures, closed in 4. We printed color copies of the digital pictures approximately 10 x 15 cm and identified the infants by arbitrary two-digit numbers.

Subjects, Questionnaire, and Procedure

College students recruited from a variety of courses served as subjects. The 31 women and 4 men reported ages ranging from 18 to 24. In a private location, each was handed a well-shuffled set of the 22 pictures and a 22-page questionnaire and asked to rate the babies on 13 Likert items, described below. Possible responses to each item were "Not at all," "Just a little," "Somewhat," "Mostly," and "Extremely," scored 1 through 5. The set of pictures was extensively shuffled anew for each subject.

Results

Ponderal Index and Body-Mass Index

Values of the PI (100 x g/cm^3) ranged from 2.04 to 3.20 with an outlier at 6.75; the mean was 2.680 (2.486 omitting the outlier), and the standard deviation was 0.955 (0.298 omitting the outlier).

To check on the possibility that an index of mass to length employed with adults would prove related to other variables, we also calculated the body-mass index (BMI) as (g/1000) / (cms/100)^2. Values ranged from 10.8 to 16.8 with an outlier, the infant also unusually high on PI, at 24.9; the mean was 13.28 (12.73 omitting the outlier), and the standard deviation was 3.00 (1.54 omitting the outlier).

PI and BMI proved to be closely correlated, r = .962 (.906 omitting the outlier).

Scales Summarizing Subjects' Judgments

On the basis of factor analyses in pilot work, we summed scores on individual items in the questionnaire to create three scales. If a participant failed to answer one or more items constituting a given scale for a given infant, the value of that scale was set to missing for that participant's judgments of that infant.

Scale A consisted of five items: "The baby looks adorable to me," "I want to cuddle the baby," "I want to kiss the baby," "The baby makes me feel good," and "The baby makes me think of angels." We take Scale A to measure the nurturance elicited by the baby.

Scale B consisted of four items: "I think the baby looks strange," "The baby looks odd to me," "The baby is repulsive to me," and "I want to keep looking at the baby" (reverse scored). We take Scale B to measure aversion to the infant.

Scale C consisted of three items: "I'm not sure I could take care of the baby," "The baby makes me feel nervous," and "The baby makes me feel scared." We take Scale C to measure lack of confidence in the rater's ability to care for the infant.

For each of the 22 babies we calculated the mean score on each scale. The number of participants contributing to the means ranged from 30 to 35. Coefficient alpha was .92, .87, and .72 for the three scales, respectively. We also calculated the mean score on an item of special interest, "The baby is cute."

Associations with Mean Judgments

Across the 22 babies, linear correlations between the mean scores on the three scales and the two measures of physique proved to be trivial and nonsignificant; r ranged in absolute value from .079 to .242. Without the outlier the range was .018 to .196. Visual inspection of the scatterplots showed no hint of curvilinearity, nor did quadratic curve-fitting discover anything but trivial and nonsignificant relationships (all R^2 values < .09; all F values < 1 except for one at 1.25). Mean ratings on the cuteness item also proved unrelated to the measures of physique.

Associations Subject-by-Subject

To investigate the possibility that some of the participants were sensitive to the neonates' PI or BMI, we calculated r values for each participant, correlating PI and BMI with the participant's scores on scales A, B, and C and the cuteness item (omitting the baby with the implausibly high PI score). We obtained 32 values statistically significant at the .05 level in two-tailed tests. These 32, however, constituted only 5.7% of the 560 values. The most parsimonious interpretation of the significant coefficients is thus that they represent type-1 errors.

We also checked for curvilinear relationships participant by participant, running 268 analyses (from which we again excluded the baby with the outlying PI and BMI scores). Only 13 yielded an R^2 that was significant at the .05 level (two-tailed). As these constituted 4.9% of the calculated figures, they too appear to be merely type-1 errors.

Discussion

An association between variables can be artifactually weak because one or both of the variables is unreliably measured or because variation across the cases is low on one or both of the variables. Could the associations that we observed have been near zero and nonsignificant for any of these reasons?

Was Reliability Low?

Because the reliabilities of the weights and lengths of the neonates in our study are unknown, we do not know the reliability of their PI scores. The reliabilities of the weights and lengths were, however, sufficient to allow a strong correlation between the two variables: $r = .73$ (excluding the outlier; with the outlier $r = .46$).

And the scales formed from the mean values of the participants' judgments did possess acceptable reliability, as shown by the alpha values cited above.

Was Variability Low?

The variability on the PI, which ranged from approximately 2.0 to approximately 3.0 (excluding the outlier), was comparable to that reported in studies that found behavioral differences between the infants in the middle of the distribution and those at the extremes (Huntington, Hans, & Zeskind, 1990; Zeskind & Ramey, 1978, 1981); our coefficient of variation (*SD/M*) was 0.120. For BMI the coefficient of variation was essentially identical at 0.121, and likewise for scale A at 0.122. For scale B the variation was even greater, .389, though for scale C it was lower, 0.072.

Conclusion

Our reluctant conclusion is that our conjecture was most likely wrong. Fetal malnourishment, as signified by both low and high values for the ponderal index, does not seem to raise the risk of caregiver neglect because of anything about the visual appeal of the infant's face.

Questions remain, of course. Perhaps there is something about the visual appeal of the infant's physique, or the visual appeal of its head in relation to its body, that correlates with PI and mediates the impact of PI on caregivers. Or perhaps the only mechanisms by which PI comes to be associated with caregiving are those that involve the infant's behavior, such as its cry.

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