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Can Perception Be Altered by Change of Reference? A Test of the Social Reference Theory Utilizing College Students' Judgments of Attractiveness¹

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Abstract

Background: Social Reference Theory is relatively new in explaining and predicting social behaviors. Sophisticated empirical observations are needed to support and refine the Theory. The theory proposes that 1) Any perception must be understood in the context of a reference; 2) without a reference, no perception exists; 3) changing the reference can change a person's perception; 4) the reason different parties disagree on an issue is that they have difference references.

Aim: This current study was to provide evidence for the Social Reference Theory with a focus on the 3rd of the four propositions: Changing the reference can change a person's perception.

Method: A large sample of undergraduate students were randomly selected from a Chinese university and asked to participate in an online quasi-experimental survey to study the effect of changing a reference on subjects' evaluation of physical attractiveness. Subjects were asked to rate the attractiveness of an average-looking woman or man presented in the context of other photographs of either more attractive or less attractive women or men.

Findings: These college students' perception of the targets' physical attractiveness were altered by a change of reference: An average image was rated high if the reference image was less attractive, and the same image was rated low if the reference was very attractive. Additionally, female respondents were more likely to be influenced by change of the reference than male respondents.

Conclusions: This study provided evidence for the proposition that changing the reference can change a person's perception.

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Social Comparison Theory (Festinger, 1954) explains how individuals evaluate their own opinions and abilities by comparing themselves to others in order to define the self. Since the inception of the theory, research began to focus on social comparison as a way of self-enhancement (Gruder, 1971), introducing the concepts of downward and upward comparisons and expanding the motivations of social comparisons (Wills, 1981). The theory is limited to personal motives to compare the self with others.

The Social Reference Theory

Enlightened by the notion of Social Comparison Theory, the Social Reference Theory has been conceptualized and developed (Zhang, 2013). This new theory with its roots in Chinese ancient philosophy (Chinn, 1997) could offer different perspectives in understanding and predicting behaviors and decisions. The Social Reference Theory covers but is not limited to the concepts in the Social Comparison Theory. The Social Reference Theory postulates that all perceptions (understanding, interpretation, knowledge, information, judgement, evaluation etc.) are based on some reference, and manipulating the reference an individual uses can change his or her perception. This theory has revitalized the concepts of reference and perception, bringing them up to date outside cognitive psychology by emphasizing the importance of social facts: contexts and environments.

Social Reference Theory complements existing theoretical perspectives, as it deals with theoretical and methodological ways of viewing the relationship between objects, the function of references, and how, consequently, perception is formed (Zhang, 2013). It emphasizes how to change someone's perception by manipulating his or her references (Norvilitis & Zhang, 2009). Symbolic interactionism argues that behavior and behavior change occur in response to subjective perceptions or the subjective interpretation of social facts, but it does not examine how a subjective interpretation (perception) of a social situation is formed. Social reference theory fills this gap, pointing that each perception is based on a reference. People have different responses to a same social fact because they interpret the same social fact differently (Symbolic Interactionism); people have different interpretations of the same social fact because they hold different references (Social Reference Theory). Both perspectives employ the concept of perception, but one focuses on the consequence of perception, acting in response to a perception, and the other explains how different perception is formed (Zhang, Zhao, Lester, & Zhou, 2014). In other words, in symbolic interactionism, behavior—or behavior change—is an dependent variable, and perception is an independent variable, while in social reference analyses, perception becomes an dependent variable, and the type of reference is an independent variable (Zhang, 2013).

Social Reference Theory looks at the nature of relationships among social facts and proposes that these relationships are fundamentally relative. Different perceptions of the same social fact are derived from different references individuals bring with them or subjectively perceive and choose (consciously or subconsciously) to use. Although its elements can be traced down to Western civilization and Chinese ancient thoughts, and can be derived from various social and behavioral theories, this notion of the Social Reference Theory is more fundamental to Chinese tradition than to many others. It can thus be viewed as a contribution

to sociology and social psychology and provides a more comprehensive explanation why different parties are responded to the same issue differently.

According to Zhang (2013), Social Reference Theory can be applied both to micro-level interpersonal interactions and to macro-level social level interpretations, complementing Western-developed social science paradigms. Ideas within Social Reference Theory are based on the following four propositions:

1. Any perception (understanding, knowledge, judgment, etc.) should be based on a reference.
2. Without a reference, there could be no perception.
3. Manipulation of a reference might change perception.
4. When people disagree, it is very likely they have different references on the issue.

