

The changes of self-esteem, sensitivity to criticism, and social appearance anxiety in orthognathic surgery patients: A controlled study

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Objectives: To evaluate the changes of psychologic parameters, such as self-esteem, sensitivity to criticism, and social appearance anxiety, in skeletal Class III patients undergoing orthognathic surgery and to compare the psychologic status of skeletal Class III patients with control subjects. **Methods:** The first group consisted of 60 patients with a mean age of 22.07 ± 1.30 years who did not need orthognathic surgery. The second group comprised 45 patients with skeletal Class III malocclusion (mean age 21.40 ± 2.02 years) who were evaluated in terms of psychologic changes from before to after surgery. A third group consisted of 50 Class III patients (mean age 20.09 ± 2.59 years) who were evaluated before surgery and a different 50 Class III patients (mean age 22.15 ± 2.03 years) who were investigated after surgery. The Rosenberg Self-Esteem Scale and the Social Appearance Anxiety Scale were used to evaluate psychologic parameters both before and after surgery. Analysis was carried out with the use of independent- and dependent-sample *t* tests, 1-way analysis of variance, and post hoc Tukey test. **Results:** Self-esteem of the patients with skeletal Class III malocclusion increased, and sensitivity to criticism and social appearance anxiety decreased significantly after the surgery ($P < 0.001$). In the patients with Class III malocclusion, self-esteem was significantly lower and social appearance anxiety significantly higher before orthognathic surgery than in the control group, and at the postoperative evaluation Class III patients had significantly higher self-esteem than the control group ($P < 0.001$). **Conclusions:** Through the improvement in facial appearance after surgery, patients' self-esteem increases and their sensitivity to criticism and social appearance anxiety decrease. (Am J Orthod Dentofacial Orthop 2019;155:482-89)

In recent years, orthognathic surgery has become a frequently preferred therapeutic approach that helps to maintain balanced anatomic and functional relationships, ideal and esthetic facial appearance, in patients with severe skeletal incompatibilities. The need

for orthognathic surgery has arisen due to concerns about respiration, speech, and chewing deficits, temporomandibular joint dysfunctions, and, most importantly, psychosocial disturbances caused by dentofacial incompatibilities.^{1,2} Studies have reported that the patients seeking orthognathic surgery treatment have depressive symptoms,³ lower self-confidence,⁴ lower self-esteem,^{4,5} lower facial body image,⁵ and higher levels of anxiety⁵ before surgery. These patients frequently benefited from orthognathic surgery treatment regarding improvement in social functioning,⁶ increased facial-attractiveness image,⁷ positive life changes,⁸ reduced anxiety,⁹ and increased self-confidence¹⁰ and self-esteem.⁸

Although the psychosocial benefits of orthognathic surgery, such as increase in self-esteem^{8,10,11} and self-confidence and self-concept,^{10,12,13} through the changes in facial appearance after orthognathic surgery have been shown in previous studies, there is

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an inconsistency between the results of some studies on psychosocial benefits. Finlay et al¹⁴ found that although a slight improvement was obtained with surgical intervention, the changes were not statistically significant. Kiliç and Ertas¹⁵ also reported that the quality of life of patients who undergo orthognathic surgery appeared to be similar to that of subjects without dentofacial deformities.

These inconsistencies may be due to limited numbers of subjects used in the studies, unknown or undetermined skeletal malocclusion of the subjects, and racial and cultural differences. Also, different research designs, such as longitudinal^{16,17} or cross-sectional^{18,19} studies, a limited number of controlled studies,²⁰ and different and nonspecific scales used to evaluate self-esteem make it difficult to clearly identify the precise psychosocial benefits of this treatment.⁹ In addition to the self-esteem state of patients, other related psychologic parameters may be affected from the surgical interventions. Despite studies evaluating the self-concept changes in orthognathic surgery patients, there are none in the literature that investigated the sensitivity to criticism and social appearance anxiety of orthognathic surgery patients. The Social Appearance Anxiety Scale (SAAS) is accepted as a beneficial tool to assess the social appearance anxiety as a 1-dimensional scale.²¹ In addition, the Rosenberg Self-Esteem Scale (RSES) is the most commonly used scale for evaluation of self-esteem and sensitivity to criticism levels owing to advantages such as high internal consistency and ease of application, scaling, and interpretation.²²

