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When Romance and Rivalry Awaken

Attractiveness-Based Social Judgment Biases Emerge at Adolescence

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Abstract Previous research indicates positive effects of a person's attractiveness on evaluations of opposite-sex persons, but less positive or even negative effects of attractiveness on same-sex evaluations. These biases are consistent with social motives linked to mate search and intrasexual rivalry. In line with the hypothesis that such motives should not become operative until after puberty, 6- to 12-year-old participants (i.e., children) displayed no evidence for biased social evaluations based on other people's attractiveness. In contrast, 13- to 19-year-old participants (i.e., adolescents) displayed positive and negative attractiveness biases toward opposite- and same-sex targets, respectively. Moreover, these biases increased with the age—and thus the reproductive relevance—of the targets being evaluated. Findings corroborate the relevance of mating-related motives for social judgment and illustrate how such biases

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can grow during human development. At a broader conceptual level, this research demonstrates the utility of investigating proximate social judgment processes through the lens of adaptationist thinking.

Keywords Cognitive bias · Physical attractiveness · Evaluation · Attribution · Social cognition · Age differences

Judging and evaluating other people is an essential part of human life. Many social evaluations are biased in particular ways, and those biases often follow an adaptive logic (Haselton and Nettle 2006; Maner et al. 2005). That is, many social judgment biases serve adaptive motives designed to help people solve the challenges of everyday social life and, ultimately, to increase reproductive success (Geary 1999, 2010; Geary and Bjorklund 2000; Kenrick et al. 2010). Understanding the way we judge others, even when we know very little about them, and investigating when and why such judgments are biased provide important insight into the adapted human mind.

Recent work from evolutionary social psychology demonstrates that social cognitive processes are adaptively tuned. Adaptive goals such as self-protection, relationship initiation and maintenance, coalition-building, and disease-avoidance can influence attention to, perception of, and thoughts about other people (Ackerman et al. 2006; Griskevicius et al. 2007; Kurzban and Leary 2001; Maner et al. 2003; Schaller and Park 2011). The current paper tests hypotheses about whether social judgment biases within the domain of mating emerge when the motives underlying those biases become developmentally relevant. Our work builds on recent findings indicating biases in the way young adults judge others who display high levels of physical attractiveness (e.g., Agthe et al. 2011). Here we examine whether such biases emerge when individuals reach adolescence, a time at which mating-related concerns become activated. Thus, the current study investigates whether mating-related functions might underlie biased judgments of attractive individuals.

Physical attractiveness is a highly valued characteristic for mate selection; both men and women tend to desire highly attractive, as compared with less attractive, partners (Buss 1989). As such, attractive members of the opposite sex are generally viewed in a positive light (Kenrick et al. 1993; Lemay et al. 2010). Conversely, because individuals often compete with one another over access to potential mates, highly attractive members of the same sex may be perceived as threatening (Bleske-Rechek and Lighthall 2010; Haselton and Gangestad 2006) and viewed in a negative light (Agthe et al. 2008, 2010; Gutierres et al. 1999). Thus, highly attractive individuals represent either desirable mating opportunities or mating-related threats, depending on whether they are of the opposite sex or the same sex (Maner et al. 2007, 2009). The rather negative reaction toward attractive same-sex individuals is particularly enlightening because it represents an important exception to the "what is beautiful is good" attractiveness stereotype (Eagly et al. 1991; Langlois et al. 2000).

An evolutionary perspective implies that biased judgments of others based on their attractiveness serve adaptive functions associated with mating and intrasexual competition. Given that social motives linked to mating and intrasexual rivalry become increasingly important when people reach adolescence (because adolescence reflects the beginning of sexual maturation), one would expect such biases to emerge around the onset of puberty. It is during this developmental period that people's interest in

mating begins to grow (Connolly et al. 2004) and dyadic relationships begin to form (Furman 2002). Thus, we predict that attractiveness-based biases in social judgment (i.e., positive judgments of attractive opposite-sex targets, negative judgments of attractive same-sex targets) would be observed among individuals only after the onset of puberty (which occurs roughly at age 13; see Bau et al. 2009), but not before adolescent age.