While it is rooted in and expanded from the Social Comparison Theory, the Social Reference Theory is related to the Symbolic Interactionism with different levels of explanation power. Another theoretical framework that should be reviewed here is the anchoring and contrast effects (Sherif, Taub, & Hovland, 1958).

The anchoring and contrast effects

The effects of contextual and situational factors on evaluations and judgments have been examined from a variety of research perspectives. For example, people's subjective social position indicates how they perceive their relative position in the social hierarchy. To evaluate their social position, people make comparisons in societal contexts (Lindemann & Saar, 2014). In the area of psychophysics, it is well established that judgments are influenced by the frame of reference provided by surrounding stimuli (Helson, 1964). Research findings from several domains illustrate the prevalence of anchoring and contrast effects in human decision-making processes (for a review, see (Furnham & Boo, 2011). For instance, people will estimate the weight of a moderately heavy object to be lighter after an initial experience with a heavy target compared with an initial experience with a light target (Sherif, et al., 1958). Similarly, when someone places one hand in hot water and the other in cold water and then places both in lukewarm water, the cold hand will feel hot and the hot hand will feel cold (Cialdini, 1993). Using both field and laboratory studies, Thorsteinson et al. (2008) have shown how anchoring works on performance judgments. In research on the rating of others' physical attractiveness, male and female college students were asked to rate photographs of average-looking females presented in the context of photographs of either attractive or unattractive females. The investigators found that the female targets were judged to be more physically attractive when viewed in the context of photos of unattractive females compared with the context of attractive stimuli (Melamed & Moss, 1975).

Different mechanisms appear to account for the anchoring and contrast effect in different contexts. Epley and Gilovich (2001) have argued that the anchoring and contrast effect is generated by multiple mechanisms. According to the literature, the anchoring and contrast effect is a result of adjustment processes (Tversky & Kahneman, 1974). Anchor value could

be a reference point for testing the correct answer as researcher authorized (Strack & Mussweiler, 1997) or a cue for finding a reasonable answer (Wegener, Petty, Blankenship, & Detweiler-Bedell, 2010).

Despite the burgeoning empirical evidence on individual subjectivity, illustrating the differential processing of self-generated and experimenter-provided anchors, it is not entirely clear how anchors are structurally constructed for the process of evaluation and judgment. In other words, how can we manipulate anchor values to change people's judgments or perceptions? Moreover, since some investigations, for example, both studies from Melamed and Moss (1975) and Cash et al. (1983) were conducted in the United States several decades ago, there is a growing need for us to integrate interdisciplinary knowledge with a broader field of vision into this traditional field of study.

The previous limited studies on the Social Reference Theory

A number of research projects have recently tested and found support for social reference theory. For instance, one previous study (Norvilitis & Zhang, 2009) found that students' judgment and evaluation of an instructor's classroom performance were largely based on the score they obtained from the instructor, compared with a perceived manipulated mean class score. Specifically, those students scoring above the manipulated mean rated the course and instructor more highly than did those students scoring below the manipulated mean.

Although the unavoidable influence of fundamental attribution error (i.e., our perception of our own negative outcomes is biased to overemphasize external influences) cannot be fully controlled, the results of this study partially support the view of social reference theory that, because of a change of reference (e.g., a perceived mean class score), students' judgments and evaluations (of an instructor's classroom performance) also changed.

Another example is Chinese students' ratings of self-perceived well-being. Zhang et al. (2014) found that Chinese students coming from urban areas, and thus from better-off families, were not necessarily more satisfied with their current life than were students coming from the countryside, and thus from lower-income families. They concluded that students' self-perceived well-being might have been affected by the reference of their pre-college life quality: In other words, the life quality of the college campus environment might have been better than the earlier lives of those from lower-income families but worse than the earlier lives of those from higher-income families. Both studies have provided validity support for the Social Reference Theory which initially proposed by Zhang (2013).

Aims of the current study

Social Reference Theory focuses on how perception (subjective interpretation) is realized. For example, the perception of attractiveness is dependent on the reference situation. Perception of the same stimulus varies because different people view it differently based on the contexts of their past and current references. Therefore, if we seek to change someone's perception or future expectation, we can change their current references or their interpretation of their prior references.

