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Validation of the Short-Form 36 for Adolescents Undergoing Reduction Mammaplasty

Catherine T. McNamara, BS*†
Gareth Parry, PhD‡§
Rebecca Netson, MS†
Laura C. Nuzzi, BA*†
Brian I. Labow, MD, FACS, FAAP*†

Background: Health-related quality of life improvements after reduction mammaplasty have been reported by patients. Although instruments exist for adults, a validated outcomes survey is not available for adolescents. This study aims to validate the Short-Form 36 (SF-36) for adolescents undergoing reduction mammaplasty.
Methods: Patients aged 12–21 years were prospectively recruited between 2008 and 2021 to unaffected or macromastia cohorts. Patients completed four baseline surveys: SF-36, Rosenberg Self-esteem Scale, Breast-related Symptoms Questionnaire, and Eating Attitudes Test. Surveys were repeated at 6 and 12 months postoperatively (macromastia cohort), and at 6 and 12 months from baseline (unaffected cohort). Content, construct, and longitudinal validity were assessed.
Results: A total of 258 patients with macromastia (median age: 17.5 years), and 128 unaffected patients (median age: 17.0 years) were included. Content validity was established, and construct validity was fulfilled: internal consistency was confirmed for all domains (Cronbach alpha >0.7); convergent validity was satisfied through expected correlations between the SF-36 and Rosenberg Self-esteem Scale, Breast-related Symptoms Questionnaire, and Eating Attitudes Test, and known-groups validity was established through significantly lower mean scores in all SF-36 domains in the macromastia cohort compared with unaffected patients. Longitudinal validity was established by significant improvements in domain scores from baseline to 6 and 12 months postoperatively in patients with macromastia ($P < 0.05$, all).
Conclusions: The SF-36 is a valid instrument for adolescents undergoing reduction mammaplasty. Although other instruments have been used for older patients, we recommend the SF-36 when assessing health-related quality of life changes in younger populations. *(Plast Reconstr Surg Glob Open 2023; 11:e5075; doi: 10.1097/GOX.0000000000005075; Published online 15 June 2023.)*

INTRODUCTION

Macromastia is common in adolescents, producing physical symptoms such as neck, back, and shoulder pain even in young patients. Disordered eating habits, poor self-esteem, and psychosocial deficits are also common in this population.[1,2] Reduction mammaplasty yields significant symptom relief for these patients.[2–4] As a result, recommendations for early surgical intervention have been made to afford affected adolescent/young adult patients the opportunity for health-related quality of life (HRQoL) gains.[2,4] Despite a growing number of reports in this area, no patient-reported HRQoL outcomes survey has been validated for younger breast patients.

The BREAST-Q has become the standard questionnaire used to gauge patient-reported outcomes for women undergoing a range of breast operations. However, it was developed using adults with a mean preoperative age of 43 years; thus, questions important to adolescent patients may be lacking.[5]

The Short Form 36 (SF-36) has become a commonly used and validated tool to assess HRQoL for adult and

*From the *Adolescent Breast Clinic, Boston Children's Hospital and Harvard Medical School, Boston, Mass.; †Department of Plastic and Oral Surgery, Boston Children's Hospital and Harvard Medical School, Boston, Mass.; ‡Health Equity Research Lab, Cambridge Health Alliance, Cambridge, Mass.; and §Harvard Medical School, Boston, Mass.*

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adolescent populations with a variety of disorders, including cystic fibrosis and endometriosis.[6–11] The survey consists of eight domains (physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional, and mental health), providing insight into both general physical and mental well-being.[12] One systematic review reported the SF-36 as the most commonly used measure to examine postoperative quality of life across various surgical specialties (13/19 studies, 68%).[13] It has also been used to measure HRQoL changes following reduction mammaplasty by our group and others.[2,4,14–16]

The purpose of this study was to validate the effectiveness of the SF-36 as a means to examine HRQoL changes in adolescents undergoing reduction mammaplasty. Although not specific for macromastia per se, its applicability in this population may be useful in the study of younger patients undergoing breast reduction.