This prediction can be contrasted with what might be predicted from some traditional social psychological theories regarding attractiveness. Some theories, for example, suggest that biased judgments of attractiveness are rooted in concerns about social approval and self-esteem (as opposed to mating), so that people like attractive opposite-sex individuals because being close to attractive individuals allows one to bask in their reflected glory (Tesser 1988). Conversely, social comparison with highly attractive members of one's own sex can damage one's self-esteem (Hill 2006; Jones 2001). Given these underlying motives (i.e., self-enhancement and avoiding self-esteem threats), such processes should occur for pre-adolescent individuals in the same way as for older individuals, because children also care about their attractiveness, are aware of cultural norms rewarding attractiveness, and compare themselves with others based on attractiveness (Bers and Rodin 1984; France-Kaatrude and Smith 1985; Kenealy et al. 1991). Thus, through the lens of traditional social psychological theories, if motives related to self-esteem and social comparison completely explain biased judgments of attractive individuals, then those biases should emerge for both pre-adolescent individuals (i.e., children) as well as older individuals (i.e., adolescents).

In contrast, if attractiveness-based evaluative biases are ultimately linked to mating-related motives, then those biases should not emerge before an age when mating-related interests become relevant. Indeed, although the self-esteem and popularity of young children benefit from being attractive (de Bruyn and Cillessen 2006), it is not before reaching puberty that underlying mating motives give rise to mating and intrasexual rivalry on the basis of physical attractiveness (Campbell 1995; Geary 1999; Leenaars et al. 2008; Weisfeld and Woodward 2004). Hence, if attractiveness-related social judgment biases reflect underlying motives associated with mating, they should emerge most strongly when individuals reach adolescence (i.e., when mating-related motives become developmentally relevant).

The current paper investigates whether attractiveness-based social judgment biases first emerge in adolescence. To test our hypotheses, we collected data from a large sample of children and adolescents, and we examined the extent to which age (as an indicator of developmental stage) moderated the presence of attractiveness-based social judgment biases.

In addition to examining effects of participant age, we also tested for potential moderating effects of target age. Motives linked to mating and intrasexual rivalry should be more influential when judging post-pubescent targets than when evaluating young children because young children are not relevant to one's own mating motives (Försterling et al. 2007). Therefore, we expected to observe attractiveness-based evaluative biases most strongly among adolescent participants judging targets who were at least of adolescent age. Smaller biases were expected when participants were judging young children.

Methods

Participants

We sent to the 60 German schools who took part in our study approximately 5,500 questionnaires, of which 4,934 were returned (participant mean age 13.13 years, SD=3.55; $n_{\text{pre-adolescent}}$=2,225 [age 6–12 years, 51.6% males], $n_{\text{adolescent}}$=2,709 [age 13–19 years, 50.7% males]).

Design and Materials

A scenario described the academic success of a target person whose photograph portrayed a male or female, highly attractive or less attractive person of one of three age groups (children, adolescents, young adults). It contained educational background information (e.g., attentive and considerate student, likes going to school, positive evaluations and recommendations by teachers, always good grades, superior grade point average) as well as social background information (e.g., sings in the school choir, likes sports) about the target. The vignette described the target person as being (compared with other persons of the same age) relatively successful in performance-related settings. The scenario was held constant across experimental conditions, differing only in the given biological sex, attractiveness, and age of the target; we used the explicitly reported chronological age, the given first name, and the stimulus photographs to induce the different experimental levels of the target characteristics. Thus, the stimuli varied along a 2 (target sex: male versus female) × 2 (target attractiveness: highly attractive versus less attractive) × 3 (target age: children vs. adolescents vs. young adults) between-subjects design. Each participant was randomly assigned to one of the 12 stimulus persons.

