Young patients’ treatment motivation and satisfaction with orthognathic surgery outcomes: The role of “possible selves”

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Introduction: We investigated how young patients’ motivation for orthognathic surgery affected their satisfaction with treatment outcomes. The objective was to explore whether patients’ “possible selves” (ie, their ideas of what they might become in the future) and their parents’ proxy assessments of the patients’ possible selves were significantly correlated with the patients’ treatment satisfaction. Methods: Questionnaire data were collected from 115 former patients (ages, 13-21 at time of surgery) and 117 parents (response rates, 41% and 42%, respectively), with responses from 95 patient-parent pairs. The patients’ motivations before surgery were assessed by determining how energized they were by thoughts about themselves after the surgery, and how much they had focused on the outcomes. The parents completed a parallel measure of their children’s motivation. Patient satisfaction was determined with the postsurgical patient satisfaction questionnaire. Results: The more emotionally energized the patients had been before the surgery, the more satisfied they were with the outcomes (Spearman rho = .54, P < .001). Similarly, the more these patients had focused on esthetic changes and improved functioning, the more satisfied they were with the outcomes (Spearman rho = .46, P < .001; rho = .41, P < .001, respectively). Parents’ recalls of their children’s motivation before the surgery were consistent with the children’s self-reports (all P < .001) and correlated with the children’s satisfaction (P < .001 in the energized domain; P < .01 for the esthetic changes domain). Conclusions: Young patients’ recalls of their possible self-based motivation for orthognathic surgery were highly correlated with their treatment satisfaction. Oral surgeons and orthodontists should discuss with young patients and their parents the patient’s motivation during the consultation phase before treatment to assess how energized and focused they are on future treatment outcomes. (Am J Orthod Dentofacial Orthop 2010;137:26-34)
satisfied with the outcomes of orthognathic surgery. In a long-term assessment, Lazaridou-Terzoudi et al\textsuperscript{19} found that the youngest age group (14-20 years at the surgery) was most critical of their current appearance and less satisfied after the surgery than patients in the 2 other age groups (20-26 years and >26 years). In addition, Scott et al\textsuperscript{20} reported that older patients were more satisfied than younger patients at all postoperative times.

Because orthognathic surgery causes significant improvement in general well-being,\textsuperscript{15,19} self-esteem,\textsuperscript{15,16,20,21} self-concept,\textsuperscript{18,22} social interactions, social needs,\textsuperscript{9,15,23} overall body image,\textsuperscript{24-26} facial body image,\textsuperscript{25} and profile body image,\textsuperscript{24} it is worthwhile to consider why younger patients are not more satisfied. It is important to explore how orthodontists and oral surgeons can predict—before the surgery—which patients will most likely be dissatisfied with the outcomes of their treatment. This study suggests that young patients’ treatment motivation before surgery affects their satisfaction with the treatment outcome.

What do we know about patients’ motivation and the factors that influence their decisions to have surgery? Some studies analyzed the role of significant others on the patients’ surgical decision-making process. They showed that the opinions of others were an important decision-making factor for some patients. Flanary et al\textsuperscript{27} found that 31.1% of the patients reported that what others thought they should do was important for their own decision-making process. Garvill et al,\textsuperscript{12} in a longitudinal study with 27 patients, found that 52% had reached the decision on their own, but 48% were influenced by family members or professionals. Jacobson\textsuperscript{16} found that 22% of patients were urged by family members or friends. It seems important to consider that these influences might be even stronger for younger patients.

Several studies analyzed the relationships between these motivational factors and satisfaction with treatment outcomes. In a review based on other types of cosmetic surgery, Peterson and Topazian\textsuperscript{28} stressed that patients who had surgery to please parents or significant others, and who had vague, nonspecific expectations were more likely to be dissatisfied with the surgical results. Other studies focusing on orthognathic surgery showed that lack of support from significant others,\textsuperscript{8,29} unrealistic expectations,\textsuperscript{8,30} emotional unpreparedness,\textsuperscript{30} and pressure from others to undergo surgery\textsuperscript{8,30} led to dissatisfaction. In addition, Rispoli et al\textsuperscript{26} found that patients with more esthetic and functional concerns before surgery were more likely to be satisfied with the results. Considering this rather eclectic set of findings, the question arises whether a unifying explanation can be found for the relationship between patients’ motivations before surgery and their treatment satisfaction after surgery.

