

The effect of nonphysical traits on the perception of physical attractiveness Three naturalistic studies

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Abstract

From an evolutionary perspective, beauty is regarded as an assessment of fitness value. The fitness value of a social partner can be influenced by both physical and nonphysical traits. It follows that the perceived beauty of a social partner can be influenced by nonphysical traits such as liking, respect, familiarity, and contribution to shared goals in addition to physical traits such as youth, waist-to-hip ratio, and bilateral symmetry. We present three studies involving the evaluation of known social partners showing that judgments of physical attractiveness are strongly influenced by nonphysical factors. Females are more strongly influenced by nonphysical factors than males and there are large individual differences within each sex. In general, research on physical attractiveness based on the evaluation of purely physical traits of strangers might miss some of the most important factors influencing the perception of physical attractiveness among known associates.

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1. Introduction

A sense of beauty is often regarded as uniquely human and without any practical value. In contrast, evolutionary biologists increasingly view beauty as an assessment of

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fitness value, computed by a phylogenetically ancient set of cognitive mechanisms that are almost certainly shared with other animals (Voland & Grammer, 2003). The basic idea is that organisms are constantly faced with decisions about where to move, with whom to interact, and so on. Each decision requires assessing the fitness value of the alternatives. In the case of habitat, the relevant factors might be food, water, and protection from predators (Orians & Heerwagen, 1992; White & Heerwagen, 1998). In the case of social partners, the relevant factors might be fecundity, strength, or health (Buss, 1999; Thornhill, 1998). In both cases, the cognitive mechanisms operate automatically and largely beneath conscious awareness. The most fitness-enhancing alternative is simply perceived as most attractive and the organism is “drawn” to what is regarded as most attractive by definition.

A fundamental implication of this view is that the perception of beauty should be influenced by nonphysical factors in addition to physical factors. For example, consider a man evaluating a woman as a possible marriage partner. The woman has a set of physical traits that contribute to her fitness value for the man: her youth, health, symmetry, waist-to-hip ratio, and so on. She also has a set of nonphysical traits that contribute to her fitness value for the male: her niceness, intelligence, sense of humor, compatibility, willingness to work hard, availability, and especially how much she likes him. The total fitness value of the woman for the man is based on a combination of physical and nonphysical traits. The question is how will the man perceive the *physical* attractiveness of the woman? One possibility is that his assessment of her physical attractiveness will be based on purely physical traits even though his choice might be influenced by other traits. He might think (consciously or unconsciously) “this person is only moderately physically attractive but has other nonphysical virtues that make her desirable to me.” Another possibility is that his assessment of her physical attractiveness will be based on her overall fitness value, including her nonphysical traits. He might simply be drawn to her and would rate her as more physically attractive than others who are unaware of her nonphysical traits. Both scenarios are theoretically possible but the second is most faithful to the basic concept of beauty as an assessment of fitness value.

A few studies have examined the effect of nonphysical factors on the judgment of physical attractiveness. Early studies that were not inspired by evolution include Gross and Crofton’s (1977) paper “What Is Good Is Beautiful,” written in response to Dion, Berscheid, and Walster’s (1972) landmark paper “What Is Beautiful Is Good,” and Nisbett and Wilson’s (1977) demonstration of a “halo effect” in which evaluations of one attribute of a person are generalized to influence evaluations of other attributes (see also Feingold 1992; Felson & Bohrenstedt, 1979; Owens & Ford, 1978). The famous “closing time effect” (Gladue & Delaney, 1990) demonstrates that simple availability can influence the perception of physical attractiveness. More recent studies inspired by evolutionary psychology show that social status (Townsend & Levy, 1990) and prosocial orientation (Jensen-Campbell, West, & Graziano, 1995) enhance perception of physical attractiveness. These are, however, vastly outnumbered by studies that focus entirely on physical traits. For example, a recent review of facial attractiveness by Langlois, Kalakanis, Rubenstein, Larson, Hallam, and

Smoot (2000), including 11 meta-analyses of over 900 studies, provides a comprehensive assessment of the questions asked and methods employed in both traditional and evolutionary psychological research. The questions are centered almost entirely on the effects of physical features such as bilateral symmetry on the perception of physical attractiveness, agreement among raters within and across cultures, the effects of physical attractiveness on the perception of nonphysical traits such as intelligence, and the differential treatment that attractive people (defined purely in terms of their physical traits) receive compared to unattractive people.