Takeaways

Question: Is the Short-Form 36 (SF-36) a valid tool for measuring health-related quality of life in adolescents undergoing reduction mammaplasty?

Findings: This prospective study included 258 patients with macromastia and 128 unaffected patients. Data were collected from four patient-completed surveys: SF-36, Rosenberg Self-esteem Scale, Breast-related Symptoms Questionnaire, and Eating Attitudes Test. These data were used in content, construct (including internal, convergent, and known-groups validity), and longitudinal validity analyses. The SF-36 satisfied all validity analyses.

Meaning: The SF-36 is a valid tool for assessing health-related quality of life in adolescents presenting for reduction mammaplasty, and we recommend it be utilized in future research of this young population.

METHODS

Eligibility Criteria

Study approval was granted by our institution's review board (Protocol Number: X08-10-0492). Patients between 12 and 21 years old presenting to our institution were recruited to one of two cohorts: patients with symptomatic macromastia, or unaffected patients (patients without macromastia). To qualify for the macromastia cohort, a diagnosis was required by the senior author (B.I.L.). This was established through physical examination of the patient, modified Schnur criteria, and a symptom evaluation.[4,17–19] Additionally, patients could not have previously received surgical treatment for the breast/chest. Patients were eligible for the unaffected cohort if they were free of psychosocial disorders, and did not have any breast/chest conditions or symptoms. Patients were recruited from October 2008 through April 2021, and patients and parents/guardians (where appropriate) provided written consent/assent prospectively.

Surveys

Patients completed four surveys: SF-36 (version 2), Rosenberg Self-esteem Scale (RSES; explores individual self-esteem), Breast-related Symptoms Questionnaire (BRSQ; assesses breast-related symptoms/concerns), and Eating Attitudes Test (EAT-26; measures general eating attitudes/behaviors).[12,20–23] While a lower score suggests healthier eating habits/attitudes for the EAT-26, a higher score is strong for the SF-36, RSES, and BRSQ surveys. Surveys were completed at baseline (preoperatively), and at 6 and 12 months postoperatively for patients with macromastia. For unaffected patients, surveys were completed at baseline, and again at 6 and 12 months. Any patient who did not answer a baseline and a 6-month or 12-month survey was omitted from validation analyses.

Validity Analyses

To assess SF-36 validity, content, construct (internal, convergent, and known-groups validity), and longitudinal validity were examined. The interpretations of and predictions for construct and longitudinal validity for our study population are detailed below. (**See figure, Supplemental Digital Content 1**, which shows the SAMPL checklist. **http://links.lww.com/PRSGO/C613**).

Construct Validity

Internal Consistency

Internal consistency is indicated when singular items are consistent within associated domains.[24] Using baseline SF-36 survey data from patients with macromastia, internal consistency of items comprising each SF-36 domain was assessed using the Cronbach alpha coefficient. A Cronbach alpha coefficient greater than 0.7 indicated internal consistency within a domain.[25] We predicted a Cronbach alpha greater than 0.7 for all SF-36 domains.

Convergent Validity

Convergent validity is present if the tool correlates with another established measure possessing a similar/identical construct.[26] Pearson's correlation coefficient (r) was calculated to measure correlations between the SF-36 and the RSES, BRSQ and EAT-26 surveys. Correlations were designated as $|r| = 0.2$ - 0.4 (weak correlation), $|r| = 0.4$ - 0.6 (moderate correlation), and $|r| > 0.6$ (strong correlation).[27]

We hypothesized the following correlations with SF-36 domains at baseline: strong positive correlation between RSES scores and mentally/emotionally-related domains (vitality, social functioning, role-emotional and mental health); strong positive correlation between BRSQ scores and physically-related domains (physical functioning, role-physical, bodily pain, and general health); and at least moderate negative correlation between EAT-26 scores and the mental health domain.[12]

Known-groups Validity

When the measure is able to differentiate across groups that are expected to show a variation in responses, known-groups validity exists.[28] Using independent samples t-tests, we predicted that known-groups validity would be established if mean baseline SF-36 domain scores for patients with macromastia were significantly lower than unaffected patients.

