

REPORT

Father absence, menarche and interest in infants among adolescent girls

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Abstract

In this study we examined the relationship between menarche and interest in infants among adolescent girls, and the effects of early environment, particularly of father absence from home, on both variables. Eighty-three girls ranging in age from between 11 and 14 years served as study participants. Interest in infants was assessed through their preferences for photos and silhouettes of animal and human faces of infants versus adults. Information on menarche and the early family environment was obtained with questionnaires and interviews. Variation in menarcheal status or timing of menarche was associated with some differences in interest in infants. There was little or no evidence, however, that suggested a direct causal relationship between these variables. Instead, both menarche and interest in infants were independently associated with early father absence from home such that father-absent girls exhibited earlier menarche and greater attraction to infant visual stimuli than father-present girls. Our results are consistent with the hypothesis that father absence is associated with a developmental trajectory characterized by earlier readiness for reproduction and parenting.

Introduction

A number of studies have shown that human females in almost any age group prefer pictures of infants to those of adults more than males do, and are more likely to interact with live babies in a variety of circumstances than males are (e.g. Berman, 1980; Blakemore, 1983; Edwards, 1993; Feldman, Nash & Cutrona, 1977; Fullard & Reiling, 1976; Maestripieri & Pelka, 2002). Female responsiveness to infants is greatest in childhood and adolescence, and declines in middle-aged and elderly women, whereas a similar pattern is not observed for males (Berman, 1980; Feldman *et al.*, 1977; Frodi & Lamb, 1978; Fullard & Reiling, 1976; Maestripieri & Pelka, 2002). Early attraction to infants probably facilitates the acquisition of mothering skills prior to the onset of reproductive activity. Thus, one may hypothesize that individual differences in interest in infants among young girls of the same age should be correlated with differences in their degree of reproductive development.

A previous study by Goldberg, Blumberg & Kriger (1982) reported a small, but significant, difference in

attraction to pictures with infant faces between 12-year-old girls who had reached menarche and same-aged girls who had not. The authors of this study suggested that possible neuroendocrine changes associated with the onset of menstruation may increase selective attention and responsiveness to infantile features, and that such attentional changes would function to increase opportunities to observe and respond to infants in the years between menarche and actual childbearing. Their findings, however, could be interpreted in a different way. In particular, it is possible that girls with early menarche had a greater interest in infants than girls with late menarche even before the onset of menarche. If this interpretation is correct, then the finding to be explained would not be why post-menarcheal girls have higher interest in infants than pre-menarcheal girls, but why girls who reach puberty early are more interested in infants than girls who reach puberty late.

Individual differences in timing of menarche among adolescent girls are associated with age differences in the onset of sexual activity and first pregnancy (e.g. Chisholm, 1999; Kim & Smith, 1998a; Kim, Smith & Palermi, 1997; Udry, 1979). Timing of menarche is known to be

affected by genetic and nutritional factors (e.g. Rowe, 2002). Genetic influences, however, do not preclude the influence of environmental and psychological factors on reproductive maturation (e.g. Chasiotis, Scheffer, Restemeier & Keller, 1998; Ellis *et al.*, 1999). In particular, a number of studies have shown that father absence and/or early family conflict and stress are associated with earlier menarche (Chisholm, 1999; Ellis & Garber, 2000; Graber, Brooks-Gunn & Warren, 1995; Jones, Leeton, McLeod & Wood, 1972; Kim *et al.*, 1997; Kim & Smith, 1998a, 1998b; Moffitt, Caspi, Belsky & Silva, 1992; Surbey, 1990; Wiersen, Long & Forehand, 1993). These findings are consistent with the hypothesis that, under some circumstances, earlier menarche may be part of a reproductive strategy that emphasizes precocious reproduction in stressful environments or in situations in which male commitment to relationships or male parental investment is not expected (Belsky, Steinberg & Draper, 1991; Chisholm, 1999; Draper & Harpending, 1982). Since early interest in infants may be functionally related to the success of early reproductive attempts, it is reasonable to hypothesize that girls who reach menarche early should exhibit earlier and more intense interest in infants than girls who reach menarche late.

