Original Article

Perceptions of Child Facial Cues as a Function of Child Age

Anthony A Volk, Child and Youth Studies, Brock University, St Catharines, Ontario, Canada L2S 3A1. Email: tvolk@brocku.ca (Corresponding author).

Janeen L. Lukjanczuk, Department of Psychology, Queen’s University, Kingston, Ontario, Canada K7L 3N6.

Vernon L. Quinsey, Department of Psychology, Queen’s University, Kingston, Ontario, Canada K7L 3N6.

Abstract: Child facial cues are known to influence adults’ perceptions, attributions, and parental care behaviors. But how does the influence of these cues change with age? There are three competing theories regarding the influence of age on child facial cues: younger cues have the strongest influence, older cues have the strongest influence, and age cues do not influence adults. There are empirical findings that provide support for each of these hypotheses. Because previous studies have not focused on measures of adults’ desire to provide parental care and have used limited stimulus sets and/or statistics, we conducted two studies to determine how age-related changes in child faces influenced adults’ perceptions and ratings in the Hypothetical Adoption Paradigm. We presented approximately 200 adults with images of 12 different children at eight different ages (from six months to six years). Adults’ ratings of adoption preference and cuteness were strongly and negatively related to the age of the child facial stimuli, while there was no consistent relationship between child age and adults’ ratings of health. Our results support the hypothesis that facial cues associated with younger ages are most effective at eliciting adult responses associated with parental care.

Keywords: age, child faces, infant facial cues, adoption preference, cuteness, health

Introduction

The ethologist Konrad Lorenz hypothesized that infant facial features evolved to elicit parental care in adults (Lorenz, 1943). John Bowlby (1982) further suggested that features of infant faces might have evolved through natural selection to facilitate the development of appropriate attachment. Both of these researchers hypothesized that youth was a critical component to the facial cues. But how critical a component is it, and at what age are the cues most effective?
There are currently three conflicting hypotheses concerning the influence of age-related changes in infant and child facial characteristics on adults’ perceptions (for brevity, hereafter, child faces will be used to refer to child and/or infant faces). The first hypothesis is that younger cues are more effective at eliciting feelings of parental care. Lorenz’s and Bowlby’s “traditional” hypotheses assume that the need and demand for parental care decreases as the child matures, leading to the prediction that infantile (i.e., younger) faces would be most effective at eliciting parental care such that adults would increase their relative investment of parental resources in younger infants. For example, Hadza mothers spend significantly more time tending holding and nursing their infants as compared to their toddlers (Marlowe, 2005).

The second hypothesis is based on Trivers’s biological theory of parental investment (Trivers, 1972; 1974) that suggests that parents should seek to invest their limited resources in the best possible fashion with regards to maximizing their biological fitness. According to this theory, adults may prefer to invest their resources in older children because they represent a more secure investment than do younger children. Across societies and historic times, infancy has typically been the period of greatest mortality in humans (e.g., Hewlett, 2005) it may therefore (from biological or economic viewpoints) be less risky to invest resources in an older child that is more likely to survive to maturity and provide return upon the investment. In a study of parental infanticide, Daly and Wilson (1988) found that younger children were much more likely to be killed than older children.

The third hypothesis is that age-related changes do not significantly influence how adults perceive and respond to child facial cues. This null hypothesis could be the case if either child facial cues were unimportant to adults, if there were no relative differences between the information provided by child faces of different ages, or if the tendencies identified in the other theories cancelled each other out.

Table 1. Empirical support for theories of younger, older, or null age preferences for child facial cues.

| Reference                        | Hypoth. | Faces | # Stimuli | # of Children | Age Range   |
|----------------------------------|---------|-------|-----------|---------------|-------------|
| Hildebrandt and Fitzgerald (1979)| Younger | Photos | 60        | 10            | 3-13 months |
| Ritter, Casey, and Langlois (1991)| Younger | Photos | 4         | 4             | 6 months    |
| Horvath, Smigelsky, and Fenton (1987)| Older  | Drawings | 7       | 1             | 2 wks-4 yrs |
| Pittenger, Mark, and Johnson (1989)| Null/Younger | Photos | 24       | 24            | 1-11 yrs    |
| Sussman, Mueser, Grau, and Yarnold (1983)| Null | Photos | 52       | 13            | 6-16 years  |