We suggest that considering patients’ “possible selves” as a unifying concept could provide a connection between patient motivation and satisfaction with the outcome of orthognathic surgery.\textsuperscript{31} “Possible selves” are the patients’ ideas of what they might become in the future. Possible selves can be positive and expressed as hopes or dreams about positive future identities. They can also be negative and take on the form of fears of whom the person might become in the future. Research on the use of possible selves in connection with psychological phenomena is extensive and covers many topics.\textsuperscript{32} Research based on this possible-self theory in health-related areas also addressed diverse phenomena. For example, some studies used the concept of possible selves to explore lifestyle-related behaviors such as alcohol abuse,\textsuperscript{33,34} smoking,\textsuperscript{34-36} and exercising.\textsuperscript{37} Other studies applied the concept of possible selves to chronic pain,\textsuperscript{38} depression,\textsuperscript{39} borderline personality disorder,\textsuperscript{40} and Alzheimer’s disease.\textsuperscript{41} However, this is the first study that applies this widely used concept to orthognathic surgery patients.

When considering the relationship between possible selves and orthognathic-surgery patients’ satisfaction with treatment outcomes, it is important to understand that these possible selves affect a person in 2 ways.\textsuperscript{42} First, the possible-selves concept energizes the person to work toward making positive possible selves become a reality or to prevent negative possible selves from becoming real. In this sense, possible selves affect the intensity or the strength of a patient’s motivation. Second, possible selves also provide a structure to a person’s motivations by affecting how clearly he or she focuses on a specific positive or negative possible self. This second motivational component can be understood as affecting the direction of the motivation.

Patients who consider undergoing combined orthodontic and orthognathic treatment are likely to differ in how they engage in possible self-images of themselves after the treatment. Some patients are excited to have surgery; they might be looking forward to positive changes in appearance or function. These patients are energized. On the other hand, some might not be excited about change and might suppress even thinking about the outcomes. Some patients might also be focused regarding their future possible selves. For example, they might imagine how they will look after the surgery and specifically how esthetic their profile will be or how their smile will change. Focused patients develop vivid images about their future possible selves, whereas nonfocused patients do not have a clear picture of the
surgical outcomes. These differences clearly shape a patient’s motivation to undergo orthognathic surgery and, according to the theory of possible selves of Markus and Nurius, will determine their satisfaction when the possible selves are realized in the future. An application of this theory to the situation of orthognathic surgery patients therefore leads to the concrete hypotheses that (1) the more energized and enthusiastic patients are when thinking about a future, postoperative possible self, and (2) the more patients are clearly focused on their future, postoperative possible self, the more satisfied they will be with the outcomes of their surgery.

MATERIAL AND METHODS

This study was approved by the Institutional Review Board for the Medical Sciences at the University of Michigan, Ann Arbor. A total of 318 patients who had undergone orthognathic surgery at the Oral and Maxillofacial Surgery Department of the University of Michigan or in a private group practice of 3 oral surgeons in Ann Arbor, Mich, between January 1, 1996, and December 31, 2005, were contacted by their surgeons and informed about the study. These recruitment letters were accompanied by a survey for the patients and a survey for their parents with stamped return envelopes. The inclusion criteria for receiving this mailing were (1) patient age (13-21 years at the surgery), (2) a developmental dentofacial deformity that was corrected by the surgery, and (3) the ability to independently complete the questionnaire. Patients were excluded from the study if they were not in this age group, had surgery to correct secondary deformities resulting from trauma or tumors, or had surgery not involving the tooth-bearing part of the jaws (eg, genioplasty alone).

Thirty-seven questionnaires were not deliverable because of invalid addresses. One hundred fifteen patients (response rate, 41%) and 117 parents (response rate, 42%) returned the questionnaires. Of these surveys, 95 in each group came from a patient-parent pair. The patients’ average age at the time of surgery was 16.89 years (SD, 1.920; range, 13-21 years), and the average age when responding to the survey was 21.84 years (SD, 3.054; range, 15-31 years). Sixty-nine percent of the responding patients were female, and 31% were male. Of the 105 patients who identified their ethnicity, 97 were white, 4 were black, 3 were Hispanic, and 1 was Asian. Thirty-two patients (23%) had maxillary surgery, 62 (45%) had mandibular surgery, and 43 (31%) had surgery in both arches. Fourteen (12%) of the parent respondents were fathers, and 103 (88%) were mothers.