Another problem is that most studies on physical attractiveness—including the few that examine nonphysical factors—are based on the evaluation of strangers. Moreover, according to Langlois et al. (2000, p. 408), “most of the research we reviewed categorized people into two levels of attractiveness, high or low.” Comparing the ends of the distribution exaggerates the consistency with which people rate others as physically attractive based on physical traits. These widespread methods are problematic from an evolutionary perspective. In ancestral social environments, interactions took place in small groups of people whose physical attributes were roughly average and whose nonphysical attributes were intimately known to each other. The psychological mechanisms that evolved to integrate these factors into an overall assessment of physical attractiveness might not be engaged by the artificial conditions of psychological experiments, even those that attempt to examine nonphysical factors. In short, there is a great need for studies of physical attractiveness that include both physical and nonphysical factors and that are conducted under naturalistic conditions.

We present three studies that were conducted in this spirit. The first added a twist to the method of evaluating photographs by having people evaluate the photographs of known individuals in their high school yearbooks. The second and third studies were conducted on actual groups of interacting individuals. In the second study, evaluation by group members was compared to evaluation by strangers based on photographs. In the third study, group members evaluated each other when the group was initially formed and again after a period of interaction, providing the strongest test of the effect of nonphysical factors on the assessment of physical attractiveness.

2. Study 1: rating yearbook photographs

Many studies of physical attractiveness involve rating photographs of strangers (e.g., Agocha & Cooper, 1999; Henss, 2000; Thornhill & Grammer, 1999). We modified this technique by having participants rate the photographs of classmates in their high school yearbooks for familiarity, liking, respect, and physical attractiveness. The same photographs were then rated for physical attractiveness by a stranger of the same sex and approximately the same age as the owner of the yearbook. If the perception of physical attractiveness is based on purely physical factors, the two raters should largely agree, although the people in the photograph are known by one and not the other. Nonphysical traits that are known by one rater should not influence raters' perception of *physical*

attractiveness, even though they presumably influence the quality of the relationship in other ways.

2.1. Methods

Twenty-seven subjects participated in the study. Twenty-one were young college students participating for research credits (10 females, 11 males, ranging in age from 18 to 20), while 6 were older associates of the authors who participated on a volunteer basis (4 females, 2 males, ranging in age from 43 to 52). The older participants are interesting because they had not interacted with most of their high school classmates for many years.

The participants were instructed to place a removable numbered sticker next to each photograph. Then they were asked “to rate each person with respect to physical attractiveness, on a scale from 1 (*highly unattractive*) to 9 (*highly attractive*). Please use your own assessment of physical attractiveness, as opposed to popular conceptions.” After all photographs were rated for physical attractiveness, participants were asked to rate familiarity (“How well did you know the individual?”), liking (“How much did you like the individual?”), and respect (“How much did you respect the individual for his or her actions, attitudes, etc.?”) on 9-point scales. Physical attractiveness was rated first and separately from the three nonphysical traits to minimize short-term carryover effects. For yearbooks with more than 80 photographs, only the first 80 were rated. After the owner of each yearbook rated the photographs, the yearbook was given to a second participant, matched for sex and (approximately) for age, to rate the photographs for physical attractiveness, defined as described above for the owner.

It might seem that 27 participants constitutes a small sample size, compared to other studies that involve the rating of photographs. It is important to stress, however, that each participant rated many photographs, enabling a separate statistical analysis to be performed for each individual in addition to aggregate analyses of all individuals. Performing a separate analysis for each individual enables individual differences to be documented in a way not possible with other experimental designs.

For each yearbook owner, a stepwise linear regression was performed with the owner’s rating of physical attractiveness as the dependent variable and the other ratings as independent variables. The stranger’s rating of physical attractiveness was always entered first into the stepwise regression. The inclusion of additional variables was based on their correlations with the residual variation (i.e., after the effects of variables already included in the analysis were removed). Variables were added until they ceased to have a statistically significant effect at the .05 level. This is the standard procedure for a stepwise regression, except that the stranger’s rating of physical attractiveness was always entered first regardless of the size of its correlation with the dependent variable. We regarded this as the most conservative procedure that weights the influence of the stranger’s rating as much as possible. Separate analyses were performed for the rating of male photographs and female photographs, resulting in two analyses for each subject. One young male (YM5) went to an all boy’s school and another (YM4) rated all male photographs as “1” (lowest possible score) for physical attractiveness, which made a regression analysis impossible.