While there is disagreement between the theoretical hypotheses, there is also conflicting empirical data regarding the relationship between the age of child facial cues and adults’ responses to them. Table 1 outlines the various studies conducted on child facial cues and age, including the study, which hypothesis the data from that study supports, whether the study used photographs or line drawings, the total number of stimuli, the number of children used to get the stimuli, and the age range of the stimuli. These empirical studies are each limited by a restricted age range, the use of line drawings as stimuli, a limited number of stimuli, and/or the use of simplistic univariate statistics. To
address these limitations, we conducted an empirical examination of how facial cues change over a wide range of child ages, and how those changes influence adults’ perceptions and reactions. Using a multivariate approach, we sought to test the three competing hypotheses regarding the influence of age on child facial cues.

Study 1

We chose the Hypothetical Adoption Paradigm to address the two aforementioned questions. In the Hypothetical Adoption Paradigm a series of child stimuli are presented to adult participants who are asked to pretend that they are interested in adopting a child. Participants then rate their desire to adopt each child based on its photograph. The Hypothetical Adoption Paradigm has been used previously to examine child facial cues of: attractiveness (Chin, Wade, and French, 2006), resemblance (DeBruine, 2004; Platek, Burch, Panyavin, Wasserman, and Gallup, 2002; Platek et al. 2004; Volk and Quinsey, 2007), general health and happiness (Volk and Quinsey, 2002), fetal alcohol syndrome (Waller, Volk, and Quinsey, 2004), and body weight (Volk and Quinsey, 2006). The paradigm is based on the hypothesis that adults may have evolved cognitive mechanisms that allow them to detect important infant or child facial cues and respond to them in ways that would maximize their own evolutionary fitness in an ancestral environment (see Volk and Quinsey, 2002, for more detail). While this approach emphasizes the importance of biological adaptation, it does not preclude or exclude learned and/or cultural influences.

We presented adults with photographic images of the faces of five children at eight different ages ranging from infancy to early childhood. To obtain a measure related to parental care, we asked adults to rate their desire to hypothetically adopt the child in each image. To obtain a second measure related to the desire to provide parental care we asked adults to rate the cuteness of the faces (Langlois, Ritter, Casey, and Sawin, 1995). Finally, we asked adults to rate the health of the faces in order to get a direct measure of perceived healthiness (all ratings used a seven point Likert scale). Given that childhood mortality has historically been greatest during infancy (Cunningham, 2005; Hewlett, 2005), it may be that infants either are, or are perceived by adults as being, more fragile and less healthy than older children. We predicted that the age of the children would significantly influence adult’s perceptions and ratings. We did not have a specific a priori prediction regarding the direction of the influence caused by changes in child age.

Materials and Methods

Participants

We recruited participants from the undergraduate population and from the local Kingston, Ontario community. Undergraduate students from the Psychology 100 Subject Pool received credit towards their course grade, while community members and non-psychology students received $5 for their participation. We contacted the community members and non-psychology students through word of mouth, e-mail, and posters. We recruited a total of 129 participants. Of these, we excluded six because they failed to follow instructions. The final sample consisted of 73 women and 50 men. There were 67 undergraduates, 29 men and 38 women, (mean age = 21.5 years, SD = 2.7) and 56 community members, 21 men and 35 women, (mean age = 47.0 years, SD = 7.5). The
undergraduates had significantly fewer children ($M = 0.04$, $SD = 0.3$ vs. $M = 1.9$, $SD = 1.2$; $t(121) = -12.81$, $p < .001$) and shorter times in committed relationships ($M = 0.8$ years, $SD = 2.0$, vs. $M = 16.2$, $SD = 11.7$; $t(121) = -10.69$, $p < .001$). Approximately 85% of both students and community members reported household/family incomes in excess of $40,000. The majority of the participants (97%) were Caucasian.