Longitudinal Validity

Longitudinal validity is established if the measure can be used to indicate expected and meaningful change over a period of time.[29] By comparing SF-36 domain scores in patients with macromastia at baseline, and at 6 and 12 months postoperatively through paired sample t-tests, we predicted longitudinal validity would exist if mean scores for all SF-36 domains increased significantly from baseline to 6 and 12 months postoperatively.

Statistical Analyses

Demographic data were collected from medical records, and frequencies were tabulated. Race was dichotomized into white and non-white, and body mass index (BMI) category was grouped into underweight/healthy-weighted, and overweight/obese. Median age was calculated at baseline for each cohort, and the Mann-Whitney *U* test was used to determine any significant age difference between groups. The Centers for Disease Control and Prevention (CDC) BMI Percentile Calculator for Child and Teen, and the CDC Adult BMI Calculator for individuals younger than 20 years old or 20 years and older, respectively, were used to ascertain BMI category.[30,31] Pearson chi-squared test was used to determine the association between BMI category and unaffected patients and those with macromastia. Survey data were housed in REDCap (Research Electronic Data Capture). IBM SPSS Version 24 (IBM Corp., Armonk, N.Y.) was used to generate all statistical results, and a *P* value less than 0.05 was deemed statistically significant.

RESULTS

Patient Demographics

Among the 258 patients with macromastia, median [interquartile range (IQR)] age at baseline was 17.5 (2.7) years, and the majority of patients were white (n = 155, 76.7%) and overweight or obese (n = 159, 61.6%) (Table 1). Nearly all patients in this cohort were diagnosed with bilateral macromastia (n = 256, 99.2%); two patients had unilateral macromastia.

Among the 128 unaffected patients, median (IQR) age at baseline was 17.0 (4.0) years, and patients were largely white (n = 83, 70.3%) and underweight or healthy-weighted (n = 88, 72.1%). Only two patients (1.6%) in this cohort were underweight.

Although age and race were similar among unaffected patients and those with macromastia (P > 0.05, both), patients with macromastia had 320% increased odds of being overweight or obese compared to unaffected patients (odds ratio: 4.2; 95% confidence interval: 2.6–6.6; P < 0.001).

Construct Validity: Internal Consistency

Internal consistency of baseline SF-36 domains measured using Cronbach's Alpha coefficient are summarized in Table 2. All SF-36 domains showed at least acceptable (Cronbach's Alpha >0.7) internal consistency, with the physical functioning, role-physical, and role-emotional domains showing excellent (Cronbach alpha ≥0.90) internal consistency.

Table 1. Demographics

Characteristic	Macromastia (n = 258)	Unaffected (n = 128)	P
Median (IQR) age at baseline, y	17.5 (2.7)	17.0 (4.0)	0.06
Diagnosis, n (%)			
Bilateral macromastia	256 (99.2)		
Unilateral macromastia	2 (0.8)		
Race, n (%)			
White	155 (76.7)	83 (70.3)	0.21
Non-white*	47 (23.3)	35 (29.7)	
BMI category, n (%)			
Underweight or healthy-weighted	99 (38.4)	88 (72.1)	**<0.001**
Overweight or obese	159 (61.6)	34 (27.9)	

*Includes patients who identified as: Black or African-American, Hispanic, Asian, American Indian or Alaska Native, or Other.
BMI, body mass index. IQR, interquartile range.