Research on physical attractiveness has focused on social comparison theory to explain how receiving information about peers who are perceived to be visually superior or inferior influences people's self-evaluations (for a review, see (Collins, 1996). The foundational assumption of social comparison theory is that people compare themselves with others to evaluate their own abilities, opinions, and characteristics (Festinger, 1954). In research on attractiveness comparisons, participants' self-evaluations have been assessed after they viewed photographs of attractive or unattractive individuals (Gutierrez, Kenrick, & Partch, 1999). For example, some experiments have shown that women perceive themselves as more attractive after viewing photographs of unattractive versus attractive women (Brown, Novick, Lord, & Richards, 1992; Cash, Cash, & Butters, 1983).

This study contributes to our knowledge by applying context effect research to China. It was designed to assess the effect of a change of reference (i.e., varying levels of physical attractiveness) on judgments of others' physical attractiveness. Our hypothesis, based on social reference theory, was that subjects would rate a target (man or woman) as less attractive if the target were presented in the context of more attractive individuals and as more attractive if the context were less attractive comparisons. Thus, it was predicted that people's perception of others' physical attractiveness could be altered by a change of reference. Moreover, evolutionary and sociocultural theories of mate selection preferences contend that men place more emphasis than women do on physical attractiveness, while women place more emphasis than men do on socioeconomic status (Berscheid & Walster, 1974; Feingold, 1990). We expected, therefore, a sex difference in judgments of others' physical attractiveness, with males placing greater value on physical attractiveness. However, no evidence exists in the literature regarding whether males or females are more affected by a change of reference.

A secondary purpose of the current study was to explore whether the effect of changing the reference context of physical attractiveness would be influenced by subjects' psychological status (e.g., depression) or structural variables (e.g., family socioeconomic status). Previous studies on evaluations of one's own physical attractiveness have found that, relative to non-depressed individuals, depressed persons tend to distort their degree of physical attractiveness, perceiving themselves to be less attractive than non-depressed individuals do (Noles, Cash, & Winstead, 1985). The family literature has also highlighted the importance of contextual influences (i.e., family, school, and community) in shaping youths' behaviors, expectations, and cognition. Scholars argue that socioeconomic status has a significant impact on awareness and internalization of socially sanctioned standards of appearance (Santo et al., 2013). Although Maliki (2011) found that university undergraduates' socioeconomic status significantly influenced preferences in marriage partner's selection in terms of personality traits and socioeconomic status, the study did not find a significant impact in terms of physical attractiveness. Hence, we further test whether students' differences in socioeconomic status might moderate the effect of changing references on judgments of attractiveness. Finally, studies have demonstrated that individuals involved in ongoing dating relationships rated persons of the opposite-sex as significantly less physically attractive than did individuals not involved in dating relationships (Simpson, Gangestad, & Lerma, 1990), as well as that the perception of one's own physical

attractiveness is positively related to stronger social support (Sarason, Sarason, Hacker, & Basham, 1985). Thus, in the present study, these two potential covariates will be controlled.

Method

Subjects

The subjects consisted of 1,102 undergraduate students from a university in Beijing, China. Male students ($n = 385$) and female students ($n = 717$) accounted for 34.9% and 65.1% of the sample, respectively. There was an excess of female respondents in the sample because of the gender composition in liberal arts universities in China where about 69% of the undergraduate population are female. A previous study (Cash & Smith, 1982) has suggested that the attractiveness-related aspects of personality were not overwhelming in magnitude or as strong as the social stereotypes themselves would suggest.

Students' ages were from 16 to 25 years. The mean age for males was 19.68, and for females, it was 19.45. A total of 21.6% of males and 15.8% of females came from a rural area before college, while 78.4% of males and 84.2% of females came from an urban setting. Table 1 presents the demographic characteristics of the sample, as well as the major independent variables of the study, including gender group comparisons. The distribution of subjects by school year showed a generally similar pattern for males and females. Females (75.7%) were more likely than males (26.6%) to report currently being in a relationship. Compared with males, females in our sample were more likely to report that they were from a relatively wealthy or a middle-level family.