In this study, we investigated interest in infants among adolescent girls in relation to menarche, father absence, and other types of early childhood experience. Similar to previous studies (e.g. Goldberg *et al.*, 1982; Maestripieri & Pelka, 2002), we assessed interest in infants through responses to visual stimuli. Based on previous studies, we predicted that father absence and/or early childhood stress would be associated with earlier menarche. If Goldberg *et al.*'s interpretation of the association between menarche and interest in infants is correct, we would expect post-menarcheal girls to exhibit greater interest in infants than pre-menarcheal girls, regardless of their timing of menarche. On the other hand, if timing of menarche is the crucial variable rather than menarcheal status, we predict that earlier menarche should be associated with greater interest in infants.

Methods

Study participants

Eighty-three adolescent girls were recruited from local schools and Girl Scout troops in the Chicago and Boston areas between June 2002 and April 2003. The participant sample consisted of 61 white females, 19 African American females, 1 Hispanic female and 2 females of mixed race descent. Participants' ages ranged from 11 years and 1 month to 14 years and 8.5 months ($M =$

149 months, $SD = 10.6$). There were no significant differences between the ages of Caucasian participants ($M = 148.14$ months) and all other (mostly African American) participants ($M = 151.05$ months), $t(76) = 1.06$, $p = .30$.

Procedure

Participants were shown 20 pairs of images and asked to identify which image of the pair they preferred. The images included five silhouettes (face profiles) of adult animals matched with their infant counterparts, five silhouettes of adult human faces matched with human infant faces, five color photographs of adult animal faces matched with their infant counterparts and five color photographs of adult human faces matched with human infant faces (see Maestripieri & Pelka, 2002, for more information on the stimulus set). Internal consistency for number of infant choices across the entire 20-item scale was .82. Reliabilities for the subscales were as follows: animal silhouettes, $\alpha = .66$; human silhouettes, $\alpha = .85$; animal photos, $\alpha = .75$; human photos, $\alpha = .71$.

After the visual preference test, participants were administered a battery of surveys. Menarche was inferred from a single item ('Have you started to menstruate?'), and timing of menarche from another item that asked participants to indicate the month and year of their first menses. Participants also indicated their age at time of testing as well as other background information such as height, weight and handedness. A family residence survey asked participants to indicate whether their parents had ever divorced or separated and to list all categories of siblings and adults (e.g. biological, step, etc.) with whom they lived in the same house from ages 0–5, 6–10, and 10–present. Variables such as father absence during specific ages were inferred from this measure. Previous experience with infants was inferred from a survey item that asked participants to indicate, 'Overall, how much experience with infants have you had?' The response scale ran from 1 (very little) to 5 (a lot). Finally, participants' perceived quality of their childhood family environments was assessed from two questionnaires. A family experience scale included four general items: How happy were you at home when you were growing up? How stressful was your family environment? How often did you feel you were treated unfairly by your parents? How often did your parents fight or have arguments? Two three-item sets assessed closeness to parents: How often did you usually see your father (mother) when you were growing up? How often did you and your father (mother) do fun activities together? How close do you feel to your father (mother)? Four-point scales were labeled according to the specific questions and negative items were reverse-keyed for the construction of composite

variables. The overall ten-item scale had a reliability of $\alpha = .82$, while the three-item subscales had reliabilities of $\alpha = .94$ for questions pertaining to the father and $\alpha = .77$ for questions pertaining to the mother. A family support scale provided a second measure of quality of family environment. Participants were asked to indicate which of 16 statements pertaining to their families were true. Examples include, 'We enjoy having dinner together and talking' and 'Others can't be counted on.' This scale has been validated and used in previous research and the full list of items can be found in Csikszentmihalyi and Schneider (2000). After reverse-scoring negative items, the scale had a reliability of $\alpha = .70$ in the present sample.

Chi-square (χ^2) tests, *t*-tests and multiple regression analyses were used. All tests are two-tailed and probabilities $\leq .05$ were considered statistically significant. Differences in sample sizes across analyses are due to missing items.