A comparison of the respondents and nonrespondents showed no significant differences between the 2 groups concerning providers. These analyses showed that female patients were more likely to respond than male patients (45.9% vs 33%; P = 0.02). The responding patients did not differ significantly from the nonrespondents in age at surgery (16.96 vs 16.90 years) or current age (21.80 vs 22.28 years). However, the respondents had a tendency to have had their surgery more recently than the nonrespondents (4.84 vs 5.39 years ago; P = 0.09).

The researchers gave the prepared mailings to the 4 oral surgeons, who then attached address labels and mailed the surveys to the parents of the former patients. A second mailing was sent 6 weeks later to patients and parents who had not responded to the first mailing. Six weeks after the second mailing, the nonresponding patients from the University of Michigan clinic received a third mailing.

The recruitment cover letters for the parents and the patients were written and signed by the patients’ providers. Because the parents received the survey and had to give it to their children, this ensured that the parents consented to have their children respond if they were under 18 years of age. No written consent and assent were required by the Institutional Review Board because the signatures on these forms would have revealed the respondents’ names.

Because the measurements of possible selves is domain specific and no prior research explored the role of possible selves for orthognathic surgery patients, it was necessary to develop the questions used to assess these concepts in this study. The reliability and validity of these questions will therefore be reported. In the patient survey, 12 questions concerning possible self and motivational issues were included (Fig). As can be seen from the wording of these questions, they have intuitive face validity. Four questions were designed to measure the energizing component of the patients’ possible selves. Eight items measured how much the patients had focused on the postoperative possible self.

A factor analysis (extraction method: principal component analysis; rotation method: Varimax) was conducted to determine whether the 4 items concerning the energizing component and the 8 items about the focusing component consistently assessed these concepts. The 4 energizing items all loaded highly on a first factor (Cronbach α = 0.89). A “possible-self energizing component” index was therefore computed by averaging the answers to these 4 questions. The 8 focus questions loaded on 2 factors, with 3 items focusing on postoperative esthetics (Fig, patient questions e-g) loading on 1 factor and 5 items focusing on the surgery and postoperative oral function (Fig, patient questions h-l) loading...
Part 1. Patient Questions

Questions assessing the energizing component:

a. I was really excited when thinking about the way I would look after the surgery.
b. I was excited about the way my profile would look after surgery.
c. I was really excited about the way my teeth would look after surgery.
d. I was really excited about having this surgery.

e. I often thought about how I would look after the surgery.
f. I often thought about how my profile would look after surgery.
g. I often thought about what my teeth would look like after surgery.

Questions assessing the patient’s focus on post operative esthetics:

h. I often thought about how it would be easier to chew after surgery.
i. I often thought about how my speech would be improved after surgery.
j. I was really determined to have this surgery.
k. I understood why I was having surgery.
l. How much did you think about having surgery?

Note: Answers to statements a to k were given on 5 point answer scales ranging from 1 = “strongly disagree” to 5 = “strongly agree”. The answers to question l were given on a 5 point answer scale ranging from 1= “not at all” to 5 = “very often.”

Part 2: Parent Questions

Questions assessing the energizing component:

My child

a. - was really excited when thinking about the way he/she would look after surgery.
b. - was excited about the way his/her profile would look after surgery.
c. - was really excited about the way his/her teeth would look after surgery.
d. - was really excited about having this surgery.

Questions assessing the child’s focus on post operative esthetics:

My child

e. - often thought about how he/she would look after surgery.
f. - often thought about how his/her profile would look after surgery.
g. - often thought about how his/her teeth would look after surgery.

Note: The answers were given on 5 point answer scales ranging from 1 = “strongly disagree” to 5 = “strongly agree.”