Materials

The stimuli consisted of pictures from each of five different Caucasian children taken at ages 6, 12, 18, 24, 36, 48, 60, and 72 months. One child was missing a picture for ages 60 and 72 months, while another child was missing pictures for ages 12, 60, and 72 months. The children faced the camera in all pictures, and all but one were in color. We obtained two of the children’s pictures (both female) through a modeling agency (Quest Worldwide Productions, Virginia, www.questmodels.com). We obtained the other three children’s pictures (two male and one female) from private collections. All children were of average body weight and had no obvious facial dysmorphisms. We cropped the pictures to obtain a standard size and resolution (640 x 680 pixels) using Corel Photo-House 5.

These 35 images were included with 20 other images used in a concurrent study (the other 20 images were of the same children at different ages but were digitally warped to represent conditions of facial asymmetry or low body weight). The images were presented on a black background using Microsoft PowerPoint 2000 software. We used Microsoft Office Excel 2000’s random numbering function to generate ten different presentation orders to minimize any order effects. The only restriction for image order selection was that a manipulated picture could not be placed immediately prior to or after its unaltered counterpart (i.e., there were never two pictures of the same child, at the same age, together). Randomized number tables assigned each participant one of the ten fixed presentation orders. Within each presentation, each image of a child’s face was followed by four separate slides on which four separate questions were posed.

Procedure

Participants received an information sheet prior to commencing the study. Participants then signed a consent form, after which they received appropriate compensation. Participants sat by themselves at a desk with a computer where they received oral instructions on how to control the PowerPoint presentation, and how to record their answers on the table provided. Participants were told that they should rate each image critically and independently. They were also asked not revisit any previously viewed slides. A series of four questions followed each stimulus presentation (i.e., after each face). “How willing would you be to adopt the previous child?”, “How healthy do you think the previous child is?”, “How much do you think the previous child resembles you?”, and “How cute do you think the previous child is?” Participants answered these questions using a Likert-scale of one to seven, where a value of one represented the lowest possible score, “very unwilling/unhealthy/no resemblance/not cute”, and a value of seven represented the highest possible score, “very willing/healthy/high resemblance/very cute”. The participants recorded their ratings on a prepared printout. Given that health and cuteness ratings may be highly correlated (e.g., Volk and Quinsey, 2002; Waller et al., 2004), we attempted to reduce method variance by separating their rating with the resemblance question in order to promote a relatively independent consideration (Volk and Quinsey, 2002). Following the
Results

Because we did not have photos for all children at all eight ages, we were unable to conduct inferential analyses on the entire data set. We therefore conducted analyses on three of the five stimulus sets that were complete. All of the results were conducted using Excel 2000 and SPSS v.8. To preserve power, resemblance was not included in the MANOVA and ANOVA analyses. We chose a general alpha level of .05 for all analyses. Effect sizes of small, medium/modest, and large/strong were defined using Cohen’s (1992) conventions. We analyzed the three stimulus sets that contained exemplars of all eight ages with a MANOVA. However, preliminary data screening revealed that sphericity was violated for most of the tests. Therefore, we chose to examine the multivariate output from SPSS using the conservative but robust Pillai’s criterion for all appropriate analyses as a general precaution against any violations of assumptions (Tabachnik and Fidell, 1996).

| Table 2. Study 1 Multivariate and Univariate Results |
|-----------------|-----------------|-----------------|-----------------|-----------------|
|                 | Multivar.        | Multivariate     | Univar.          | Adoption         | Cuteness        | Health          |
|                 | df              | df              | df              | Preference       |                |                |
| Sex             | 3,117           | 3.38*           | 1, 119          | 7.75**           | 9.81**         | 6.37*           |
|                 |                 | .08             |                 | .06              | .08            | .05             |
| Group           | 3,117           | 4.91**          | 1, 119          | 8.84**           |                |                |
|                 |                 | .11             |                 | .07              |                |                |
| Stimulus        | 6,114           | 5.85***         | 2, 118          | 9.72***          | 13.77***       | 9.48***         |
|                 |                 | .24             |                 | .14              | .19            | .14             |
| Stimulus x Group| 6,114           | 5.03***         | 2, 118          | 2.09**           | 5.66**         |                |
|                 |                 | .21             |                 | .09              | .09            |                |
| Age             | 21, 99          | 12.34***        | 7, 113          | 13.03***         | 23.06***       | 4.23***         |
|                 |                 | .73             |                 | .45              | .59            | .21             |
| Age x Group     | 21, 99          | 2.47***         | 7, 113          | 4.09***          |                |                |
|                 |                 | .34             |                 | .20              |                |                |
| Age x Stimulus  | 42, 78          | 4.68***         | 14, 106         | 4.72***          | 6.98***        | 9.02***         |
|                 |                 | .72             |                 | .37              | .48            | .54             |

Note: Top values are $F$ values, while the italicized bottom values are partial $\eta^2$ measures of effect size. *$p < .05$, **$p < .01$, ***$p < .001$.