Results

Menarche, race, father absence and experience with infants

A total of 76 girls indicated whether they had achieved menarche, with 30 indicating that they had and 46 that they had not. Among the post-menarcheal girls, 24 reported their age at first menses. These ages ranged from 119 to 165 months ($M = 140.79$, $SD = 12.15$). A higher proportion of non-white participants had reached menarche (10/17) than white participants (20/59), but the difference was only marginally significant, $\chi^2 (1, n = 76) = 3.43$, $p < .07$. There was substantial overlap in the occurrence of father absence between the 0–5, 6–10 and 10–present age ranges (i.e. if the father was absent in one age period, he was likely absent in all three), and therefore, we constructed a measure of whether the father was ever absent. Twenty girls reported father absence versus 62 for whom the father was always present. Father absence differed significantly by race, with 8% of white participants (5/61) but 71% of non-white participants (15/21) reporting father absence, $\chi^2 (1, n = 82) = 33.87$, $p < .0001$. Father-absent girls were more likely to be post-menarcheal at the time of testing (10/14) than were father-present girls (20/61), $\chi^2 (1, n = 75) = 7.08$, $p < .01$. Self-reported overall experience with infants did not differ between the pre- ($M = 4.04$, $SD = .87$) and the post-menarcheal ($M = 4.07$, $SD = .98$) girls, $t(74) = -.11$, $p = .91$, nor between the father-absent ($M = 4.25$, $SD = .97$) and the father-present ($M = 4.02$, $SD = .88$) girls, $t(80) = 1.01$, $p = .32$.

Timing of menarche

A timing of menarche variable was computed as follows. We first computed the median age of menarche from the 24 girls who reported age at first menses. This value was 140 months. Girls who reported menarche before 140 months were classified as 'early' and those after 140 months as 'late.' Girls older than 140 months at the time of testing who had not yet achieved menarche could then be classified as late. This method necessarily excluded girls who were younger than 140 months at the time of testing but had not yet achieved menarche, since they might still reach this milestone before the cut-off point. This left 54 valid cases, with 14 (25.93%) classified as early and 40 (74.07%) classified as late. Father-absent girls had earlier menarche at a higher rate (5/9) than father-present girls (9/45), $\chi^2 (1, n = 54) = 4.94$, $p < .05$. Timing of menarche did not differ by race, with 33% of white participants (11/44) and 30% of non-white participants (3/10) falling into the early category, $\chi^2 (1, n = 54) = .11$, $p = .75$. Overall experience with infants also did not differ significantly between the early ($M = 4.29$, $SD = .91$) and the late menarche ($M = 4.05$, $SD = .68$) groups, $t(52) = 1.02$, $p = .31$. Finally, the early and late menarche groups did not differ significantly on any of the childhood experience surveys, although there was a trend toward lower closeness to fathers among those in the early category ($p < .10$).

Effects of menarche, timing of menarche and father absence on preferences for infant visual stimuli

Table 1 presents the average number of infant stimuli chosen on the visual preference test in relation to menarcheal status, timing of menarche and father absence. The possible moderating variables of age, race and experience with infants were not significantly associated with scores on the overall test or on any of the subscales. The top third of the table compares girls who had achieved menarche at the time of testing with those who had not. For the animal silhouettes, pre-menarcheal girls showed a significantly higher preference for the infant stimuli than post-menarcheal girls (effect size, $d = .90$). For the other stimuli, there were no significant differences between pre-menarcheal and post-menarcheal girls. When age, race and overall experience with infants were simultaneously entered in a regression model along with menarche, menarche still had no significant effects on the preference scores for the overall test ($\beta = -.04$, $p = .76$).

The effects of timing of menarche on visual preferences for infants appear in the middle panel of Table 1. Girls with early menarche showed a greater preference for the human infant stimuli than girls with late

Table 1 Effects of pubertal events and father absence on visual preferences for infantst

	Silhouettes of animals	Silhouettes of humans	Photos of animals	Photos of humans	All visual stimuli
Reached menarche?					
No (<i>n</i> = 46)	3.33 (1.48)	3.34 (1.70)	3.91 (1.52)	4.07 (1.22)	14.29 (3.88)
Yes (<i>n</i> = 30)	1.97 (1.54)	3.76 (1.72)	3.63 (1.54)	3.83 (1.60)	13.62 (3.96)
<i>t</i> -statistic:	3.86***	-0.94	0.78	0.72	0.72
Timing of menarche					
Early (<i>n</i> = 14)	2.21 (1.72)	4.29 (1.33)	3.50 (1.74)	4.00 (1.66)	14.29 (3.71)
Later (<i>n</i> = 40)	2.98 (1.54)	3.05 (1.92)	3.65 (1.51)	3.75 (1.41)	13.32 (4.41)
<i>t</i> -statistic:	-1.54	2.62**	-0.31	0.55	0.73
Father absence?					
No (<i>n</i> = 62)	2.85 (1.62)	3.35 (1.80)	3.63 (1.61)	3.79 (1.45)	13.47 (4.07)
Yes (<i>n</i> = 20)	2.50 (1.67)	3.55 (1.99)	4.45 (0.89)	4.70 (0.47)	15.40 (3.05)
<i>t</i> -statistic:	-0.85	0.42	2.88**	4.29***	1.95*

Note: †Values within cells are mean number of infant stimuli chosen (SD out of five possible for individual subscales and out of 20 possible for all visual stimuli).