2.2. Results & discussion

Figs. 1 and 2 show the amount of variation explained by the four independent variables for the 27 subjects, which sum to the total amount of variation explained by the stepwise multiple regression (R^2 , very highly significant in all cases). The first point to notice is that the stranger's rating of physical attractiveness was not the only independent variable that explained the owner's rating of physical attractiveness. The degree to which the person in the photograph was liked, was familiar, and was respected explained as much or more of the variance in the assessment of physical attractiveness. A second point to notice is the great heterogeneity among the subjects. For example, OF3's rating of physical attractiveness was explained almost entirely by the stranger's rating with only a minor influence of liking in the rating of males. In contrast, OF2's rating of physical attractiveness was explained almost entirely by how much she liked the person in the photograph and hardly at all by the stranger's rating of physical attractiveness.

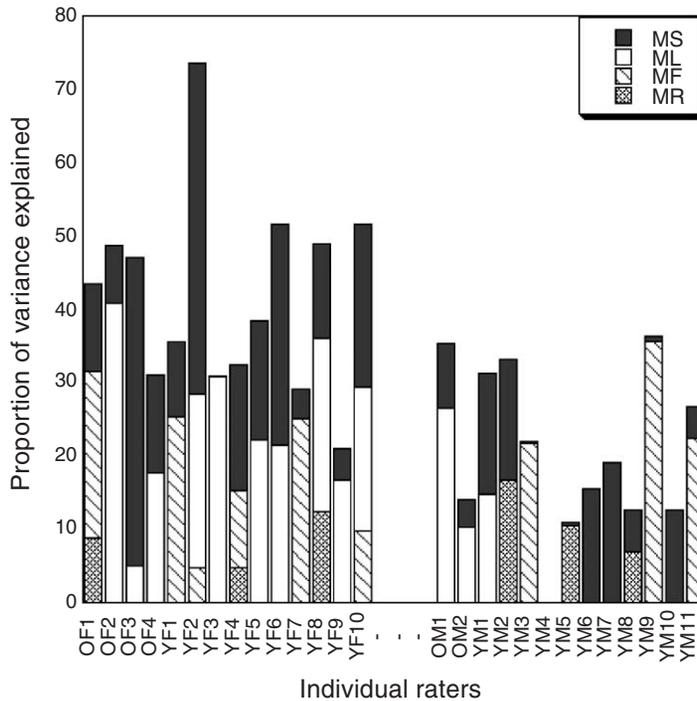


Fig. 1. The proportion of variation in perceived physical attractiveness of males (dependent variable) explained by the following independent variables in a multiple regression analysis: stranger's assessment of physical attractiveness (MS), the degree to which the person was liked (ML), the degree to which the person was familiar (MF), and the degree to which the person was respected (MR). Each bar of the histogram consists of a single individual rating a number of photographs of males, including 4 older females (OF), 10 younger females (YF), 2 older males (OM), and 11 younger males (YM).