Stimulus photographs were selected from a large pool pretested by 20 male and 20 female university students on a 10-point Likert scale ranging from 1 (less attractive) to 10 (very attractive). Targets were between 6 and 12 years for the children target group, between 13 and 17 for the adolescent group, and between 18 and 20 for the young adult group. Targets whose ratings resulted in large standard deviations were discarded. Four target photos (one attractive male and one attractive female; one less attractive male and one less attractive female) were selected for each of the three stimulus age groups. Targets chosen were rated between 7.00 and 9.00 for the attractive targets, and between 2.00 and 4.00 for the relatively less attractive targets.

Dependent Measure

Explicit measures of social evaluation can elicit social desirability effects and other response biases. Thus, instead of asking people to explicitly evaluate each target, we used a more implicit attributional measure used in previous research to tap underlying biases in social judgment (Agthe et al. 2008; Försterling et al. 2007). Using two scales (from 1, "not important," to 10, "essential"), participants attributed the target person's successes to ability as well as to luck. Such attributions have been shown to be successfully applicable even when examining children (Benson 1989). As in previous research, the difference between these two scales served as the dependent variable (M=2.48, SD=3.16, ranging from

−9.00 to 9.00; relative normal distribution, |skewness| and |kurtosis| <0.5) and reflected the extent to which participants attributed the target's successes to internal versus external causes. Previous studies have shown that positive social evaluations foster internal attributions of success (i.e., to ability), whereas negative evaluations promote external attributions (i.e., to luck) (Agthe et al. 2008, 2011; Försterling et al. 2007). After giving these responses, participants provided manipulation checks by estimating the attractiveness (on a scale from 1 [not at all attractive] to 10 [very attractive]) and the age (in years) of the target.

Results

Manipulation Checks

Participants judged the attractive stimulus persons ($M_{overall}$=5.9) as more attractive than the less-attractive ones ($M_{overall}$=3.5), and this was the case across all six combinations of participant age (6–12 years; 13–19 years) and target age (children; adolescents; young adults): t values>7.00, p values<0.0001. Thus, the attractiveness manipulation was successful across all target and participant age constellations. In both participant age groups the three stimulus person age groups were perceived to be of different age ($M_{children}$=10.2, $M_{adolescents}$=15.7, $M_{young\ adults}$=18.9 years, p values <0.0001), thus confirming the effectiveness of the age manipulation.

Omnibus Analyses

In line with previous research (Agthe et al. 2010), regression analyses[1] replicated the three-way interaction among participant sex, target sex, and target attractiveness observed in previous research (β=−0.04, p=0.006). For the sample as a whole, this indicated positive attributional judgments of attractive (relative to less-attractive) opposite-sex targets, but negative attributional judgments of attractive same-sex targets. Female participants provided less positive attributions for attractive female targets (M=2.13, SD=2.84) compared with less-attractive female targets (M=2.54, SD=3.01, p=0.025). In contrast, they provided more positive attributions for attractive male targets (M=2.70, SD=3.19) compared with less-attractive male targets (M=2.27, SD=2.89, p=0.023). Male participants tended to provide somewhat less positive attributions for attractive male targets (M=2.46, SD=3.46) than for less-attractive male targets (M=2.63, SD=3.10), even though this difference proved insignificant (p=0.339), and gave equal attributions for attractive (M=2.50, SD=3.32) and less-attractive female targets (M=2.50, SD=3.19, p=0.992). Thus, for the complete sample (i.e., including pre-adolescent children as participants and targets, for which we expected no biases) we detected the overall three-way interaction. Corresponding lower-order simple main effects reached significance for female participants only.

[1] Following standard procedures, in this and the subsequent regression analysis all possible lower-order effects (i.e., the main effects as well as the lower-order interaction terms) were included as predictors when examining the hypothesized effect of higher-order interactions. Analyses indicated no problems concerning the application of regression (e.g., no collinearity problems, tolerance values>0.90, condition indices<2; approximate normal distribution of residuals, |skewness|<0.5, |kurtosis|<0.5).