Table 2. Internal Consistency of SF-36 Domains as Measured Using Cronbach Alpha

	n	Cronbach Alpha*	95% CI	Level
Physical functioning	247	0.90	(0.88–0.92)	Excellent
Role - physical	256	0.91	(0.88–0.92)	Excellent
Role - emotional	253	0.93	(0.92–0.95)	Excellent
Vitality	249	0.79	(0.75–0.83)	Acceptable
Mental health	254	0.81	(0.77–0.85)	Good
Social functioning	255	0.81	(0.76–0.85)	Good
Bodily pain	256	0.78	(0.72–0.83)	Acceptable
General health	250	0.77	(0.72–0.81)	Acceptable

*The Cronbach alpha coefficient ranges from 0 to 1; 0 indicates no internal consistency, and 1 indicates perfect. internal consistency.[25] Cronbach alpha was determined using baseline surveys completed by patients with macromastia.
CI, confidence interval.

Construct Validity: Convergent Validity

Table 3 summarizes baseline associations between the RSES, BRSQ, and EAT-26 scores, and the SF-36 domains expected to be correlated with them. RSES scores were strongly positively correlated with mentally-focused vitality (r = 0.628) and mental health (r = 0.705) SF-36 domain scores. However, RSES scores were only moderately positively correlated with social functioning (r = 0.572) and role-emotional (r = 0.513) SF-36 domain scores. Similarly, BRSQ scores were moderately positively correlated with physically-focused physical functioning (r = 0.535), role-physical (r = 0.469) and bodily pain (r = 0.550) SF-36 domain scores, and weakly positively correlated with general health (r = 0.259) domain scores. Lastly, EAT-26 scores were weakly negatively correlated with SF-36 mental health domain scores (r = - 0.322).

Construct Validity: Known-groups Validity

To determine known-groups validity, mean SF-36 domain scores were compared between age-matched unaffected patients and those with macromastia at baseline (Table 4). Patients with macromastia reported significantly lower mean scores in all domains compared with unaffected patients (P < 0.05, all).

Table 3. Correlations between the SF-36 and the RSES, BRSQ, and EAT-26 to Assess Convergent Validity

	Physical Functioning	Role - Physical	Bodily Pain	General Health	Vitality	Social Functioning	Role - Emotional	Mental Health
RSES								
Correlation (r)		N/A†		0.415	0.628	0.572	0.513	0.705
n				248	246	253	250	251
BRSQ								
Correlation (r)	0.535	0.469	0.550	0.259		N/A*		
n	242	249	249	244				
EAT-26								
Correlation (r)		N/A†		– 0.144		N/A*		– 0.322
n				248				253

*Analysis not conducted, no relevant correlation predicted.
BRSQ, Breast-related Symptoms Questionnaire; EAT-26, Eating Attitudes Test; RSES, Rosenberg Self-esteem Scale.

Table 4. Establishing Known-groups Validity Using Macromastia and Unaffected Cohort Scores at Baseline

	Patients with Macromastia			Unaffected Patients			Difference between Patients with Macromastia and Unaffected Patients		
	n	Mean*	Standard Deviation	*n*	Mean*	Standard Deviation	Difference†	95% CI	*P*
Physical functioning	247	70.3	24.9	123	93.6	16.8	–23.3	(–27.6 to –19.0)	<0.001
Role - physical	256	65.0	27.6	127	91.0	15.7	–26.0	(–30.4 to –21.7)	<0.001
Bodily pain	256	49.2	22.5	128	82.7	18.1	–33.5	(–37.7 to –29.3)	<0.001
General health	250	73.0	17.8	124	79.6	16.3	–6.6	(–10.4 to –2.9)	0.001
Vitality	249	48.1	19.2	119	63.8	17.5	–15.7	(–19.8 to –11.6)	<0.001
Social functioning	255	63.3	26.9	127	84.8	19.4	–21.5	(–26.2 to –16.8)	<0.001
Role - emotional	253	68.2	28.8	125	87.3	15.6	–19.1	(–23.6 to –14.5)	<0.001
Mental health	254	63.7	19.0	125	75.9	16.5	–12.2	(–15.9 to –8.5)	<0.001
RSES	255	28.9	5.8	126	33.6	5.2	–4.7	(–5.9 to –3.5)	<0.001
BRSQ	251	36.3	16.1	121	94.0	11.5	–57.7	(–60.6 to –54.9)	<0.001
EAT-26	256	9.8	9.8	127	5.5	5.9	4.3	(2.7 to 5.9)	<0.001

*Represents baseline scores.
†A negative value indicates a lower average score at baseline in patients with macromastia compared with unaffected patients.
BRSQ, Breast-related Symptoms Questionnaire; CI, confidence interval; EAT-26, Eating Attitudes Test; RSES, Rosenberg Self-esteem Scale.