Fig. Possible-self assessment.

on a second factor. The reliability of these 2 scales (Cronbach $\alpha = 0.82$ and 0.71, respectively) justified computing 2 separate indexes: “possible self—focus I” and “possible self—focus II.” The results of the factor analyses showed that these scales have construct validity. This fact allowed us to use the created
possible-self indices in the presentations of the results in Tables I and II.

The patients’ satisfaction with the outcome of the surgery was assessed with the postsurgical patient satisfaction questionnaire (PSPSQ) by Kiyak et al.24 This questionnaire consisted of 3 questions (Table III) with 7-point rating scales from 1, “not at all,” to 7, “very.” The factor analysis confirmed that the 3 questions loaded on 1 factor. The reliability of this scale was excellent (Cronbach α = 0.90), and an index of overall patient satisfaction was constructed by averaging the responses to the 3 questions for each patient.

The parent survey contained 4 items to measure the parents’ perception of the energizing component of the patients’ possible selves and 7 items assessing the parents’ perception of the focusing aspect of their children’s possible selves (Fig). The factor analysis of the parents’ responses showed that the 4 energizing items all loaded on 1 factor (Cronbach α = 0.85). An index of the parents’ perceptions of the “possible-self energizing component” was therefore constructed by averaging the answers to these questions. Evaluation of the 7 focus items showed that the findings concerning the focus on postoperative esthetics (possible self—focus I) could be replicated (Cronbach α = 0.76), whereas the 4 items related to the focus on the surgery and postoperative oral function did not load on 1 factor. Only the focus I index was therefore computed. The possible-self scales had face validity (Fig), construct validity as demonstrated by the results of the factor analyses, and external validity. By assessing both patient and parent possible-self measures independently, these measures serve as external criteria for each other. External validity is shown by the results reported in Table II: that the independently assessed patient and parent possible-self concepts were highly correlated.

### Statistical analysis

The data were analyzed by using SPSS software (version 14.0, SPSS, Chicago, Ill). Factor analyses were used to determine the construct validity of the patients’ and the parents’ possible-self measures. The reliability of the scales was determined by computing Cronbach α reliability coefficients for each scale. Descriptive statistics were used to provide an overview of the distribution of the respondents’ answers concerning the concepts of interest (Tables I and III). Correlational analyses with Spearman rho coefficients were performed to determine whether the predicted relationships between the patients’ possible selves and the parents’ perceptions of the patients’ possible selves correlated as predicted with treatment satisfaction.

### RESULTS

Before testing the hypotheses, we considered whether the patients truly varied in the degrees to which they were motivated. Specifically, were there variations in the energizing and focusing components of their possible-self reflections? In addition, we considered whether parents’ perceptions of their children’s possible-self components varied. Table I provides an overview of the aggregated percentages of responses and the mean values for these variables. On average, the patients’ self-perceived and parent-perceived motivations were high, with average scores between 3.41 and 3.8 on a 5-point scale (5 was the highest level of motivation). However, as expected, the patients differed in their degrees of motivation. For example, in the patients’ responses concerning how energized they were before the surgery, Table I shows that 24.3% of them

![Table I](https://example.com/table1.png)
Table II. Correlations between patients’ self-assessed motivational factors and parents’ assessments of their children’s motivations

<table>
<thead>
<tr>
<th>Patients’ self-assessments of possible selves</th>
<th>Patients’ self-assessments of possible selves</th>
<th>Focus on postoperative function (focus I)</th>
<th>Focus on postoperative function (focus II)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energizing component</td>
<td>1</td>
<td>.86</td>
<td>.70</td>
</tr>
<tr>
<td></td>
<td>(P &lt; 0.001)</td>
<td>(n = 115)</td>
<td>(n = 112)</td>
</tr>
<tr>
<td>Focus on postoperative esthetics (focus I)</td>
<td>.86 (n = 115)</td>
<td>1</td>
<td>.59 (n = 112)</td>
</tr>
<tr>
<td>Focus on postoperative function (focus II)</td>
<td>.70 (n = 112)</td>
<td>.59</td>
<td>1</td>
</tr>
<tr>
<td>Parents’ assessments of the children’s</td>
<td>.60 (n = 93)</td>
<td>.52</td>
<td>.48</td>
</tr>
<tr>
<td>possible selves</td>
<td>(P &lt; 0.001)</td>
<td>(n = 93)</td>
<td>(P &lt; 0.001)</td>
</tr>
<tr>
<td>Energizing component</td>
<td>.54 (n = 93)</td>
<td>.58</td>
<td>.43</td>
</tr>
<tr>
<td>Focus on postoperative esthetics (focus I)</td>
<td>(P &lt; 0.001)</td>
<td>(n = 93)</td>
<td>(P &lt; 0.001)</td>
</tr>
</tbody>
</table>