Comparison of Pre-adolescent to Adolescent Participants

More importantly, and confirming our hypothesis, this three-way interaction was moderated by participants' age. We dichotomized participant age so as to compare pre-pubescent to post-pubescent participants based on the average onset of puberty established by previous research (i.e., 13 years; Bau et al. 2009).[2] We observed the predicted four-way interaction among target sex, target attractiveness, participant sex, and participant age ($F_{1,4818}$=6.42, p=0.011, η^2=0.001), indicating that the interaction among participant sex, target sex, and target attractiveness varied as a function of participant age.[3] Therefore, we conducted six separate ANOVAs, for pre-adolescent participants (6–12 years) and adolescent participants (13–19 years) evaluating children, adolescents, and young adult targets. For pre-adolescent participants, as expected we observed no interactions among participant sex, target sex, and target attractiveness, and this result held for all three target person age groups (all p values>0.300). The only significant effect was an unpredicted target sex × target attractiveness interaction (p= 0.026) when judging child targets. This interaction indicated a positive effect of attractiveness for male targets, but not for female targets. For this participant age group (i.e., between 6 and 12 years) we also collapsed the data across sex constellation of evaluator and target and the three target person age groups, resulting in a 2 (sex constellation: same sex vs. opposite sex) × 2 (target attractiveness: attractive vs. less attractive) design. These analyses revealed no effects of attractiveness for same-sex evaluations (p=0.555) or opposite-sex evaluations (p=0.653) (see Fig. 1, the two columns on the left-hand side).

In contrast, for participants between 13 and 19 years we observed the hypothesized attractiveness-based judgment biases (i.e., a three-way interaction among target sex,

[2] Although this probably leads to some misclassified participants (e.g., participants with a later onset of puberty now erroneously classified as post-pubescent) there is no evidence that both potential misclassifications (i.e., false positive, false negative) are of different probabilities. Considering that timing of puberty varies between individuals (Marshall and Tanner 1970), a distinction between pre- and post-pubescent individuals results in a rather more conservative test of analyses because respondents who have not yet reached puberty, but are included in the post-pubescent group, should lessen the bias expected to emerge after the onset of puberty. Thus, even though some classification errors might attenuate these analyses, no biases should result from this dichotomization. It should be noted that this dichotomization is based on an empirically confirmed cutoff point indicating the emergence of a qualitatively new status (i.e., puberty). These analyses were also confirmed by regression analysis using participant age as continuous moderator (see Note 3).

[3] Corresponding results were obtained when using participant age as a continuous moderator in regression analyses (i.e., without dichotomizing participant age): The three-way interaction was moderated by participants' age (i.e., a four-way interaction), β=−0.05, p=0.002. In order to further elucidate this moderation, we followed the suggested procedures of Aiken and West (1991). In this frequently applied analytical approach one examines the effects of a predictor (in our case: the three-way interaction) at different levels of another predictor serving as the moderator (in our case: participant age). Following common analytical strategies we examined the strength of the three-way interaction effect between participant sex, target sex, and target attractiveness on attributional judgments at three different levels of the moderator, i.e., at low levels of participant age (1 SD below the mean; M=9.58 years), at moderate levels of participant age (i.e., at the mean age; M=13.13 years), and at high levels of participant age (1 SD above the mean; M=16.68 years). The three-way interaction was not observed among young participants, β=0.01, p=0.760. However, it was observed among participants of average age, β=−0.04, p=0.010, and even more strongly among older participants, β=−0.08, p<0.0001. Consistent with our hypotheses, these analyses corroborate the positive (negative) impact of attractiveness for judgments of opposite-sex (same-sex) targets for adolescent participants, but not for pre-adolescent participants.