Previous studies using the HAP have found effects of participant sex (Volk and Quinsey 2002) and group (Volk, Luckjanczuk, and Quinsey, 2005). Therefore we performed a 2 x 2 x 3x 8 x 3 MANOVA analysis on three dependent variables: adoption
preference, cuteness, and health. The independent variables were Sex (of participants), Group (community vs. undergraduates), Stimulus (set), and Age (of stimuli). The results of the multivariate tests are presented in Table 2. The tests for Sex, Group, Stimulus, Stimulus x Group, Age, Age x Group, Age x Stimulus, and Age x Stimulus x Group effects were significant, with Age showing the largest effect size.

The significant multivariate results justified univariate tests of adoption preference, cuteness, and health. Alpha levels were divided by three to account for the multiple tests (i.e., Bonferroni method; \( \alpha = .016 \)). The results of these tests are also presented in Table 2. For adoption preference, Sex (higher scores for women), Stimulus, Age, and Stimulus x Age were significant. Stimulus x Group \( (F(2,118) = 4.10, p = .019, \text{partial } \eta^2 = .07) \) and Age x Group \( (F(7,113) = 2.52, p = .019, \text{partial } \eta^2 = .14) \) approached significance. The relationship between age and adoption preference ratings for these data is presented in Figure 1. As can be seen, there was a strong negative relationship between age and adoption preference. The undergraduate group tended to give lower ratings than did the community group. The typical standard deviation for the mean ratings of adoption preference, cuteness, and health were all around 1.0 rating-units

**Figure 1.** Influence of age on average adoption ratings for overall, community, and student groups in Study 1.

For cuteness, Sex, Group, Stimulus, Stimulus x Group, Age, Age x Group and Stimulus x Age were significant. Stimulus x Age x Group approached significance \( (F(14,106) = 1.89, p = .035, \text{partial } \eta^2 = .20) \). The relationship between age and cuteness ratings for these data is presented in Figure 2. Again there was a strong negative relationship between age and cuteness ratings with the student participants having given lower ratings than the community participants.
Figure 2. Influence of age on average cuteness ratings for overall, community, and student groups in Study 1.

For health, Sex, Stimulus, Stimulus x Group, Age, and Stimulus x Age were significant. Stimulus x Age x Group approached significance ($F(14,106) = 1.97, p = .027$, partial $\eta^2 = .21$). The relationship between age and health ratings is presented in Figure 3. The negative relationship between age and health ratings is not easily discernible from this figure, illustrating the relatively small effect of age on health ratings. Furthermore, there was no clear difference between the ratings of the community versus student participants.

Figure 3. Influence of age on average health ratings for overall, community, and student groups in Study 1.

The correlations between adoption preference, health, resemblance, and cuteness are presented in Table 3. Average correlations are presented for the stimuli ages of six months and six years. To calculate the average correlations, each individual infant face (stimulus) was treated in much the same way as a separate trial in a repeated-measures design. These individual correlations would then be then transformed into $z'$ scores using Fisher’s $z'$ transformation, averaged as $z'$ scores, then transformed back into correlations years (see Volk et al., 2005, for specific details regarding calculating average correlations).
All of the average correlations were significant. The correlations between adoption, cuteness, and health were all large, while the correlations with resemblance were small to medium in effect size.

**Table 3.** Average correlations between Adoption Preference, Health, Resemblance, and Cuteness at Stimuli ages 6 months and 6 years in Study 1 (*n* = 123)

|                  | Health | Resemblance | Cuteness |
|------------------|--------|-------------|----------|
| Adoption Pref.   | .61*   | .41*        | .75*     |
| Health           | --     | .17*        | .51*     |
| Resemblance      | --     | --          | .32*     |

Note: Top values are for stimuli age 6 months, while the italicized bottom values are for stimuli age 6 years. *p* < .05.