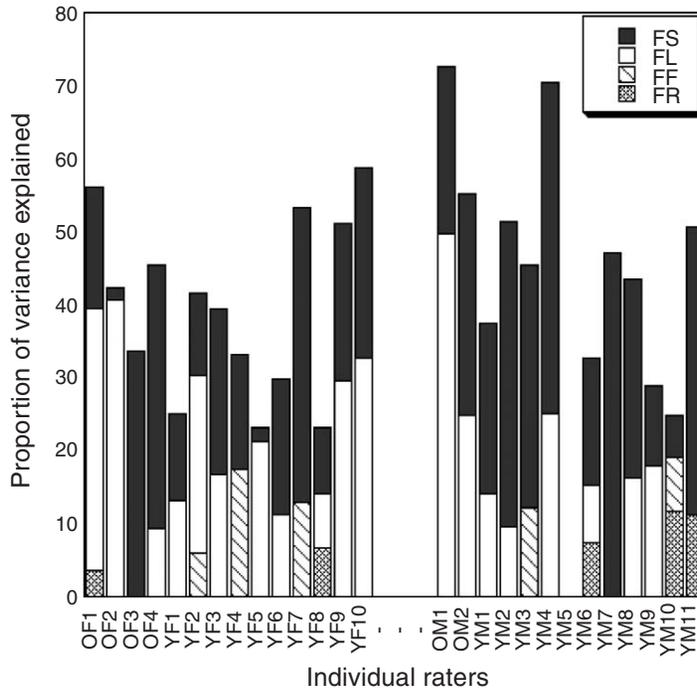


Fig. 2. The proportion of variation in perceived physical attractiveness of females rated by the same individuals as in Fig. 1.

An anecdote from the study will make these results more vivid and intuitive. After OF2 completed her ratings we looked at the photograph of the male who she regarded as least physically attractive. To us (and to the stranger who rated the photographs) he did not seem ugly at all but rather quite average in physical attractiveness. When we showed her the photograph and asked why she rated him as so ugly, her face became contorted with disgust as she related what a horrible person he was, what a foul mouth he had, and so on. She was physically disgusted by his image, even though the unfavorable qualities she described had nothing to do with his physical characteristics. Moreover, her perception of the person as physically ugly remained strong even though she had not actually seen him for over 30 years.

A third point to notice is that liking was usually the most important independent variable among the nonphysical factors, although there were exceptions (such as YF7, YM3 and YM5). Determining the relative importance of variables in a multiple regression analysis can be tricky when the variables are highly correlated with each other, as they often were in this study. For example, after the stranger’s rating was entered into an analysis, both liking and familiarity might correlate highly with the residual variation. The fact that one correlation is slightly higher than the other can be largely a matter of chance but it determines which factor will be the next to be included in the stepwise regression. The next decision is based on the residual variation after the factor has been added, which may render the second highly correlating factor insignificant. These problems attend all multiple regression analyses with

intercorrelating variables. Some apparent differences in Figs. 1 and 2 are probably artifacts of this problem. For example, YF1 appeared to be influenced by familiarity rather than liking in her assessment of male physical attractiveness, but if liking is substituted for familiarity it explains almost as much variation ($R^2=33.1$ rather than 35.6). In other cases the differences appear to be more meaningful. For example, OF1 appeared to be influenced by familiarity in her assessment of males and by liking in her assessment of females. When liking was substituted for familiarity as the independent variable in her assessment of males, the R^2 value dropped from 56.1% to 41.8%. When familiarity was substituted for liking as the independent variable in her assessment of females, the R^2 value dropped from 43.4% to 31.7%. In both cases, including both liking and familiarity increased R^2 by less than one percentage point. Thus, it appears that OF1 was genuinely influenced by different nonphysical factors in her assessment of the physical attractiveness of males and females.

In most cases the regression coefficients for the nonphysical traits were positive; the more people were familiar, liked, and respected, the more physically attractive they were perceived to be. In a few cases, however, the coefficients were negative (OF3 for liking males, YF4 for respecting males, YF8 for respecting males and females, YF10 for familiar males, YM6 for respecting females, M10 for familiar females). Familiarity, liking, and respect were associated with a slight but significant *decrease* in physical attractiveness.

Evolutionary theory suggests that the perception of physical attractiveness of the opposite sex (potential sexual partners) might be different than for a member of the same sex (a potential social, but not sexual, partner, assuming heterosexuality). Furthermore, males rating females should be more influenced by purely physical traits than females rating males (Buss, 1999). Our data confirm these expectations. The stranger's rating of physical attractiveness accounted for a larger proportion of the explained variation for males rating females than for females rating males (60.1% vs. 37.5%, Mann–Whitney $U=131$, $P=.01$). Males agreed more with the stranger in their rating of females than males in 11 of 12 cases (Wilcoxon signed rank test, $P=.002$). This difference did not exist for females, who agreed more with the stranger in their rating of males than females in only 7 of 14 cases (Wilcoxon signed rank test, $P=.807$).