The present controlled study was based on 2 different study designs as longitudinal and cross-sectional. We aimed to evaluate the self-esteem, sensitivity to criticism, and social appearance anxiety of skeletal Class III patients at the presurgical and postsurgical periods with the use of RSES and SAAS in the different study designs. The objective was to assess the changes of the psychologic parameters in skeletal Class III patients undergoing bimaxillary osteotomies for the correction of skeletal malformations and to compare the psychologic status of skeletal Class III patients with control subjects who do not have dentofacial discrepancy and do not need orthognathic surgery.

SUBJECTS AND METHODS

Ethical approval for this study was received from the Ethics Committee of Erciyes University (approval code 2017/203). All participants were informed about the aims and protocol of the study. The informed consent forms were signed by the patients or their legal guardians.

Two hundred five subjects with a mean age of 21.42 ± 1.98 years (95 male, 110 female) were involved

in this patient-control study. One hundred forty-five patients with Class III dentofacial deformity were invited to participate in this study who had applied to the Department of Orthodontics, Faculty of Dentistry, Erciyes University. Patients were included in this study according to the following criteria: for subjects who were candidates for orthognathic surgery, 16 years of age or older; for subjects who underwent orthognathic surgery, age 18–25 years, having orthodontic treatment before and after orthognathic surgery, and undergoing double-jaw surgery with combination of advancement of the maxilla by the Le Fort I osteotomy procedure and setback of the mandible by bilateral sagittal split ramus osteotomy (BSSRO) for anterior/posterior and vertical skeletal corrections for Class III deficiency; and for control subjects, age 18–25 years, with Class I canine and molar relationship with well aligned dental arches, normal overjet and overbite, normal facial appearance, and no orthodontic/orthognathic surgery treatment needed.

Subjects with syndromes affecting the craniofacial anatomy, cleft lip or palate, or trauma-related malocclusion, and subjects who were mentally handicapped, psychologically ill, or had cognitive or behavioral impairment were not included in this study. Patients who underwent distraction osteogenesis, temporomandibular joint surgery, or resection due to malignancy present in the head and neck region, also were excluded from the study.

Group 1 (control group) consisted of 60 subjects (24 male, mean age 22.47 ± 1.46 years; 36 female, mean age 21.80 ± 1.12 years) who had Class I canine and molar relationship with well aligned dental arches (<2 mm crowding on the upper and lower dentition), a normal overjet and overbite, normal facial appearance and no dentofacial anomalies. Self-esteem, sensitivity to criticism, and anxiety about social appearance of these subjects were evaluated with the use of the questionnaires.

Group 2 (longitudinal group) comprised 45 patients (18 male, mean age 21.68 ± 2.18 years; 27 female, mean age 21.22 ± 1.92 years) with skeletal Class III malocclusion. They were evaluated for self-esteem, sensitivity to criticism, and anxiety about social appearance before and after surgery.

Group 3 (cross-sectional group) comprised 50 patients with skeletal Class III malocclusion (27 male, mean age 19.75 ± 2.17 years; 23 female, mean age 20.74 ± 2.74 years) who were prepared for orthognathic surgery and a different 50 patients with skeletal Class III malocclusion (26 male, mean age 22.34 ± 2.01 years; 24 female, mean age 21.95 ± 2.08 years) who had undergone orthognathic surgery (double jaw surgery:

maxillary advancement and mandibular setback). These 100 patients also were interviewed to evaluate self-esteem, sensitivity to criticism, and social anxiety levels.