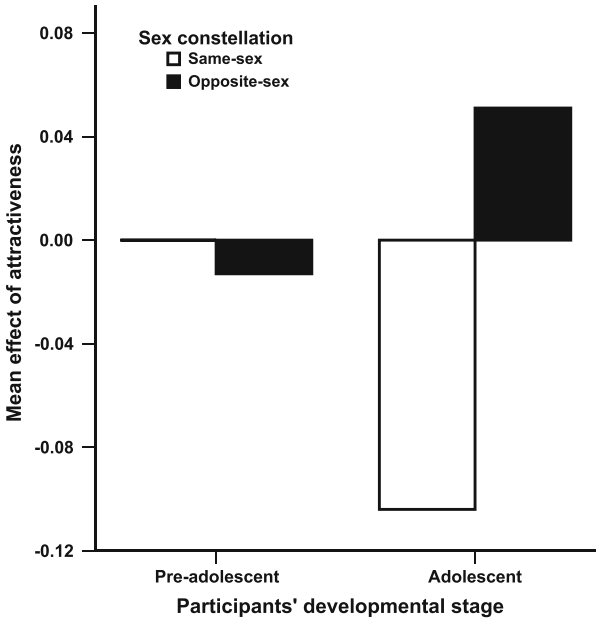

Fig. 1 Mean Standardized Regression Weights (aggregated across the three target age groups) of the Attractiveness Effect on Evaluations of Same-sex and Opposite-sex Targets for Participants before (i.e., 6–12 years, pre-adolescent) and after (i.e., 13–19 years, adolescent) the Average Onset of Puberty. Positive values indicate a positive impact of attractiveness; negative values indicate a negative impact of attractiveness

target attractiveness, and participant sex ($F_{1,2690}=16.75$, $p<0.0001$, $\eta^2=0.006$). Moreover, this bias tended to increase with the age of the targets (Table 1). Toward child targets, we observed no significant three-way interaction ($p=0.130$) or other effects. For teenage targets we observed a small and marginally significant tendency toward a three-way interaction between participant sex, target sex, and target attractiveness ($F_{1,902}=3.64$, $p=0.057$, $\eta^2=0.004$), indicating negative effects of attractiveness for same-sex targets ($p=0.007$) but no effects of attractiveness for opposite-sex targets ($p=0.909$).

As expected, the strongest effects were observed for adolescent participants evaluating young adult targets (i.e., those of reproductive age). For those targets, we observed the predicted three-way interaction between participant sex, target sex, and target attractiveness ($F_{1,1093}=12.08$, $p<0.001$, $\eta^2=0.011$). Corresponding two-way interactions between target sex and target attractiveness were observed for both female participants ($F_{1,539}=4.82$, $p=0.029$) and male participants ($F_{1,554}=7.35$, $p=0.007$). Female participants tended to provide less positive attributions for attractive female targets ($M=2.45$, SD=2.78) compared with less-attractive female targets ($M=2.87$, SD=2.68), although this difference proved insignificant ($p=0.203$). In contrast, they tended to provide more positive attributions for attractive male targets ($M=2.79$, SD=2.68) compared with less-attractive male targets ($M=2.20$, SD=2.54, $p=0.088$). Similarly, male respondents voiced somewhat less positive attributions for attractive male targets ($M=2.31$, SD=2.88) than for less-attractive male targets ($M=2.79$, SD=2.84), although this difference proved insignificant ($p=0.142$). In contrast, they provided more positive attributions for attractive

Table 1 Means and standard deviations (in brackets) of attributional judgments of adolescent participants (13–19 years) as a function of targets' age category

	Sex of target			
	Male		Female	
	Attractiveness of target		Attractiveness of target	
	Low	High	Low	High
Children targets				
Male participants	2.79 (2.64)	2.54 (3.15)	3.04 (2.68)	2.95 (3.68)
Female participants	2.52 (2.81)	2.92 (2.73)	2.81 (2.78)	2.01 (2.67)
Teenage targets				
Male participants	3.08 (2.85)	2.44 (2.89)	2.83 (3.20)	2.66 (3.09)
Female participants	2.39 (2.68)	2.55 (2.37)	3.02 (2.55)	2.23 (2.26)
Adult targets				
Male participants	2.79 (2.84)	2.31 (2.88)	2.02 (3.15)	2.87 (2.64)
Female participants	2.20 (2.54)	2.79 (2.68)	2.87 (2.68)	2.45 (2.78)

female targets (M=2.87, SD=2.64) compared with less-attractive female targets (M=2.02, SD=3.15, p=0.014). Aggregating across sex constellations of respondent and target, this pattern reflected marginally significant negative effects of attractiveness for judgments of same-sex targets (p=0.052) as well as significant positive effects of attractiveness for judgments of opposite-sex targets (p= 0.003) for adolescent participants between 13 and 19 years evaluating adult targets.