The fact that our study confirmed this familiar sex difference should not obscure two other results that are more novel: First, nonphysical factors (mostly liking) accounted for a high proportion of the variation even for males rating females. Second, at least some females were influenced primarily by physical attractiveness (as assessed by the stranger), a tendency that is commonly associated with males.

To summarize the results of our first study, the perception of physical attractiveness appeared to be highly influenced by knowing the people and their nonphysical traits. It was not familiarity per se that was important in most cases—otherwise familiarity would have been the most important independent variable in the multiple regressions—but what is known and how it is evaluated in terms of liking and respect. Of course, correlation does not imply causation. It is possible and even likely that physical attractiveness influences liking, familiarity, and respect in addition to the reverse (e.g., Langlois et al., 2000, Watkins & Johnston, 2000; Rhodes, Halberstadt, & Brajkovich, 2001; Zebrowitz & Lee, 1999). If the causal arrow ran purely from physical attractiveness to the other factors, and if the stranger's rating provides a good estimate of purely physical attractiveness, then by entering the

stranger's rating first in the stepwise regression the influence of physical attractiveness should have been largely removed from the residual variation. The fact that the other factors often explain much more variation than the stranger's rating therefore suggests that the causal arrow runs at least partially from liking, familiarity, and respect to the perception of physical attractiveness. Our second and third studies were designed to assess this possibility more directly.

3. Study 2: physical attractiveness in a task-oriented group

Human groups are often task oriented, in both modern times and throughout our evolutionary history. In task-oriented groups, the value of potential social partners depends in part on their contribution to the fulfillment of the task. We might therefore expect the most valuable members of a task-oriented group to be perceived as more physically attractive by other members of the group, a factor that would be invisible to strangers evaluating physical attractiveness on the basis of physical features alone. We examined this possibility as part of a larger study of a college sports team from an evolutionary perspective.

3.1. Method

The participants were members of a university rowing team (17 males, 25 females) who were studied for an 18-month period. In addition to conducting a general ethnography and obtaining more focused data, KMK became an "insider" by joining and training with the team during the first year. Part of the more focused information was a survey distributed at the end of the spring semester, after the training and competitions were over for the year, which asked each individual to rate all other team members on a scale from 0 (*low*) to 99 (*high*) for talent, effort, respect, liking, and physical attractiveness. The survey was returned by 25 members. Four surveys were incompletely filled, resulting in complete surveys for 11 females and 10 males.

It proved difficult to take standardized pictures of each member to be rated by strangers. As a substitute, a single group photo of five uniformly attired male crew members was used. These males were rated for physical attractiveness by 10 male and 10 female strangers of approximately the same age as the crew members who participated on a voluntary basis.

3.2. Results & discussion

Table 1 shows the correlation matrices for male and female rowing team members. Perception of physical attractiveness, talent, effort, liking, and respect were all highly correlated with each other and relatively uncorrelated with the rating of physical attractiveness by strangers. When the strangers' rating of physical attractiveness was entered first into a stepwise regression, it explained a negligible amount of variation in the crew members' rating of physical attractiveness ($R^2 = .6\%$ and 0% for males and females, respectively). For females, liking was the variable that correlated most highly with the residual variation and therefore

Table 1
Pearson product–moment correlations for the rowing team study

	Attr	Talent	Effort	Liking	Respect	StrangeM
Attr	1.000					
Talent	.812	1.000				
Effort	.709	.761	1.000			
Liking	.732	.737	.897	1.000		
Respect	.823	.719	.691	.752	1.000	
StrangeM	−.077	−.240	−.281	−.243	−.046	1.000
	Attr	Talent	Effort	Liking	Respect	StrangeF
Attr	1.000					
Talent	.684	1.000				
Effort	.636	.856	1.000			
Liking	.795	.818	.794	1.000		
Respect	.745	.670	.767	.890	1.000	
StrangeF	.012	−.212	−.193	−.049	.007	1.000

Five male team members were rated by other male (top matrix) and female (bottom matrix) team members for physical attractiveness (Attr), talent, effort, liking, and respect. The same five male team members were then rated for physical attractiveness by 10 men (StrangeM) and 10 women (StrangeF) who did not know the identity of the members. Attractiveness, talent, effort, liking, and respect all correlate highly with each other but not with the assessment of physical attractiveness by strangers.