Procedure

The study's procedure and the questionnaire that was utilized were approved by the Institutional Research Board (IRB) at the Chinese university. Respondents provided signed informed consent, and all were informed of their rights to end their participation at any time. Then they were instructed to sit in front of personal computers to complete the survey. The average time to finish the study was approximately 30 minutes.

In this study, the target man and woman, as well as the comparison stimulus men and women, were of Chinese descent so that participants would not encounter cross-cultural cognitive issues. The image attractiveness evaluation was based on portraits of two target individuals (one man and one woman) who were selected randomly from our photo gallery. The photo gallery comprises over 1,000 portraits donated by volunteers. Eight other portraits (stimulus for comparison) were selected respectively for men and women. All portraits were shown in a 2×3 inch color head shot photograph from the front. Both target and comparison men and women were in their mid-20s or early 30s with no makeups. Women had long dark hair and men had short dark hair. Stimulus photos were pre-rated and selected by 10 male and female undergraduates who did not participate in the experiment. Four female photos with a mean rating of 7.8 ($SD = .45$) and for male photos with a mean rating of 7.5 ($SD = .54$) were selected for the high-physically attractive reference. Four female photos with a mean rating of 3.3 ($SD = .20$) and four male photos with a mean rating of 3.2 ($SD = .21$) were selected for the low-physically attractive reference.

The experiment reported in this paper was part of a longer survey. For this experiment, subjects were first presented the portraits of the four less attractive women, one by one, on computer screen for one minute, and then they were presented the image of the target woman. The subjects were then asked to evaluate the attractiveness of the target woman, using a scale from 1 (least physically attractive) to 10 (most physically attractive). This procedure was repeated three additional times, utilizing the portraits of the four more attractive women with the same portrait of the target woman, then the portraits of the four less attractive men with the portrait of the target man, and finally the portraits of the four more attractive men with the portrait of the target man. The order of presentation was always the same.

Measures

We utilized perception discrepancy to capture the effect of the change of reference on people's perception. For both the target man and target woman, this consisted of the deviation between the judgment score with less attractive references and the judgment score with more attractive references. Then, we dichotomized the variables based on whether the deviation scores were 0 (there was no difference) or not 0 (there was a difference).

To control for other effects that might influence people's perception, several social psychological scales were used in the study, including the MSPSS (Multidimensional Scale of Perceived Social Support) measure of social support (Zimet, Dahlem, Zimet, & Farley, 1988) and the CES-D (Center for Epidemiologic Studies Depression Scale) measure of depression (Radloff, 1977). Each of these scales has previously been validated with Chinese college student samples in the current Chinese language format (Zhang & Norvilitis, 2002).

No items on the MSPSS scale need to be reverse scored. We used a 7-point scale with 1 = very strongly disagree, 2 = strongly disagree, 3 = mildly disagree, 4 = neutral, 5 = mildly agree, 6 = strongly agree, and 7 = strongly agree. All scores were added, and higher scores indicated higher perceived social support. The CES-D scale was used to evaluate the subjects' depression level. For each of the 20 items in the full version of the scale, respondents were asked to indicate the frequency of the symptom in the past week using a 4-point scale (0 = less than a day, 1 = 1–2 days, 2 = 3–4 days, and 3 = 5–7 days). The four negatively formulated items (item 4, 8, 15, and 20) were reversed before a tally of the scores. The total score of the 20 items ranged from 0 to 60. Higher scores indicated higher levels of depression.

Subjects were asked to provide demographic information, including age, gender, household registration (i.e., whether an urban or rural area), year in school, current relationship status, self-evaluated attractiveness, and family socioeconomic status. For this last question, they were asked, "Compared with your neighbors, what do you think your family socioeconomic status is?" using a 5-point scale: 1 = wealthy, 2 = relatively wealthy, 3 = middle level, 4 = relatively poor, and 5 = poor. As the responses to this question formed a normal distribution with lower numbers in tails, for further analysis, we recoded answers 1 and 2 as relatively wealthy, 3 as middle level, and 4 and 5 as relatively poor.

The latest version of SPSS (IBM SPSS Statistics 24) was employed for the data analyses. The bivariate analyses used the t test, analysis of variance (ANOVA) test, and chi-square test. Multiple Logistic Regression model was used to assess the model for predicting perception discrepancy. Coefficients were converted to odds ratios (ORs) for the analysis, and 95% confidence intervals (CIs) were determined. Both authors of this study certify that they are responsible for the methods used in the data collection and data analyses.