* $p < .06$; ** $p < .05$; *** $p < .001$.

menarche, with a significant difference found for the human silhouettes ($d = .74$). Although this effect remained significant when the effects of age, race and experience with infants were controlled individually, the influence of timing of menarche dropped to marginal significance when all four variables were simultaneously entered into a regression model ($\beta = -.28$, $p < .07$).

The relationship between father absence and visual preferences for infants is presented in the bottom panel of Table 1. With the exception of the animal silhouettes, more infant stimuli were chosen by father-absent girls across each of the subscales. Differences were significant for the animal photos ($d = .64$) and the human photos ($d = .96$), and marginally significant for the entire test ($d = .44$). After controlling for age, race and experience with infants, the influence of father absence remained significant for human photos ($\beta = .42$, $p < .01$), dropped to marginal significance for animal photos ($\beta = .28$, $p < .07$) and became significant for the overall test ($\beta = .39$, $p < .01$).

Since father absence had a significant association with both menarche and visual preferences for infants, a question arises as to whether menarcheal status and timing of menarche have effects on visual preferences for infants that are independent of father absence. When father absence was added to regression models that included menarche, age, race and experience with infants, it accounted for significant increases in variance explained for the overall test ($\beta = .46$, $p < .01$), photos of humans subscale ($\beta = .43$, $p < .01$), photos of animals subscale ($\beta = .30$, $p < .05$) and silhouettes of humans subscale ($\beta = .31$, $p < .05$). Likewise, when the number of human infant silhouettes chosen was regressed on to both timing of menarche and father absence, father absence explained significant variance in this measure ($\beta = .29$, $p < .05$) but timing of menarche did not

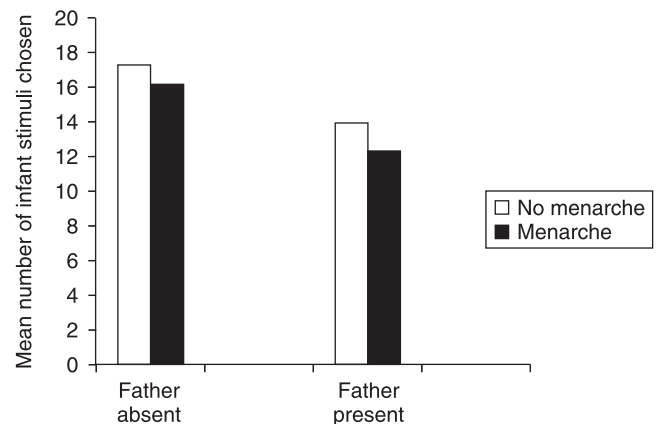


Figure 1 Mean number of total visual infant stimuli chosen by father-absent and father-present girls in relation to menarcheal status.

($\beta = -.22$, $p = .12$). The two variables together accounted for 13% of the variance, while father absence alone accounted for 10%. Figure 1 breaks down the total score on the visual preference test by father absence and menarcheal status. A 2×2 ANOVA revealed only a significant main effect of father absence, $F(1, 69) = 8.51$, $p < .01$, with no main effect of menarche or a significant interaction. Figure 2 breaks down the number of human infant silhouette choices by both timing of menarche and father absence. Again, there was only a significant main effect of father absence ($F(1, 48) = 4.16$, $p < .05$), and no main effect of timing of menarche or an interaction between these variables. Taken together these results suggest that menarche and timing of menarche do not exert an influence on visual preferences for infant stimuli independent from the effects of father absence.

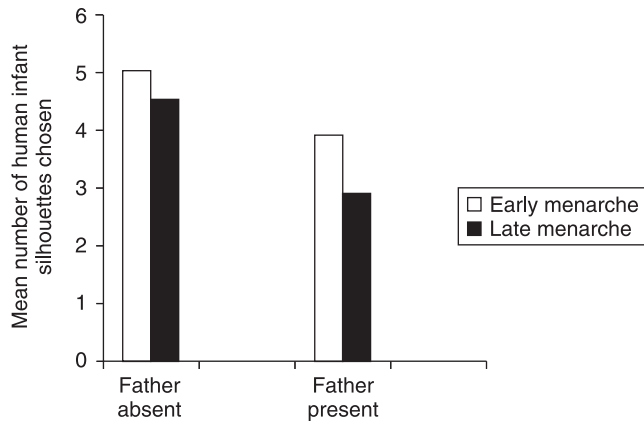


Figure 2 Mean number of human infant silhouettes chosen by father-absent and father-present girls in relation to timing of menarche.