According to the treatment plan, preoperative orthodontic decompensation procedures were completed by means of fixed orthodontic mechanics, and surgical splints were prepared on the plaster models. Osteotomies were performed with the use of Le Fort I and BSSRO osteotomy techniques. Surgical stabilization was achieved with rigid fixation method, and patients stayed in hospital for ~3 days after surgery.

A descriptive initial form consisting of questions asking demographic characteristics, such as age, type of malocclusion, type of surgical operation, and date of operation was prepared, and patients were requested to answer those questions. As part of the stratified random sampling procedure, patients whose related characteristics matched with inclusion criteria were listed. Patients of the longitudinal study group and patients in the presurgical part of the cross-sectional study group were selected randomly from the list of subjects who were candidates for orthognathic surgery. Forty-five patients were chosen for group 2 and 50 patients were selected for the presurgical investigation part of group 3 by simple random sampling in this strata. The list of patients who underwent the orthognathic surgery was used to constitute the postsurgical part of the cross-sectional study group as well. The control group consisted of undergraduate dental students attending a dental examination. As the result of their examination, subjects whose characteristics matched the inclusion criteria of the control group were listed. Sixty subjects were chosen from this list by simple random sampling procedure.

The participants were asked to complete paper-pencil questionnaires in a quiet room away from the clinical area. An investigator explained the questions and checked the questionnaires for completeness. No time limit was given to patients for completion of the questionnaires. All data were collected, scored, and evaluated by the same investigator.

In groups 2 and 3, postoperative questionnaires were applied ≥ 6 months after surgery (18.4 ± 12.2 months), because of the expected reduction of postoperative complications, such as postoperative pain, postoperative edema, loss of sensation in the mouth, and limited mouth opening.

One of the questionnaires was the RSES, which consists of 12 subscales. For the present study, self-esteem (for details of the RSES, see [Supplemental Fig 1](#)) and sensitivity to criticism (for details of the Sensitivity to Criticism Scale, see [Supplemental Fig 2](#)) subscales were

used to assess the self-esteem and sensitivity to criticism levels of the subjects. The self-esteem subtest (Guttman scale) is a 4-point Likert-type subscale with low scores representing high self-esteem levels. In the subtest of sensitivity to criticism, 0-1 points indicates less sensitivity and 2-3 points indicate more sensitivity.

The other questionnaire was the SAAS, which consists of 16 items regarding the appearance anxiety of the subjects (for details of the SAAS, see [Supplemental Fig 3](#)). The SAAS scale has a 5-point Likert-type answer key from 1, "not appropriate," to 5, "totally appropriate." High scores on the SAAS indicate higher social appearance anxiety.

Statistical analysis

Data analysis was performed with the use of the Statistical Package for the Social Science software (SPSS), version 20.0 (SPSS, Chicago, Ill), with statistical significance set at $P < 0.05$. The results of the Kolmogorov-Smirnov normality test confirmed that all of the variables followed a normal distribution. Because they were normally distributed, parametric tests, including dependent- and independent-sample *t* tests, were applied to analyze the data obtained. The self-esteem, sensitivity to criticism, and social appearance anxiety measurements of the groups were compared with the use of 1-way analysis of variance. A multiple-comparison procedure including post hoc Tukey test was used to isolate the group or groups that differ from the others.

RESULTS

The total sample consisted of 205 subjects; 46.3% (95 subjects) were male and 53.6% (110 subjects) were female ([Table 1](#)). The average ages were 22.07 ± 1.30 years in group 1 (control group), 21.4 ± 2.02 years in group 2 (longitudinal group), 20.09 ± 2.59 years in group 3-before surgery (cross-sectional group), and 22.15 ± 2.03 years in group 3-after surgery (cross-sectional group), ranging from 16.60 to 25.12 years for all subjects ([Table 1](#)).

All control, presurgical, and postsurgical questionnaires were available for evaluation in this study, and no significant differences were found between female and male subjects or between different ages for any answer.