Results

Table 1 illustrates the distribution (mean or frequency) of each expected correlate of perception discrepancy for all subjects and the comparison between males and females. Males reported slightly higher levels of self-esteem and depression than did females, and females reported higher social support levels than did males. In the sample, 56.0% of all subjects changed their judgments (score = 0) for the target woman after the change of references, while for the target man, only 40.1% of subjects changed their perception after the change of reference (see Table 1).

T-test, ANOVA, and Chi-square tests were used for the comparison between males and females on independent variables. The results indicated that significant differences existed between males and females in age, household registration, relationship status, family socioeconomic status, social support, and discrepancy for the target woman. But differences in school year, self-esteem level, depression level, and discrepancy for the target man were not statistically significant.

The dependent t-test analysis indicated a significant difference in subjects' judgments of others' physical attractiveness after the change of reference. As predicted in our first hypothesis, the results indicated that subjects were more likely to score a target's physical attractiveness lower when the references were more attractive than when the references were less attractive. Specifically, for the target woman, there were significantly lower ratings across all subjects when the reference photos were of more attractive women ($M = 3.11$) than when the less attractive women were used as references ($M = 4.51$; $t = 20.036$, $p < 0.001$). For the target man, the mean rating across all subjects was significantly lower when the reference photos were of more attractive references ($M = 2.65$), compared with less attractive references ($M = 3.35$; $t = 13.541$, $p < 0.001$; see Table 2).

In addition, the second hypothesis, that males place greater value on women's physical attractiveness than do females, was supported. Specifically, following exposure to the more attractive comparison women, males ($M = 2.69$) evaluated the target woman to be less physically attractive than did females ($M = 3.33$; $t = -5.276$, $p < 0.001$). Even with less attractive women as references, males ($M = 3.81$) still gave lower evaluation scores to the target woman than did females ($M = 4.89$; $t = -7.02$, $p < 0.001$). In other words, males expressed less tolerance for a woman's unattractive physical appearance than did females. However, we did not find the same situation when the target man was the stimulus (See Table 3).

From Table 1, a significant difference can be noted between males' and females' perception discrepancy when the target photo was of a woman ($\chi^2 = 25.352$, $p < 0.001$, $\phi = 0.152$), but not when the target photo was of a man ($\chi^2 = 2.993$, $p = 0.086$, $\phi = 0.052$). The ANOVA test showed that, when the target woman was the stimulus, females were affected by the references more than males were ($F_{(1, 1100)} = 8.815$, $p = 0.003$). Females reported higher discrepancy scores ($M_s = 1.55$ versus 1.12 , $E.S. = .008$) than did males. However, the close-to-zero effect size indicated few statistical differences between males and females in the study. Therefore, the statistical power may be due to the large sample size. Logistic regression models were used for further analyses to identify predictors of a change of perception of the target man and woman. In other words, we sought to determine whose judgments were more likely to be influenced by the change of reference. As can be seen in Table 4, both gender and self-evaluated attractiveness were significant predictors of a change of perception of the target woman and man. Specifically, the ORs in the multiple logistic regressions indicated that females were more likely to be influenced by the references than were males. For a female, the likelihood of changing her perception of the target woman (man) was about 1.966 (1.272) times more than it was for a male. In addition, people who had higher scores on self-evaluated attractiveness were more likely to change their perception of the target man and woman based on different references (See Model 1 and Model 3).

The finding that gender and self-evaluated attractiveness were significant predictors also held true in Model 2 and Model 4, with all other variables held constant in the same model. With all other relevant variables controlled for, relationship status and social support were not found to be significant predictors in the current context. However, for both the target woman and the target man, depression and family socioeconomic status were found to be significant predictors of a change of perception. The ORs suggested that the higher a subject's self-reported depression was, the more likely the subject was to change his or her perception of the target. Compared with people from relatively wealthy families, those from middle-level families were more likely to be influenced by the references on physical attractiveness. However, we did not find a significant impact from changing attractiveness references on people from relatively poor families. Previous empirical research has shown that outcomes of physical attractiveness vary across social classes. It is assumed that physical attractiveness should be considered a form of capital that is more advantageous to some groups than to others. For example, Bourdieu (1984, p. 206) has referred to physical attractiveness as "body capital," arguing that the body operates as a bearer of class-based taste differences. According to Bourdieu (1984), the meaning of physical attractiveness is highly gendered and associated with one's social class, with women from the middle class, especially, having learned to utilize their body capital and considering physical attractiveness to be a valuable asset. Based on this explanation, the current finding further demonstrates that people from middle-level families are more likely to be influenced by references on physical attractiveness because of their class-based taste differences. Nevertheless, further studies are needed before conclusions can be reached.