the next to be entered into the stepwise regression according to the procedure outlined in the previous section. It explained 63.2% of the variance and removed significant residual variation for the other variables. For males, respect was the variable that correlated most highly with the residual variation and incremented the R^2 value by 67.8%. Talent explained a significant amount of the residual variation, increasing the total R^2 value to 77.9%. Because these variables are highly intercorrelated, the apparent difference between female and male raters should be interpreted with caution, as discussed in the previous section. For example, liking alone yielded an R^2 value of 55.6% for males, and respect plus talent yields an R^2 value of 55.5% for females. The most important point is that for both males and females, the perception of physical attractiveness was based on factors that required knowing the people being rated in the context of a task-oriented group, which was invisible to strangers rating the same people on the basis of a photograph.

A description of two team members will make the results of this study more vivid and intuitive. One of the five males was a “slacker” who obviously was not pulling his weight, either literally or figuratively. He was the primary object of negative gossip and social control efforts, such as teasing and inspecting his bedroom window when he failed to show up for practice. He was uniformly rated as physically ugly by team members. Another of the five males was the opposite of the slacker, working so hard that he was discussed as possibly a contender for the U.S. Olympic team. He was uniformly rated as physically attractive by team members. This large difference in perceived physical attractiveness did not exist for raters who knew nothing about the contributions of the two men to the team.

4. Study 3: perception of physical attractiveness at the beginning and end of a task-oriented group

The first two studies suggest that rating the physical attractiveness of strangers, usually on the basis of photographs, may miss some of the most important factors influencing the perception of physical attractiveness among people who actually know and interact with each other. Studying physical attractiveness among known associates, however, introduces methodological problems associated with naturalistic research. One problem is that a single photograph may not accurately convey a person's physical appearance, compared to actually seeing the person in the flesh or even watching a video clip (e.g., Ambady et al. 1993, 1999). Perhaps if the strangers in the previous study had been able to watch the five men without knowing their contributions to group effort, their perception of physical attractiveness would have correlated more highly with that of the team members. We attempted to solve this problem in a third study by having members of a task-oriented group rate each other at the beginning, after they had observed each other but before they had interacted with respect to the task, and again at the end, after they had interacted with respect to the task.

4.1. Method

The task-oriented group in this case was a 6-week summer archaeology course whose students worked on a dig site 5 days per week and approximately 8 hours per day. Eighteen students were enrolled in the class of which 15 completed the study (3 men and 12 women; the other three members were absent on one of the two testing days). With the permission of the instructors and the relevant human subject research review board, one of us (KMK) visited the class on the first day to administer the first questionnaire, which asked the students to rate each other on a 9-point scale for familiarity (“how well you know the person”), intelligence (“how smart they appear to you”), effort (“how hard they are likely to work on course activities”), liking (“how much you like them”), and physical attractiveness (“how physically attractive you find them”). Since some of these questions were inappropriate on the first day of class, the participants were told to answer even if they had only a vague impression or to leave their answer blank if they had no impression at all. Name panels were placed by each student's seat to facilitate identification. The same questionnaire was completed during the last day of class. KMK also spent several days working with the class and interviewed the instructors to obtain a descriptive account of the group and the participation of its members.

4.2. Results and discussion

Fig. 3 shows the results of stepwise multiple regression for females rating females, females rating males, and males rating females. The number of males in the course was too small for an analysis of males rating males. For each analysis, the final rating of physical attractiveness served as the dependent variable and the initial rating of physical attractiveness by the same person served as an independent variable, along with the final rating of familiarity, intelligence, liking, and respect. Initial rating of physical attractiveness accounted for only