Possible variables mediating the influence of father absence on preferences for infant visual stimuli

Previous analyses showed that although father-present and father-absent girls differed significantly for race, the effect of father absence on visual preferences for infants persisted after controlling for race. In fact, race did not influence scores on the overall visual preference test (white participants: $M = 14.05$, $SD = 4.07$; non-white participants: $M = 13.82$, $SD = 3.47$; $t(79) = .24$, $p = .81$). Furthermore, white girls with father absence ($n = 5$) preferred human infant stimuli in 50 out of 50 choice trials, whereas white girls with father presence ($n = 54$) preferred such stimuli only 73% of the time. Table 2 shows that, in addition to race, father-present and father-absent girls differed in three other variables that may possibly affect their interest in infants. First, father-absent girls were more likely than father-present girls to have lived with an unrelated adult man, though only six father-absent girls were actually in this category. Second, father-

absent girls had more siblings, including more younger siblings, than did girls with fathers present. Finally, father-absent girls reported lower ratings of the quality of their home environment, whether measured as closeness to mother, closeness to father, overall family experience, or the family support scale.

The father-absent girls with an unrelated adult man present chose the same number of infant stimuli ($M = 15.67$, $SD = 3.39$) in the visual preference test as father-absent girls who did not report the presence of an unrelated adult man ($M = 15.29$, $SD = 3.02$). Father absence, furthermore, still exerted a significant influence on this measure when added to a regression model that included race, menarche and unrelated adult male presence ($\beta = .46$, $p < .01$).

Neither number of brothers/sisters nor number of younger siblings correlated with number of infant choices on the visual preference test among either father-absent or father-present girls. Consistent with this, father absence still predicted total scores on the visual preference test after controlling for race, menarche and number of younger siblings ($\beta = .45$, $p < .01$; similar results obtain after controlling for number of brothers or number of sisters).

Higher scores on the family experience scale (i.e. more positive experiences) were associated with greater interest in human infant photos among father-present girls ($r(60) = .28$, $p < .05$), thus suggesting that lower scores on this scale might actually suppress the influence of father absence on interest in infants. Consistent with this, the effect of father absence on the total visual preference score was larger after controlling for scores on the family experience scale in a regression model that also held constant race and menarche ($\beta = .56$, $p < .01$). Similar results were obtained when the family support scale was substituted for the family experience scale (the two scales correlated at $r(77) = .52$) within the same regression model ($\beta = .49$, $p < .01$). Finally, although measures of girls' closeness to their fathers did predict number of

Table 2 Relationship between father absence and possible mediating influences on interest in infants

	Father absent	Father present	Statistical test
Age in months	150 (11.78)	148.76 (10.32)	$t(75) = 0.43$
Height (in)	60.77 (3.56)	60.67 (3.23)	$t(68) = 0.92$
Weight (lbs)	95.92 (15.55)	101.39 (22.26)	$t(63) = -.83$
Started dating?	55% (11/20)	40% (25/62)	$\chi^2(1, n = 82) = 1.32$
Unrelated adult male?	30% (6/20)	2% (1/62)	$\chi^2(1, n = 82) = 15.61^{**}$
Number of brothers	2.05 (1.55)	0.82 (0.85)	$t(78) = 4.47^{**}$
Number of sisters	1.68 (1.38)	0.62 (0.92)	$t(78) = 3.88^{**}$
Number of younger siblings	2.83 (2.12)	0.54 (0.67)	$t(18) = 4.52^{**}$
Family experience scale	2.74 (0.47)	3.54 (0.29)	$t(21) = -6.77^{**}$
Closeness to father	2.20 (1.02)	3.73 (0.38)	$t(18) = -6.22^{**}$
Closeness to mother	3.48 (0.73)	3.88 (0.20)	$t(20) = -2.38^*$
Family support scale	0.60 (0.24)	0.76 (0.12)	$t(22) = -2.95^{**}$

Note: * $p < .06$; ** $p < .05$.

infant stimuli chosen when race and menarche were held constant ($\beta = -.35$, $p < .001$), this effect dropped out after adding the influence of father absence ($\beta = -.13$, $p = .43$); father absence, however, continued to predict significant variance on the visual preference test exclusive of the effects of race, menarche and closeness to the father ($\beta = .39$, $p < .05$).