Discussion

In this study, there are three major findings: First, in the context of more attractive references, subject rates targets' physical attractiveness lower than when the context consists of less attractive references. Second, males are more likely than females to place greater value on women's physical attractiveness, but no difference between males and females existed in evaluating men's physical attractiveness in the current study. Finally, the ANOVA test and logistic regression models indicate that females are more likely to be influenced by a change of reference than are males; moreover, people who have higher scores on self-evaluated attractiveness are more likely to be influenced by a change of references.

These findings among Chinese college students provide further support for the Social Reference Theory that people's perceptions can be altered by a change of reference (Zhang, 2013). According to Social Reference Theory, when people make judgments on a social fact, it must be in reference to each individual's background and knowledge. Also, people tend to make judgments by contrasting the present state with a former state. When two situations exist close in time to each another, people may evaluate them against each another rather than against a fixed standard (Zhang, 2013). Therefore, in our study, the preceding reference photos influenced judgments of the attractiveness of the target man and woman. This is in line with previous study (Thorsteinson, et al., 2008). The findings also support the Social Reference Theory with a focus on the 3rd of the four propositions that when the references changed, people's perception of the targets also changed. This indicates that a reference—and the manipulation of a reference—may play an important role in forming and changing Chinese students' judgments and evaluations. However, this study looked only at a highly educated and young sample of full-time Chinese college students aged between 17 and 24 years. Other populations may respond differently to judgments of attractiveness, and their perceptions of attractiveness may change differently depending on the reference situation.

In addition to indicating that the perception of physical attractiveness can be altered by a change of reference, the present results point to the value of further research to clarify the individual differences that are not only associated with, but also are consequences of, variation in social references. This study supported the Social Reference Theory by providing evidence for the proposition that changing the reference can change a person's perception. The current study also has some limitations. For instance, the findings from this study may be only generalized to Chinese college students. The quasi-experimental survey can be limited by the lack of supervision. Further research to support the Social Reference Theory needs to be conducted in non-student populations and in some controlled experimental settings.

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Data availability statement:

The data that support the findings of this study are available from Central University of Finance and Economics. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from the corresponding author with the permission of Central University of Finance and Economics.

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Table 1.
Descriptions of the Sample for Perception Discrepancy and All the Major Variables with Their Gender Comparisons

Variable	All Subjects (N=1102)		Males (N=385)		Females (N=717)		Gender Comparison Statistics		
	Mean or f	SD or %	Mean or f	SD or %	Mean or f	SD or %	df	t/F/ χ^2	p
Age, Years (Mean and SD)	19.5	1.3	19.7	1.4	19.5	1.3	1101	2.758	0.006
Gender									
Male	385.0	34.9							
Female	717.0	65.1							
Household location							1	5.759	0.016
Rural	196.0	17.8	83.0	21.6	113.0	15.8			
Urban	906.0	82.2	302.0	78.4	604.0	84.2			
Year in school							3	0.99	0.804
Freshman	356.0	32.3	127.0	33	229.0	31.9			
Sophomore	351.0	31.9	116.0	30.1	235.0	32.8			
Junior	228.0	20.7	80.0	20.8	148.0	20.6			
Senior	167.0	15.2	62.0	16.1	105.0	14.6			
In a relationship							1	5.66	0.017
No	809.0	73.4	266.0	69.1	543.0	75.7			
Yes	293.0	26.6	119.0	30.9	174.0	24.3			
Family socioeconomic status							2	11.938	0.003
Relatively wealth	256.0	23.2	86.0	22.3	170.0	23.7			
Middle level	630.0	57.2	202.0	52.5	428.0	59.7			
Relatively poor	216.0	19.6	97.0	25.2	119.0	16.6			
Self-evaluated attractiveness	5.6	1.9	5.8	2.3	5.5	1.7	1100	2.129	0.033
Self-esteem	21.5	3.8	21.6	3.9	21.5	3.7	1099	0.346	0.729
Depression	16.0	10.6	16.4	11.2	15.7	10.2	1099	1.0	0.318
Social support	62.8	14.1	60.7	15.1	63.9	13.5	1099	-3.613	<0.001
Discrepancy for target woman							1	25.352	<0.001
No Change	485.0	44.0	209.0	54.3	276.0	38.5			
Change	617.0	56.0	176.0	45.7	441.0	61.5			
Discrepancy for target man							1	2.993	0.084