**Discussion**

As predicted, the age of child facial cues significantly influences adults’ perceptions and ratings. At the multivariate and univariate levels, stimulus age was negatively related to adoption preference, cuteness, and health. The effect sizes were medium to large for adoption preference and cuteness, but were small for health. The plots of age versus adoption preference and cuteness suggest that there is an initial peak of adoption preference and cuteness during infancy that declines to a slight plateau in toddler years, and then declines again at the end of the toddler years. Interestingly, the figures appear to correspond with the amount of time that children typically spend with their caregivers in many cultures - a high level during infancy, reduced but still high level during the toddler years, and then further drop once the child becomes relatively independent in early childhood (Eibl-Eibesfeldt, 1989). These data best fit the “traditional” hypothesis that child facial cues are most effective during early childhood and that these effects diminish with time. The average correlations between adoption preference, cuteness, and health were similar in size and direction as in previous studies (e.g., Volk and Quinsey, 2002).

However, two findings complicate the support of the traditional hypothesis. First, the small but significant negative relationship between stimulus health and stimulus age makes it possible that the observed relationships between stimulus age and the adoption/cuteness ratings are mediated by the increased apparent health of younger children. Second, the three individual stimulus sets significantly influenced the results at all levels of analysis, and interacted significantly with stimulus age. This suggests that different children’s faces may undergo different developmental trajectories and/or that their facial cues differentially influence adults at different ages.

Overall then, the findings of this first study strongly suggest that stimulus age significantly and negatively influenced adults’ perceptions and ratings of adoption preference and cuteness. The ambiguity of the negative relationship with health, along with the apparent importance of stimuli (the individual children) as a variable led us to conduct a second study in an effort to replicate and expand the results of the initial study.
Study 2 (Replication)

Study 2 was designed to confirm and elaborate upon our initial findings. In this second study we used new participants, expanded the number of different children used as stimuli, and included an independent measure of stimulus quality. The other aspects of the study remained the same.

Materials and Methods

Participants

We again recruited participants from both the undergraduate population and from the local community using the Psychology 100 Subject Pool, word of mouth, email, and posters. Undergraduate students from the Psychology 100 Subject Pool received credit towards their course grade, while community members and non-psychology students received $5 for their participation. We recruited a total of 76 participants. Of these, we excluded one because of a failure to follow instructions. The final sample consisted of 48 women and 23 men. There were 47 undergraduates, 13 men and 34 women, (mean age = 21.1 years, SD = 5.6) and 24 community members, 10 males and 14 females, (mean age = 36.4 years, SD = 12.6). The undergraduates had significantly fewer children (M = 0.0 vs. M = 0.8, SD = 1.1; t(27adjusted for unequal variances) = -3.56, p < .01) and committed relationships that were significantly shorter (M = 0.8 years, SD = 2.0, vs. M = 15.1, SD = 12.7; t(69) = -8.69, p < .001). Approximately 75% of both students and community members reported household incomes in excess of $40,000 (students’ household income was based on their parents’ income). The majority of participants (96%) were Caucasian.

Materials

The stimuli consisted of pictures from each of seven different Caucasian children, at ages 6, 12, 18, 24, 36, 48, 60, and 72 months. We obtained all of the children’s pictures (two male and five female) from private collections. One of the female stimulus sets was missing a picture for age 48 months, leaving a total of 55 facial images. The photos were similar in nature to, and present in the same way, as the photos in Study 1.

Procedure

The procedure in the second study was the same as the procedure in first study.