We again collapsed the data across the sex constellation of evaluator and target and the three target-person age groups for this participant age group (i.e., adolescents between 13 and 19 years). Analyses confirmed significant negative effects of attractiveness in same-sex constellations (p<0.0005) as well as significant positive effects of attractiveness in opposite-sex constellations (p=0.039) (see Fig. 1, the two columns on the right-hand side).

A summary of these findings can be seen in Fig. 2, which aggregates across the two types of biases (i.e., positive bias for attractive opposite-sex targets, negative bias against attractive same-sex targets). As explained above, and as depicted in Fig. 2, hypothesized biases were observed only among adolescent participants, and most strongly toward the young adult targets.

Discussion

Findings from the current study support the hypothesis that attractiveness-related social evaluation biases would be moderated by evaluators' age: Participants below the average onset of puberty (i.e., children) showed little evidence for biased responding, despite the fact that the manipulation check indicated that they (like

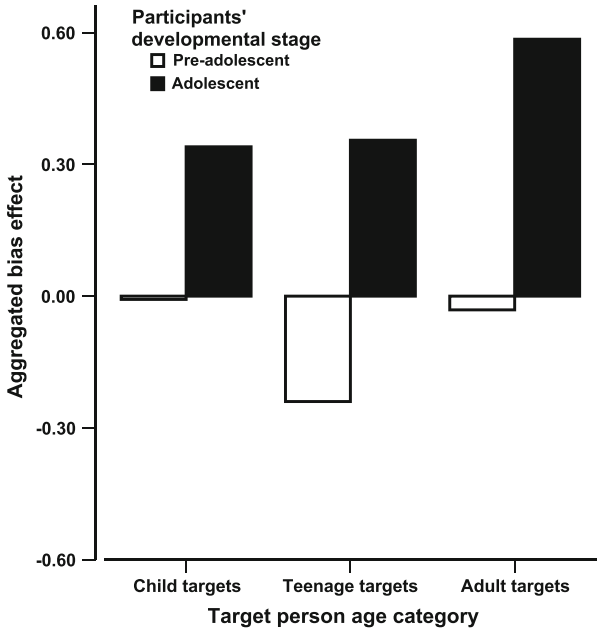

Fig. 2 Mean Evaluative Bias by Target Age Group for Pre-Adolescent and Adolescent Participants. Positive values indicate response patterns in line with expected evaluative biases (i.e., positive evaluations of attractive opposite-sex targets; negative evaluations of attractive same-sex targets); negative values indicate opposing response tendencies (e.g., more positive evaluations for attractive same-sex targets)

older participants) were fully able to recognize the difference between attractive and less-attractive targets. In contrast, participants who had reached at least adolescent age—the time when interest in mating starts to emerge—displayed a pattern of bias consistent with that observed in previous studies (Agthe and Spörrle 2009; Agthe et al. 2008, 2010, 2011; Försterling et al. 2007; Luxen and van de Vijver 2006). Older participants (i.e., above the average onset of puberty) displayed a positive bias toward attractive opposite-sex targets (potential mates), but a negative bias toward attractive same-sex targets (potential intrasexual rivals). Moreover, this bias increased with the age—and thus the reproductive relevance—of the targets being judged.

These findings are consistent with the hypothesis that social judgment biases based on attractiveness are linked to underlying motives associated with mating and intrasexual rivalry and fit with previous evidence that highly attractive individuals may be automatically perceived as posing reproductive opportunities or threats, depending on whether the target person is of the opposite sex or the same sex as the perceiver (Maner et al. 2007). The current research extends this literature by demonstrating that such biases are not observed among perceivers below the developmental age at which mating-related motives become active. This provides important support for the link between attractiveness-based biases and mating-related motives. Our findings are less consistent with theoretical views that solely emphasize self-esteem and social comparison functions associated with attractiveness. Social comparison and self-esteem processes based on attractiveness are well-documented among children; nevertheless, the predicted judgment biases were not observed among this age group.