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Variable	All Subjects (N=1102)		Males (N=385)		Females (N=717)		Gender Comparison Statistics	
	Mean or f	SD or %	Mean or f	SD or %	Mean or f	SD or %	df	t/F/ χ^2 p
No Change	660.0	59.9	244.0	63.4	416.0	58.0		
Change	442.0	40.1	141.0	36.6	301.0	42.0		

Table 2.
Dependent T-tests for the Effect of Changing Reference on Evaluations of Attractiveness of the Target Images

Respondents	Mean score for target woman (SD)			Mean score for target man (SD)		
	more attractive women as references	less attractive women as references	t (2-Tailed <i>p</i>)	more attractive men as references	less attractive men as references	t (2-Tailed <i>p</i>)
All subjects (N=1,102)	3.11 (1.938)	4.51 (2.471)	20.036 (<0.001)	2.65 (1.811)	3.35 (2.194)	13.541 (<0.001)
Males (N=385)	2.69 (1.943)	3.81 (2.447)	10.506 (<0.001)	2.71(2.056)	3.32 (2.439)	6.404 (<0.001)
Females (N=717)	3.33 (1.900)	4.89 (2.403)	17.146 (<0.001)	2.61 (1.665)	3.36 (2.053)	12.292 (<0.001)

Table 3.
Independent T-test for the Effect of Changing Reference on Evaluations of Attractiveness between Males and Females

Variables	Gender comparison			
	All subjects	Males	Females	t (2-Tailed p)
Mean score with less attractive women (SD)	4.51 (2.471)	3.81 (2.447)	4.89 (2.403)	-7.02 (<0.001)
Mean score with more attractive women (SD)	3.11 (1.938)	2.69 (1.943)	3.33 (1.900)	-5.276 (<0.001)
Mean score with less attractive men (SD)	3.35 (2.194)	3.32 (2.439)	3.36 (2.053)	-0.282 (0.778)
Mean score with more attractive men (SD)	2.65 (1.811)	2.71 (2.056)	2.61 (1.665)	0.928 (0.354)

Table 4.
Multiple Regression Predicting the Perception Discrepancy with Major Covariates

Predictors	Discrepancy for the target woman			Discrepancy for the target man		
	Model 1	Model 2	Model 3	Model 4		
	OR	95% CI (lower-upper)	OR	95% CI (lower-upper)	OR	95% CI (lower-upper)
Gender						
Male	1.0 (–)	1.0 (–)	1.0 (–)	1.0 (–)	1.0 (–)	1.0 (–)
Female	1.966***	1.526	2.533	1.522	2.558	1.643
					1.272*	1.284*
Self-evaluated attractiveness	1.118***	1.049	1.191	1.139***	1.231	1.126
					1.056*	1.081**
Depression					1.020**	1.014*
					1.003	1.026
Social support					1.007	1.001
In a relationship					0.999	0.993
					1.018	1.012
No					1.0 (–)	1.0 (–)
Yes					1.074	0.952
Family socioeconomic status					1.418	0.721
Relatively wealth					1.0 (–)	1.0 (–)
Middle level					1.0 (–)	1.0 (–)
					1.388*	1.368*
Relatively poor					1.318	1.320
					0.845	0.767
Constant	0.442***				0.421***	0.220**
R ²	0.045				0.007	0.019
Hosmer-Lemeshow X ²	3.99 (p=0.780)				9.601 (p=0.212)	6.168 (p=0.628)

*** P value is significant at the 0.01 level (2-tailed).

** P value is significant at the 0.05 level (2-tailed).

* P value is significant at the 0.1 level (2-tailed).