were not energized, 25.2% had an intermediate level of motivation, and 50.4% were clearly motivated. Based on these findings, it seems justified to assume that the degree of the patients’ motivations varied but were skewed toward highly energized and highly focused possible selves. In addition, these data also show that the parents’ perceptions of the degree of their children’s motivation varied and were also skewed toward highly energized and highly focused possible selves.

One follow-up question was whether parents’ perceptions match their children’s self-perceptions. As can be seen in Table II, the patients’ self-assessed motivation for orthognathic surgery and the parents’ assessments of their children’s motivation were significantly correlated. The more the patients reported that they engaged in energizing reflections, the more the parents perceived that their children engaged in energizing reflections (rho = 0.60; P < 0.001). Similarly, the more the patients reported that they focused on the esthetic outcomes of the surgery, the more the parents reported that their children had focused on the esthetic outcomes (rho = 0.58; P < 0.001).

Table II also shows that energizing and focusing motivational forces are not independent. The more the patients were energized, the more they also focused on both the esthetic and oral-function components of their postoperative possible selves (rho = .86, P < 0.001; rho = .70; P < 0.001, respectively).

The 2 hypotheses stated that (1) the more energized patients were when thinking about a future, postoperative possible self, and (2) the more patients were clearly focused on the postoperative possible self, the more satisfied they would be with the outcome of the surgery. Satisfaction with the treatment outcome was assessed with the PSPSQ of Kiyak et al.24 As can be seen in Table III, this questionnaire consists of 3 questions with 7-point answer scales. Answers to the first 2 questions showed that...
approximately 70% of the patients would likely re-
elect surgery and recommend it to others; considering
everything, 78.3% of the respondents reported clear satsis-
cation with the results of the surgery. When an 
average score of the 3 responses was computed as 
an index of patient satisfaction, 73.7% of the respon-
dents were highly satisfied, and 5.3% were not at all 
or not satisfied.

Table IV shows that the data clearly supported the 
hypotheses. The more energized the patients were before 
surgery, the higher their postsurgical satisfaction was, as 
measured with their responses to the 3 satisfaction items 
(rho = .46, P < .001; rho = .52, P < .001; rho = .43, 
P < .001) and the overall satisfaction index (rho = .54, 
P < .001). The patients’ focus on the esthetic compo-
ent correlated significantly with each of the 3 items of 
the satisfaction scale (rho = .37, P < .001; rho = .46, 
P < .001; rho = .41, P < .001) and the overall satisfac-
tion index (rho = .46, P < .001). In addition, the more 
the patients had focused on the surgery, especially the 
oral-functioning component of their possible selves, 
the more satisfied they were. The patients’ possible self—focus II index correlated significantly with each 
of the 3 items of the satisfaction scale (rho = .35, 
P < .001; rho = .41, P < .001; rho = .35, P < .001) and 
the overall satisfaction index (rho = .41, P < .001) (Table IV).

Table IV also shows that the parents’ assessments of 
the patients’ possible selves correlated significantly 
with their children’s treatment satisfaction. The more 
the parents perceived their children as having been 
energized before the surgery, the more satisfied the 
patients were with the treatment outcome (rho = .36, 
P < .001). The more the parents perceived their 
children as having a clear esthetic focus, the more 
satisfied the patients were (rho = .29, P < .01).