The patients with Class III malocclusion in both longitudinal and cross-sectional study groups had significantly lower self-esteem before surgery than the control group subjects ($P \leq 0.05$), but there was no significant difference between the groups in terms of sensitivity to criticism. In the social anxiety evaluation,

Table I. Age and sex distribution of the subjects

Group	Sex	n	Age (y)			
			Min	Max	Mean	SD
1. Control, Class I	Male	24	20.46	25.12	22.47	1.46
	Female	36	19.95	24.13	21.80	1.12
	Total	60	19.95	25.12	22.07	1.30
2. Longitudinal, Class III	Male	18	18.33	24.90	21.68	2.18
	Female	27	18.36	24.87	21.22	1.92
	Total	45	18.33	24.90	21.40	2.02
3. Cross-sectional before surgery, Class III	Male	27	16.65	24.89	19.75	2.17
	Female	23	16.83	24.83	20.74	2.74
	Total	50	16.60	24.80	20.09	2.59
3. Cross-sectional after surgery, Class III	Male	26	18.94	24.75	22.34	2.01
	Female	24	18.76	24.86	21.95	2.08
	Total	50	18.76	24.86	22.15	2.03

significantly higher anxiety values were found in the patients with Class III malocclusion in the longitudinal and cross-sectional study groups than in the control groups ($P < 0.05$; Table II).

After surgery, self-esteem of the Class III patients in the longitudinal and cross-sectional study groups was significantly higher than the control group subjects ($P < 0.05$), but there were no significant differences between the groups in the sensitivity to criticism and social anxiety level assessments (Table III).

Multiple comparisons of self-esteem, sensitivity to criticism, and social anxiety levels before and after surgery in all groups are presented in Table IV.

According to the results of the longitudinal study group, self-esteem of patients increased significantly from before to after surgery ($P < 0.001$). Also, sensitivity to criticism ($P < 0.001$) and social appearance anxiety levels decreased significantly with surgery ($P < 0.001$; Table V).

In the results of the cross-sectional study group, self-esteem of patients increased significantly with surgery ($P < 0.001$), and the levels of sensitivity to criticism ($P < 0.05$) and social appearance anxiety ($P < 0.001$) decreased significantly, as in the longitudinal study group (Table VI). Correction of malocclusion through surgical intervention was shown to improve self-esteem and reduce social appearance anxiety and sensitivity to criticism levels significantly.

Patients in both longitudinal and cross-sectional study groups exhibited similar psychologic changes with surgical treatment. Comparing the self-esteem, sensitivity to criticism, and social appearance anxiety levels of patients with Class III malocclusion between the longitudinal and cross-sectional study groups, it was observed that there was no significant difference between the longitudinal and cross-sectional study designs in the presurgical and postsurgical psychologic evaluations. Self-esteem,

sensitivity to criticism, and social appearance anxiety changed in both groups in the same way (Table VII).

DISCUSSION

The aim of this study was to evaluate the self-esteem, sensitivity to criticism, and social appearance anxiety, with the use of control group, longitudinal, and cross-sectional study designs, of skeletal Class III patients undergoing orthognathic surgery. In the literature, some longitudinal studies investigated basic personality traits, such as anxiety, fear, depression, self-concept, and body image, in surgically treated adult patients.^{5,23} However, the number of longitudinal studies conducted on self-esteem and the numbers of subjects used in those studies are limited, as the number of well designed prospective studies with concurrent control groups on this subject. The addition of a control group makes a study more reliable if it is designed properly for the goals of study. Hunt et al⁹ suggested that in a psychologic assessment of orthognathic surgery patients, the use of subjects who should have orthognathic surgery but refused surgical treatment as a control group^{17,20} is a technical flaw and may lead to suspect results. Because the main goals of orthognathic surgery are to correct the dentofacial structures and to get the psychologic state of patients into normal ranges, control group subjects should consist of normal subjects without dentofacial deformity. In addition, the scales used for psychologic assessment should be selected appropriately and specifically to the purposes of the research. The Fitts Tennessee Self-Concept Scale is not specific to self-esteem evaluation and provides a general conclusion about all dimensions of self-concept, whereas the RSES is a 1-dimensional scale that is specifically optimized to self-esteem evaluation. The RSES is also accepted as a valid, reliable, and standard scale by researchers.^{24,25}