Taken together, these results suggest that the effect of father absence on visual preferences for infants did not appear to be mediated by race, the presence of an unrelated adult man, number of siblings, or poor quality of the home environment, including overall negative family experience, low family support, or low closeness to the father.

Discussion

Variation in the degree of reproductive development among adolescent girls was associated with some differences in their interest in infants. Attainment of menarche in itself was not associated with differences in overall preferences for images of infant versus adult faces, with the exception that pre-menarcheal girls showed significantly higher preferences for silhouettes of animal infants than post-menarcheal girls. Girls with early menarche had a significantly higher preference for human infant faces, and in particular for their silhouettes, than girls with late menarche.

The stronger association between menarche variables and responses to silhouettes versus photos of infants is consistent with the findings of a previous study, in which sex and age effects were also greater for silhouettes of infant faces than for photos (Maestripieri & Pelka, 2002; see Lorenz, 1971). This consistency seems to support the argument that responses to silhouettes are less likely than responses to photos to be affected by cues of individual identity and attractiveness, and more likely to be influenced by biological variables (Maestripieri & Pelka, 2002; see Lorenz, 1971). Since our visual preference test involved a forced choice between faces of infants and those of adults, we cannot unequivocally exclude the possibility that preferences for infant faces are driven by disliking of adult faces. Previous studies using the same paradigm, however, provided no evidence that this may be the case (e.g. Feldman *et al.*, 1977; Fullard & Reiling, 1976; Goldberg *et al.*, 1982; Maestripieri & Pelka, 2002).

Although the association between timing of menarche and interest in infants may suggest a direct causal relationship between these variables, once the possible effects of age, race and previous experience with infants were controlled for, this association became weak. Moreover, further analyses indicated that this association was

mostly driven by another variable – father absence – which was strongly and independently correlated with both timing of menarche and with preferences for infant stimuli. Therefore, timing of menarche and interest in infants appear to be correlated by virtue of both being affected by another variable that affects the rate of reproductive maturation.

As in other previous studies (see Introduction for references), we found a significant association between father absence and early menarche in adolescent girls. Our study, however, is the first to report an association between father absence and interest in infants in adolescent girls. Father absence was associated with overall greater preference for infant faces across both photos and silhouettes of human and animal faces. This association was statistically independent from possible confounding effects of age and previous experience with infants. Father absence was associated with differences in race, presence of an unrelated adult male at home, number of siblings and overall perceived negative family experience. None of these variables, however, accounted for the association between father absence and greater preferences for infant faces. If anything, negative family experience appeared to reduce the effects of father absence on preferences for infant faces rather than enhance them.

Belsky *et al.* (1991) suggested that early sexual maturation in father-absent girls may be part of a life-history strategy that emphasizes the benefits of early reproduction in a social environment that is difficult or unpredictable, in which infant mortality is high, or in which male commitment to long-term relationships and parental investment is not to be expected. In addition to early puberty and early onset of sexual activity, the suite of adaptations that characterize this life-history strategy may include tendency to engage in short-term romantic relationships, insecure attachment romantic style, and high fertility and reproductive output. Although our findings are clearly preliminary due to the small sample size, they suggest that the father-absent girls on a fast reproductive track also exhibit greater attraction to visual infant stimuli relative to father-present girls of the same age, which may suggest greater readiness for parenting or greater tendency to find opportunities to acquire parenting experience. In other words, by being more attracted to infant stimuli, or by expressing interest in infants earlier during development, rapidly maturing girls may acquire crucial parenting skills earlier in life and be better equipped for early reproduction and child-rearing.

The mechanisms by which father absence may lead to the expression of this life strategy as well as the relationship between different kinds of adaptations (e.g. sexual versus parenting) need to be further addressed by future research. Future research should also attempt to replicate

the reported association between father absence and interest in infants using a larger sample size and other measures of responsiveness to infants. We believe, however, that responsiveness to images of infant versus adult faces provides useful information on individuals' attraction to infantile facial features and more generally on their interest in infants. Therefore, this experimental paradigm may be an important tool for future research investigating human behavioral and cognitive adaptations for reproduction and parenting.

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