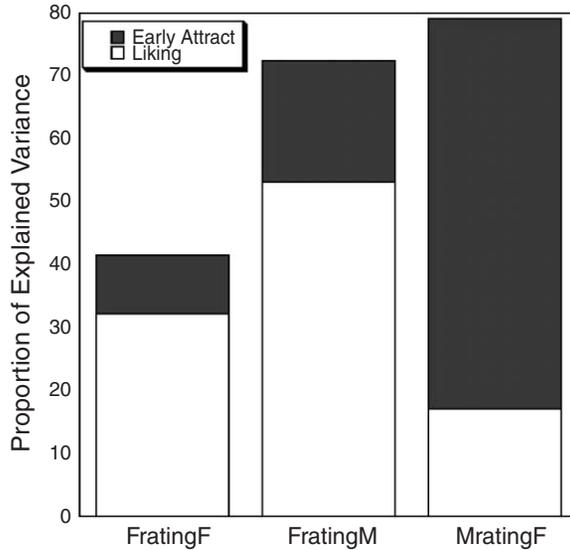


Fig. 3. The proportion of variation in perceived physical attractiveness (dependent variable) explained by the following independent variables in a multiple regression analysis: Physical attractiveness ratings when the group was initially formed (Early Attract) and the degree to which the person was liked after working together for an 8-week period (Liking). The three bars of the histogram represent females rating females (FratingF), females rating males (FratingM), and males rating females (MratingF).

9.3% of the variation in final rating of physical attractiveness for females rating females, 19.2% for females rating males, and 62% for males rating females. The remaining independent variables were highly correlated with each other and with the residual variation, as in our other two studies. Liking was the next variable to be entered in all three analyses and none of the other factors explained the residual variation after the addition of liking.

Again, a description of two group members will help to make the results of this study more vivid and intuitive. One was a woman whose physical attractiveness was rated as roughly average during the first day of class but who proved to be lazy and uncooperative, according to the instructors and as observed directly by KMK. Not only was she disliked by her classmates, but her physical attractiveness rating declined from a mean of 5.07 to a mean of 4.14 by the end of the study. Another was a woman whose physical attractiveness was rated as below average during the first day of class but who became a popular and hardworking member of the group. Not only was she well liked, but her physical attractiveness rating increased from a mean of 3.25 to a mean of 7.00 by the end of the study.

Our third study is methodologically the strongest by avoiding the use of photographs and employing before-and-after ratings of physical attractiveness by the same person rather than ratings by a separate stranger. Nevertheless, the results of our third study are fully consistent with our other two studies. Among people who actually know and interact with each other, the perception of physical attractiveness is based largely on traits that cannot be detected from physical appearance alone, either from photographs or from actually observing the person

before forming a relationship. The effect of nonphysical factors on the perception of physical attractiveness is strongest for females rating females, females rating males, and males rating males. It is weaker but still highly significant for males rating females.

5. General discussion

Our studies were designed to address two shortcomings in the literature on physical attractiveness: (1) a relative paucity of studies that examine the effects of both nonphysical and physical factors on the assessment of physical attractiveness and (2) a relative paucity of studies that involve people who actually know each other. All three studies demonstrate that nonphysical factors have a very potent effect on the perception of physical attractiveness, which can persist for decades in the case of the middle-aged participants of our yearbook study.

It is important to stress that physical attractiveness can be important outside the context of sexual relationships. Just as we regard fitness-enhancing features of landscapes as beautiful and are drawn to them for nonsexual reasons, we can regard people as beautiful and be drawn to them when they enhance our fitness for nonsexual reasons. Physical traits per se are especially important in sexual relationships because they will be partially inherited by one's offspring. Thus, it makes sense that males are more influenced by physical features when evaluating females than when evaluating males, although the comparable asymmetry did not exist for females.

Our studies also reveal individual differences within each sex that rival between-sex differences and that merit further study. In particular, individual differences are increasingly being studied in game theoretic terms as alternative social strategies, such as cooperation versus exploitation (Wilson, Near, & Miller, 1996, 1998) or high-investment versus low-investment mating strategies (Gangestad & Simpson, 2000). In future research it will be interesting to see if people who differ in these respects also differ in the factors that influence their perceptions of physical attractiveness. For example, are women from father-absent homes, who appear to adopt a reproductive strategy based on low male investment (Draper & Harpending, 1982, Ellis, McFadyen-Ketchum, Dodge, Pettit & Bates, 1999), more influenced by purely physical traits in males than those from father-present homes?

In conclusion, thinking of beauty as an assessment of fitness value leads to the prediction that nonphysical factors should have a strong effect on the perception of physical attractiveness. In addition, naturalistic studies are needed to fully understand how physical and nonphysical factors are integrated in the perception of physical attractiveness. If we were to state our results in the form of a beauty tip, it would be, "If you want to enhance your *physical* attractiveness, become a valuable social partner."

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