Table II. Comparison of presurgical self-esteem, sensitivity to criticism, and social appearance anxiety among groups

Measure	1. Control group			2. Longitudinal group before surgery			3. Cross-sectional group before surgery			P	Multiple comparison
	n	Mean	SD	n	Mean	SD	n	Mean	SD		
SE	60	0.82	0.47	45	1.13	0.69	50	1.04	0.52	0.05	2 > 1 3 > 1
SC	60	1.67	1.07	45	2.09	1.00	50	2.10	0.93	0.09	-
SAA	60	31.23	8.87	45	41.58	14.83	50	42.00	12.01	0.00	2 > 1 3 > 1

SE, Self-esteem; SC, sensitivity to criticism; SAA, social appearance anxiety.

Table III. Comparison of postsurgical self-esteem, sensitivity to criticism, and social appearance anxiety among groups

Measure	1. Control group			2. Longitudinal group after surgery			3. Cross-sectional group after surgery			P	Multiple comparison
	N	Mean	SD	N	Mean	SD	N	Mean	SD		
SE	60	0.82	0.47	45	0.62	0.27	50	0.55	0.27	0.00	1 > 3 1 > 2
SC	60	1.67	1.07	45	1.56	1.01	50	1.66	0.96	0.82	-
SAA	60	31.23	8.87	45	28.09	9.38	50	27.12	10.24	0.06	-

SE, Self-esteem; SC, sensitivity to criticism; SAA, social appearance anxiety.

Table IV. Multiple comparison of self-esteem, sensitivity to criticism, and social appearance anxiety between groups before and after surgery

Measure	Before surgery		After surgery	
	1 vs 2	1 vs 3	1 vs 2	1 vs 3
SE	*	*	*	*
SC	NS	NS	NS	NS
SAA	*	*	NS	NS

SE, Self-esteem; SC, sensitivity to criticism; SAA, social appearance anxiety; NS, nonsignificant difference.

*Significant difference ($P \leq 0.01$).

Table V. Changes of self-esteem, sensitivity to criticism, and social appearance anxiety of group 2 (longitudinal patients) from before to after surgery

Measure	Before surgery			After surgery			P
	n	Mean	SD	n	Mean	SD	
SE	45	1.13	0.69	45	0.62	0.27	0.00
SC	45	2.09	1.00	45	1.56	1.01	0.00
SAA	45	41.58	14.83	45	28.09	9.38	0.00

SE, Self-esteem; SC, sensitivity to criticism; SAA, social appearance anxiety.

The results of the present study revealed that patients with skeletal Class III malocclusion have significantly lower self-esteem before surgery than the control group

Table VI. Changes of self-esteem, sensitivity to criticism, and social appearance anxiety of group 3 (cross-sectional patients) from before to after surgery

Measure	Before surgery			After surgery			P
	n	Mean	SD	n	Mean	SD	
SE	50	1.04	0.52	50	0.55	0.27	0.00
SC	50	2.10	0.93	50	1.66	0.96	0.02
SAA	50	42.00	12.01	50	27.12	10.24	0.00

SE, Self-esteem; SC, sensitivity to criticism; SAA, social appearance anxiety.

subjects. After surgical intervention, the self-esteem of Class III patients was found to increase significantly over the control group. At the stage of previous orthodontic treatment, the esthetic appearance of Class III patients was worsened by dental decompensation, and therefore the self-esteem was found to be lower, as the malocclusions of the patients became clear. Because our surveys were taken ≥ 6 months after the surgery, the patients had overcome the discomfort of the postoperative complications, such as pain, edema, and lip numbness. Thus patients were able to recognize the esthetic correction by focusing on their views, and their self-esteem increased in relation to esthetic appearance and improved function ≥ 6 months after the surgery. Similarly to the findings of present study, Burden et al²⁶ reported that Class III orthognathic surgery patients had lower self-esteem than the control group as