Results

We analyzed the data using the same methods as in the previous study. Of the seven sets of stimuli, only six had all eight ages required for inclusion in the MANOVA. However, preliminary data screening led us to again employ the more conservative but more robust Pillai’s criterion for all appropriate significance tests. We identified two outliers using Cook’s distances of 1.36 (stimulus 4, age 1, adoption scores) and 1.72 (stimulus 1, age 1, cuteness scores). Given that these were relatively modest Cook’s distances, we left them unaltered. There were also two missing data points that we replaced with the mean value between an average value for the particular participant and the particular stimulus (Widaman, 2005).
We performed a $2 \times 2 \times 6 \times 8 \times 3$ MANOVA analysis on three dependent variables: adoption preference, cuteness, and health. As in the previous study, the independent variables were Sex (of participants), Group (community vs. undergraduates), Stimulus (set), and Age (of stimuli). The multivariate tests results are presented in Table 4.

### Table 4. Study 2 Multivariate and Univariate Results

| Variable(s)       | Multivar. $df$ | Multivariate $F$ | Univar. $df$ | Adoption Preference | Cuteness | Health |
|-------------------|----------------|------------------|--------------|---------------------|----------|--------|
| Stimulus          | 15,56          | 9.49***          | 5,67         | 10.64***            | 20.61*** | 22.18***|
|                   | .71            |                  | .45          | .61                 |          | .62    |
| Age               | 21, 50         | 8.43***          | 7, 65        | 4.34**              | 4.85**   | 10.61***|
|                   | .78            |                  | .32          | .34                 | .53      |        |
| Age x Group       |                |                  | 7, 65        | 2.11*               | 2.71*    |        |
|                   |                |                  | .19          | .23                 |          |        |
| Age x Stimulus    | 35,37          | 5.84***          | 5.68         | 4.56***             | 5.56 *** |
|                   | .85            |                  | .81          | .84                 |          |        |

Note: Top values are $F$ values, while the italicized bottom values are partial $\eta^2$ measures of effect size. * $p < .05$, ** $p < .01$, *** $p < .001$.

The univariate tests for adoption preference, cuteness, and health were adjusted using the Bonferroni method and the results are presented in Table 4. Adoption preference and cuteness were negatively correlated with age, but in contrast to the original study, there was a significant positive relationship between health and age.

The Study 2 correlations between adoption preference, health, resemblance, and cuteness did not differ significantly from the Study 1 correlations presented in Table 3. In both Study 1 and 2, child sex did not significantly influence any of the correlations (including those with age).

### General Discussion

The large multivariate effects of Age found in both studies (with partial $\eta^2$ values in excess of .7) strongly support the hypothesis that the influence of child facial cues on adults changes with child age. In both studies the individual stimulus sets also played a significant role in the multivariate analysis (i.e., not all children were rated equally). There was also a strong effect of Stimulus x Age that may reflect developmental differences in how the influence of individual children’s facial cues changes with age. Indeed, some of the children underwent significant changes in their physical appearance (e.g., a common change being darkening of their hair), while other children remained quite similar (e.g., a uniformly red haired child was especially noted in participant debriefing reports).
Differences in adults’ individual traits may have influenced the perceptions and ratings of the child faces, as suggested by the significant main effects for sex and group in the first study. There were similar, but non-significant trends, in the second study. These non-significant findings are likely due to the reduced power of the second study and/or the younger average age and fewer number of children in the second community sample. The sex and group differences between the adults are consistent with previous studies of child facial cues (Volk and Quinsey, 2005).

At the univariate level, age was significantly and negatively related to adoption preference and cuteness in both studies. The effect sizes were not as large as in the multivariate model, but were substantial nonetheless. One might argue that the negative relationship between adoption preference and age is related to factors that are not related to facial cues (e.g., increased probability of fostering an emotional bond/attachment or lower probability of established behavioral problems). However, these factors do not explain why there is a parallel drop in cuteness with age. Taken together, we believe that the reduction in adults’ ratings of adoption preference and cuteness with stimulus age reflects a reduction in the elicitation of feelings related to parental care by older child faces.

Put differently, it appears that adults may possess an evolved psychological mechanism that mobilizes parental investment during the developmental period when children would be most helpless and parent dependent. This mobilization would be important not just for parents of infants, but also “allo-parents” (Hrdy, 1999). Indeed, if younger is cuter, infantile facial cues could facilitate the adoption of abandoned or orphaned children by allo-parents. A parallel benefit in adopting younger children is that the younger the adoption, the greater the opportunity for maternal- and familial-kinship imprinting (Lieberman, Tooby, and Cosmides, 2007).