Longitudinal Validity

To establish longitudinal validity, the difference in mean SF-36 domain scores in patients with macromastia at baseline were compared with scores 6 and 12 months postoperatively (Tables 5 and 6). All mean SF-36 domain scores significantly improved from baseline to 6 and 12 months postoperatively ($P < 0.001$, all). Conversely, unaffected patients did not have considerably different scores in any SF-36 domain from baseline to 6 and 12 months (Fig. 1). (**See table, Supplemental Digital Content 2**, which shows mean SF-36 domain scores at baseline, and 6 and 12 months follow-up or postoperatively for the unaffected and macromastia cohorts, respectively. **http://links.lww.com/PRSGO/C614**.)

DISCUSSION

Macromastia results in significant HRQoL detriments in adolescents that can be largely ameliorated through surgical correction.[2,4] However, a validated patient-reported HRQoL survey specific to adolescents with macromastia has yet to be determined. The overall goal of our study was to validate the SF-36 survey as an appropriate measure of HRQoL changes in this patient population by examining content validity, construct validity (internal consistency, convergent validity, and known-groups validity), and longitudinal validity. Overall, we found that the SF-36 provides a reliable and useful measure of HRQoL in adolescents with macromastia.

Content Validity

Establishing content validity is essential because it examines whether the SF-36 covers the full range of health status domains relevant to the population of interest.[32] The SF-36, although not disease specific, focuses on general physical and mental HRQoL. It has been validated across adult and adolescent populations with different conditions, suggesting an overall general applicability that we expected to apply to our sample of patients with macromastia undergoing reduction mammaplasty.[6–11]

On the mental HRQoL arm, the SF-36 has four domains (vitality, social functioning, role-emotional, mental health; vitality and social functioning also overlap with physical HRQoL). These domains cover general perceptions/feelings about oneself, and their impact on everyday life/activities.[12] Given that adolescents with macromastia have reported general psychosocial deficits that interfere with their daily lives (avoiding social situations due to embarrassment, and experiencing anxiety, depression, and disordered eating), the SF-36 would be appropriate to assess this area.[1–3,33]

Similar to the mental HRQoL domains, the physical domains (physical functioning, role-physical, bodily pain,

Table 5. Difference in Domain Scores from Baseline to 6 Months Postoperatively in Patients with Macromastia

		Baseline		6 Months Postoperative		Difference from Baseline to 6 Months Postoperative		
	n	Mean	Standard Deviation	Mean	Standard Deviation	Difference*	95% CI	*P*
Physical functioning	210	69.8	24.8	96.2	11.3	26.5	(22.9 to 30.0)	<0.001
Role - physical	216	64.5	27.6	96.0	9.2	31.5	(27.8 to 35.2)	<0.001
Bodily pain	216	49.1	22.9	87.3	16.1	38.2	(34.6 to 41.8)	<0.001
General health	211	73.3	17.0	80.2	16.1	6.9	(4.9 to 9.0)	<0.001
Vitality	211	48.3	19.1	65.9	17.6	17.6	(14.8 to 20.4)	<0.001
Social functioning	216	62.6	26.8	89.4	17.8	26.7	(23.1 to 30.4)	<0.001
Role - emotional	215	68.8	28.9	90.3	16.9	21.5	(17.5 to 25.5)	<0.001
Mental health	213	64.3	18.8	77.6	16.4	13.4	(10.9 to 15.9)	<0.001

*A positive value indicates an improvement at 6 months postoperatively compared with baseline.
CI, confidence interval.