Table VII. Comparison of self-esteem, sensitivity to criticism, and social appearance anxiety of patients with Class III malocclusion between the longitudinal and cross-sectional study groups

Measure	Before surgery							After surgery						
	Longitudinal group			Cross-sectional group			P	Longitudinal group			Cross-sectional group			P
	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	
SE	45	1.13	0.69	50	1.04	0.52	0.24	45	0.62	0.27	50	0.55	0.27	0.20
SC	45	2.09	1.00	50	2.10	0.93	0.96	45	1.56	1.01	50	1.66	0.96	0.61
SAA	45	41.58	14.83	50	42.00	12.01	0.88	45	28.09	9.38	50	27.12	10.24	0.33

SE, self-esteem; SC, sensitivity to criticism; SAA, social appearance anxiety.

evaluated with the use of the RSES. However, the difference was not found to be statistically significant, probably owing to the wide age range of subjects and racial/cultural differences.

According to the findings obtained from the longitudinal and cross-sectional study groups, the self-esteem of the patients with skeletal Class III malocclusion increased significantly with the surgical intervention. These findings are consistent with previous studies.^{8,14,16} In the longitudinal study by Kiyak et al,²⁷ who used the Fitts Tennessee Self-Concept Scale, the self-esteem of orthognathic surgery patients was found to be increased 4 months after surgery. However, the self-esteem of orthognathic patients showed a significant decrease at 9 months after surgery compared with 4 months.²⁸ At 24 months after surgery, self-esteem of patients again increased, but the increased self-esteem at 24 months was still lower than presurgical levels.²⁹ Our findings are similar to the 4-month findings of Kiyak et al but do not overlap with the 9- and 24-month findings. These differences can be explained by the different scales used to evaluate self-esteem, selection of the subjects, racial and cultural characteristics, and the period when the study was carried out. The difference in the evaluation periods may influence timely social and sociopsychologic perspective. In recent years, increasing of esthetic awareness and rising of expectations for facial appearance because of the increased use of social media and the spread of technologic and visual tools most likely influence the level of interest in orthognathic surgery and satisfaction of patients with surgical intervention, compared to 30 years ago when Kiyak et al reported their findings.²⁷⁻²⁹ Therefore, it is expected that patient satisfaction will not be adversely affected and the self-esteem of patients will be increased compared to before surgery, even though there are complications such as pain or numbness after surgery.

The self-esteem levels of patients with skeletal Class III malocclusion in the cross-sectional study group

showed significant increase after surgical intervention. In the cross-sectional study performed by Cunningham et al,¹⁸ 83 patients before surgery and 100 patients after surgery were examined in terms of changes in self-esteem. Unlike the cross-sectional group findings of our study, Cunningham et al¹⁸ found no significant difference between presurgical and postsurgical self-esteem of patients. The differences between results may be explained with the unclear recognition of the malocclusion type of the subjects and the upper limit of the age range in the Cunningham et al study.

The findings of the present study revealed that sensitivity to criticism of the patients with skeletal Class III malocclusion decreased after surgery and reached close to the control group values. Patients with Class III malocclusion are aware of and have discomfort with the deformity before surgery. This situation leads patients to be more sensitive to criticism than normal subjects. The increased presurgical sensitivity to criticism level was also due to the malocclusion during decompensation of the teeth is further exacerbated immediately before the surgery and patients feel more discomfort about the facial appearance.³⁰ The postsurgical sensitivity to criticism results in the present study can be interpreted to suggest that improved facial appearance allows patients to pay less attention to criticism. This is the first study in the literature investigating the sensitivity to criticism of orthognathic surgery patients.