**DISCUSSION**

An analysis of the degree to which the respondents in 
this study were satisfied with their surgery showed that 
overall 73.7% of the patients reported very high satsis-
cation. On a scale from 1, “not at all satisfied,” to 7, “very 
satisfied,” the average satisfaction score was 5.86. These 
findings are consistent with the results of other studies 
that used the PSPSQ to assess patient satisfaction with 
orthognathic surgery outcomes.24 The average satisfac-
tion scores in these other studies ranged from 5.15 to 
6.11.18,24,26,29,43 The result of this study that approxi-
mately 80% of the patients would reelect to have surgery 
if they had to make the decision again also agreed with 
past studies.7,12 However, 79% were likely to recom-
mend the surgery to others; this is slightly lower than 
the range of 87% to 89% reported by other authors.14,16

Although these high percentages of satisfied pa-
tients are impressive, the fact that some patients were 
unhappy with their surgical results deserves attention.
One interesting question in this context would be to de-
termine how we can predict which patients will be dis-
satisfied with the outcomes of orthognathic surgery. We 
focused on finding an answer to this question by using 
the theory of possible selves.31 Based on that, this study 
tested whether the degree to which patients were ener-
gized by thinking about the surgical outcomes or fo-
cused on the outcomes of the surgery would be 
correlated with their postsurgical satisfaction. The
results showed convincingly that both the energizing and the focusing aspects of the patients’ possible-self evaluations were significantly correlated with their postsurgical satisfaction. In addition, the parents’ assessments of their children’s possible self components were also correlated with the children’s satisfaction.

These findings support the idea that the theory of possible selves can be used as a unifying concept to help predict patient satisfaction. As shown previously, unrealistic expectations, emotional unpreparedness, and pressure from others to undergo surgery can cause patient dissatisfaction. These factors are related to the concept of possible selves. All can be reinterpreted as affecting the specificity, clarity, and emotional quality of a patient’s possible self. For example, emotionally unprepared patients might not be excited about the potential outcomes of the surgery or clearly focused on a postoperative possible self. This can create problems for the patient’s acceptance of the new situation.

What are the practical implications of these findings? The answer to this question is twofold. First, the findings imply that it could be helpful for providers to understand the viewpoints of their younger patients if they want to predict whether a patient is likely to be satisfied or dissatisfied with the treatment outcome. Because these findings suggest that the more excited and focused a patient is on the future surgery outcomes, and the more satisfied he or she will be with the results of the surgery, it could be helpful for both orthodontists and oral surgeons to ask their patients about their possible-self motivations and consider these when finalizing a treatment plan. In addition to asking about their possible-self motivations, it would also be helpful to ask parents about their perceptions of their children’s possible selves. The information from these conversations could be valuable for orthodontists and oral surgeons when discussing treatment options with a surgical candidate.

A second practical consideration that can be based on these findings is that motivations are not static but can be shaped by communication with the patients. If orthodontists and oral surgeons realize that patients are not energized and positively focused on the surgery outcomes, and thus are in danger of ultimately being dissatisfied with the treatment outcomes, active steps can be taken to induce possible-self reflections in these patients. For example, providing a patient with vivid images of his or her future esthetic appearance or engaging the patient in an active comparison of facial features before and after surgery could increase the patient’s motivation considerably and might ultimately improve treatment satisfaction.

A clear limitation of this study was that it was retrospective. Patients answered the questions about their motivations for surgery on average 4.8 years after they had actually undergone surgery. This limitation is clearly related to the fact that no prior research has explored the role of possible selves in orthognathic surgery patients’ treatment satisfaction. This study was a first exploration of the usefulness and importance of the possible-self concept for this domain. With these findings, however, it is now important to conduct a prospective study to assess patients’ possible-self motivations presurgically and then evaluate their satisfaction postsurgically.

CONCLUSIONS

1. Patients differ in the degrees to which they are energized by thinking about their postsurgical possible selves and to which they focus on postsurgical possible selves. In addition, parents can make proxy assessments of their children’s possible-self considerations. These proxy assessments correlated significantly with the children’s own assessments regarding being energized and focused on esthetics.
2. The more energized and focused the patients recalled being before their orthognathic surgery, the more satisfied they were with the treatment outcomes.
3. The more the parents perceived that their children had been energized and focused on their postsurgical possible selves before surgery, the more satisfied the patients were.

We thank Drs Airtón Arruda, George Upton, and Katherine Kelly for their valuable feedback to this research as members of the first author’s masters thesis committee, and Drs Dalbert W. Fear, William D. Baxter, Roger B. Hitchcock, and George Upton for supporting this study by allowing us to survey their patients and writing a cover letter for the survey; without their generous help, this study could not have been conducted.

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