It is important to note that explanations involving mating, social comparison, and self-esteem are not mutually exclusive. Because physical attractiveness represents a highly desirable criterion for mate selection, it is also very likely to be relevant for social comparison and self-esteem. Yet, as the current study suggests, social judgment biases that emerge as a function of attractiveness are unlikely to be caused *merely* by concerns associated with self-esteem and social comparison. Rather, these processes may in part reflect proximate manifestations of underlying mating-related motives—motives that tend to emerge only as individuals reach an age at which the interest in potential partners and the fear of potential rivals becomes salient.

This research thus provides support for the mating-related functions underlying biasing effects of attractiveness within social judgment contexts that seem to be unrelated to mating (i.e., performance attribution). The current study is the first to show that these biasing effects on social judgments emerge around puberty—the time when romance and rivalry begin to awaken. Developmental differences in mating motivations reflect the changing nature of social relationships from childhood to adolescence and adulthood: Puberty represents the time at which humans typically begin to face the challenges of mate search and intrasexual rivalry. Changes in interpersonal perception, evaluation, and social interaction seem to be adaptive ways of dealing with these fundamental developmental tasks. Thus, the way people respond to others, and the way those responses change across the lifespan, represent functional methods of dealing with developmentally relevant adaptive challenges (Geary and Bjorklund 2000).

Our results are also consistent with findings pertaining to hormonal influences on human cognition and behavior. For instance, with the onset of puberty, females are influenced by hormonal changes associated with their menstrual cycle in that they show more mating-related interest in opposite-sex persons (Bullivant et al. 2004; Gangestad et al. 2002; Haselton and Gangestad 2006; Pillsworth et al. 2004) as well as more rivalry regarding same-sex persons (Fisher 2004; Lucas et al. 2007) during the fertile phase of their cycle (i.e., around ovulation). Similarly, with the onset of puberty, males are increasingly influenced by testosterone levels: When their testosterone levels are high, men tend to show more mating-related effort (McIntyre et al. 2006; Mehta et al. 2008), interest in attractive opposite-sex persons (Roney et al. 2007, 2003) and, accordingly, more intrasexual competition (Massar and Buunk 2009; Mazur and Booth 1998; Miller et al. 2012). These findings are in line with our hypothesis that adolescence (when puberty brings about hormonal changes) is a time when attractiveness-based social evaluations reflect mating-related opportunities or threats. In order to further investigate the developmental processes of social judgment, it would be worthwhile for future research to apply longitudinal designs and to include measures of hormones as well as additional indicators of puberty.

Moreover, future studies should include a broader set of social evaluative measures (e.g., perceived popularity or personality traits) as well as different stimuli to test whether the effect and its moderation by age generalize to different domains. Despite the limitations of the current research, the findings

may have relevant implications. Attractiveness-based social biases make an important difference for society as well as for the individual, because—even though the obtained effect sizes of the interaction effects in this research are relatively small—such biases may accumulate during the life span (Agars 2004). They are of practical importance because innumerous social evaluations take place every single day, so small biases could ultimately give rise to large social effects. This is particularly the case when one considers that individuals are likely to be evaluated by many different people in many different contexts across time. All the more, it seems to be worthwhile for future research to investigate which interventions could be developed to mitigate the effects of attractiveness biases on social judgments and interactions.

The current research provides important information about the developmental trajectory of attractiveness-based social evaluative biases and helps to link those biases to the emergence of underlying mating motives. Investigating other potential moderating variables, as well as underlying physiological processes (e.g., hormonal fluctuations across the menstrual cycle in women; increasing levels of testosterone in men), will provide valuable opportunities for future research. Addressing these questions benefits from an integrative biosocial perspective and helps us to understand why and when people display persistent social evaluation biases.

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