There are various studies evaluating the change in level of anxiety due to orthodontic treatment.^{31,32} However, there is no study in the literature investigating the social appearance anxiety of orthognathic surgery patients. The social appearance anxiety findings of the present study revealed that patients with skeletal Class III malocclusion in the longitudinal and cross-sectional study groups had higher social anxiety levels before surgery than the control group subjects. In the study conducted by Kovalenko et al,³³ subjects with mild to moderate facial deformity showed

no significant difference in psychologic status compared with the control group, and subjects with severe facial deformity showed higher emotional instability, inwardness, anxiety, and antisociality. In addition, those patients had a tendency to show distress, depression, and adverse psychologic reactions. In the light of the findings of present study, the level of self-esteem increases and social appearance anxiety levels decrease owing to improved facial appearance after surgery.

The results of the present study showed that the self-esteem, sensitivity to criticism, and social appearance anxiety results of the longitudinal and cross-sectional study groups were similar and there was no significant difference between the different study design groups. The esthetic expectation from surgical intervention does not vary among subjects, and similar results can be obtained regardless of the study design when results consistent with the patient's expectations are achieved after surgical intervention.

Further studies should evaluate the changes in the psychologic parameters of subjects with different skeletal deformities undergoing orthognathic surgery treatment, such as Class II malocclusions, skeletal asymmetry, and open bite.

CONCLUSIONS

1. Patients with Class III malocclusion had significantly lower self-esteem before orthognathic surgery than individuals of the control group. After surgery, patients' self-esteem was found to be higher than those of the control group.
2. The self-esteem of patients with Class III malocclusion increased after orthognathic surgery, and sensitivity to criticism and social appearance anxiety decreased significantly.
3. The social appearance anxiety levels of patients with Class III malocclusion was significantly higher before surgery than those of the control group. Through the orthognathic surgery, the social appearance anxiety levels of Class III patients reached close to the control group values.
4. Data on self-esteem, sensitivity to criticism, and social appearance anxiety of patients in longitudinal and cross-sectional study groups were found to be compatible with each other.

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APPENDIX

SELF ESTEEM SCALE	Strongly Agree	Agree	Disagree	Strongly Disagree
1. On the whole, I am satisfied with myself.				
2. At times, I think I am no good at all.				
3. I feel that I have a number of good qualities.				
4. I am able to do things as well as most other people.				
5. I feel I do not have much to be proud of.				
6. I certainly feel useless at times.				
7. I feel that I am a person of worth, at least on an equal plane with others.				
8. I wish I could have more respect for myself.				
9. All in all I am inclined to feel that I am a failure.				
10. I take a positive attitude toward myself.				

Supplemental Fig. 1.

SENSITIVITY TO CRITICISM SCALE
1. How sensitive are you to the criticism? a) Too much sensitive b) Quite sensitive c) Less sensitive d) Not sensitive
2. Criticism or rebuke hurts me too much. a) True b) False
3. How much are you bothered when someone laughs at you or blames you for something you do wrong? a) Too much b) Quite c) Not

Supplemental Fig. 2.

SOCIAL APPEARANCE ANXIETY SCALE
1. I feel comfortable with the way I appear to others.
2. I feel nervous when having my picture taken.
3. I get tense when it is obvious people are looking at me.
4. I am concerned people would not like me because of the way I look.
5. I worry that others talk about flaws in my appearance when I am not around.
6. I am concerned people will find me unappealing because of my appearance.
7. I am afraid that people find me unattractive.
8. I worry that my appearance will make life more difficult for me.
9. I am concerned that I have missed out on opportunities because of my appearance.
10. I get nervous when talking to people because of the way I look.
11. I feel anxious when other people say something about my appearance.
12. I am frequently afraid I would not meet others' standards of how I should look.
13. I worry people will judge the way I look negatively.
14. I am uncomfortable when I think others are noticing flaws in my appearance.
15. I worry that a romantic partner will/would leave me because of my appearance.
16. I am concerned that people think I am not good looking.

Supplemental Fig. 3.