The relationship between age and health differed between the two studies. In the first study, there was a small negative relationship between age and health, while in the second study there was a small positive relationship. Combined, these two results suggest that there is not a stable relationship in either direction between age and apparent health in child and infant faces.

Overall then, our results best fit the hypothesis that infantile (i.e., younger) faces are cuter and that adults prefer to care for younger children. The significant, large effect sizes argue strongly against the hypothesis that child facial cues either do not change significantly with age, or that the changes that do occur are not important to adults’ perceptions and ratings. The hypothesis that adults prefer to older facial cues is also unlikely given the strong negative relationships between age and adoption preference/cuteness. Furthermore, the replication in the second study of these negative relationships in spite of the positive relationship between age and ratings of health argues against any adult tendency to prefer “safer/healthier” cues over cues of youth. Thus, our findings concur with those of Hildebrandt and Fitzgerald (1979) as well as Ritter et al (1991).

How then do we account for the disparate findings in support of the other theories? The theory that age-related changes do not significantly influence how adults perceive and respond to child facial cues was supported by findings from Sussman et al. (1983) and Pittenger et al. (1989). All of these studies relied primarily on child stimuli from children aged 6-12. There are likely fewer significant changes in physical appearance from ages 6-12 years than during the ages 6-72 months used in the current studies. The support of the hypothesis that adults would prefer to invest their resources in older children may also be
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due to differences in the stimuli used. The findings of Horvath, Szmigelsky, and Fenton’s research (1987) were based on facial illustrations that may represent not ecologically valid stimuli. Other findings of parenting that support increased investment in older children (e.g., Daly and Wilson’s 1988 infanticide data) may reflect other parenting variables. Indeed, parenting is a complex task that typically involves a variety of concurrent mechanisms that influence parental care (Belsky, 1984). Child facial cues are likely to be only one of many variables that influence parental investment. Other child traits, parental traits, and environmental factors can all independently influence parenting in ways that are contrary to the influence of facial cues (Belsky, 1984).

The average correlations between the independent variables corroborate the analytical conclusions regarding age. The general similarities between the correlations at 6 months and 6 years suggest that the age-related differences in adults’ ratings are due to underlying changes in the relationships between the variables. Of particular interest are the large correlations between adoption-health and cuteness-health. These correlations are of the same order as the correlation between adoption-cuteness, yet health did not show the same age-related changes as did the other two variables. This suggests the absence of a general age mechanism that influences all the variables equally. This conclusion is strengthened by the positive correlation between health ratings and age in Study 2.

Limitations
A potential limitation of our stimuli was the lack of very early infant photos. Infant faces can undergo a dramatic change in appearance during the first weeks of life, and it would be interesting to examine whether the negative relationship with age and adoption preference/cuteness also existed during these early weeks. A more general limitation of the study is the correlational nature of the Hypothetical Adoption Paradigm. Given that it is a proxy for feelings associated with parental care, one must be cautious about extending the findings directly to actual parental behavior. All of the average ratings of adoption, cuteness, and health were greater than 3, with most greater than 4, meaning that there were no strongly negative ratings for any age group on any of the measures.

Conclusions
We found that adults’ ratings of adoption preference and cuteness were strongly and negatively related to the age of the child, while there was no consistent relationship between age and adults’ ratings of health. These changes do not appear to be due to changes in the underlying relationships between the dependent variables. We believe that our use of a large number of photographic-quality stimuli from a dozen different children at eight different ages offers substantial validity for the current results. Our results most strongly support the hypothesis that facial cues associated with infancy or youth are most effective at eliciting adult responses related to parental care.

These results may have important theoretical and practical implications. From a theoretical perspective, our results reinforce the theory that evolution operated to energize parental investment during developmental periods when children would be most helpless and parent dependent. From a practical perspective our results may be especially relevant for adoption and foster care, especially when adults are first introduced to “candidate” children through photographs. Indeed, the increasing reliance on photographs by adoption agencies, including the use of online “photo-catalogues” (e.g., the Canadian province of
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Alberta or AdoptUSKids.com in the United States), illustrates the potential for facial cues to potentially influence critical parental decisions such as whether or not to adopt a child.

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