Table 6. Difference in Domain Scores from Baseline to 12 Months Postoperatively in Patients with Macromastia

		Baseline		12 Months Postoperative		Difference from Baseline to 12 Months Postoperative		
	n	Mean	Standard Deviation	Mean	Standard Deviation	Difference*	95% CI†	*P*
Physical functioning	184	71.5	24.6	97.2	8.9	25.7	(22.0 to 29.5)	<0.001
Role - physical	190	66.5	27.6	95.4	11.1	28.9	(25.0 to 32.8)	<0.001
Bodily pain	191	50.1	22.4	89.7	14.1	39.5	(36.0 to 43.1)	<0.001
General health	184	74.3	17.8	78.7	17.8	4.4	(2.1 to 6.8)	<0.001
Vitality	180	48.9	19.3	67.9	18.7	19.1	(15.8 to 22.4)	<0.001
Social functioning	191	64.4	26.3	89.5	17.4	25.1	(21.0 to 29.2)	<0.001
Role - emotional	188	70.2	27.4	89.8	16.3	19.6	(15.6 to 23.7)	<0.001
Mental health	192	64.3	18.7	77.2	17.3	12.9	(10.1 to 15.6)	<0.001

*A positive value indicates an improvement at 12 months postoperatively compared with baseline.
CI, confidence interval.

and general health; general health also overlaps with mental HRQoL) cover the impact of physical discomfort/limitations on one's ability to complete everyday activities.[12] This is relevant to our sample as physical pain and discomfort (often in the neck, back and shoulder) also interfere with everyday life (such as exercising, and participating in sports).[1,3]

Construct Validity: Internal Consistency, Convergent Validity, and Known-groups Validity

SF-36 construct validity was examined through evaluation of internal consistency, convergent validity, and known-groups validity. All SF-36 domains met the requirements of internal consistency, providing strong evidence that the SF-36 has internal consistency within our macromastia sample at baseline. This also mirrors SF-36 internal consistency in studies of ulcerative colitis, Crohn disease, and spondyloarthritis.[10,34]

Convergent validity of the SF-36 was assessed through comparisons with the RSES, BRSQ, and EAT-26 baseline surveys. These surveys have been used in publications to examine self-esteem, breast-related symptoms, and eating attitudes, respectively, in adolescents with macromastia.[1,2,4] Prior studies show lower baseline self-esteem (low RSES scores) in this population compared with patients without macromastia, even after adjusting for BMI category.[1,2] Therefore, we expected baseline RSES scores to be positively correlated with mental HRQoL domains (vitality, social functioning, role-emotional, mental health). In fact, RSES scores were moderately positively correlated with all of these domains, and were strongly positively correlated with SF-36 vitality and mental health domain scores. One explanation for the higher positive correlation of RSES scores with the mental health and vitality domains may be the specific purpose of each domain. The mental health and vitality domains largely focus on one's current feelings, thoughts, and emotions (similar to the RSES), whereas the social functioning and role-emotional domains examine the impact of physical and emotional distress on daily life activities.[12] Thus, a higher positive correlation of RSES scores with domains pertaining to one's thoughts and feelings (vitality and mental health) might be expected. Despite some differences in the magnitude of correlation with RSES scores, the SF-36 mental HRQoL domains satisfy convergent validity as a whole with respect to the RSES.

Similarly, the BRSQ has documented physical symptoms associated with macromastia in adolescents.[1,2,4] We anticipated baseline BRSQ scores would positively correlate with measures of physical HRQoL (physical functioning, role-physical, bodily pain, and general health). We observed a moderate positive correlation among all domains and BRSQ scores, except for general health (weak correlation). The absence of a moderate/strong correlation with the general health domain could be related to its broad nature, focusing on overall general health, rather than a specific area similar to the BRSQ.[23,35] For instance, even though patients with macromastia experience significant

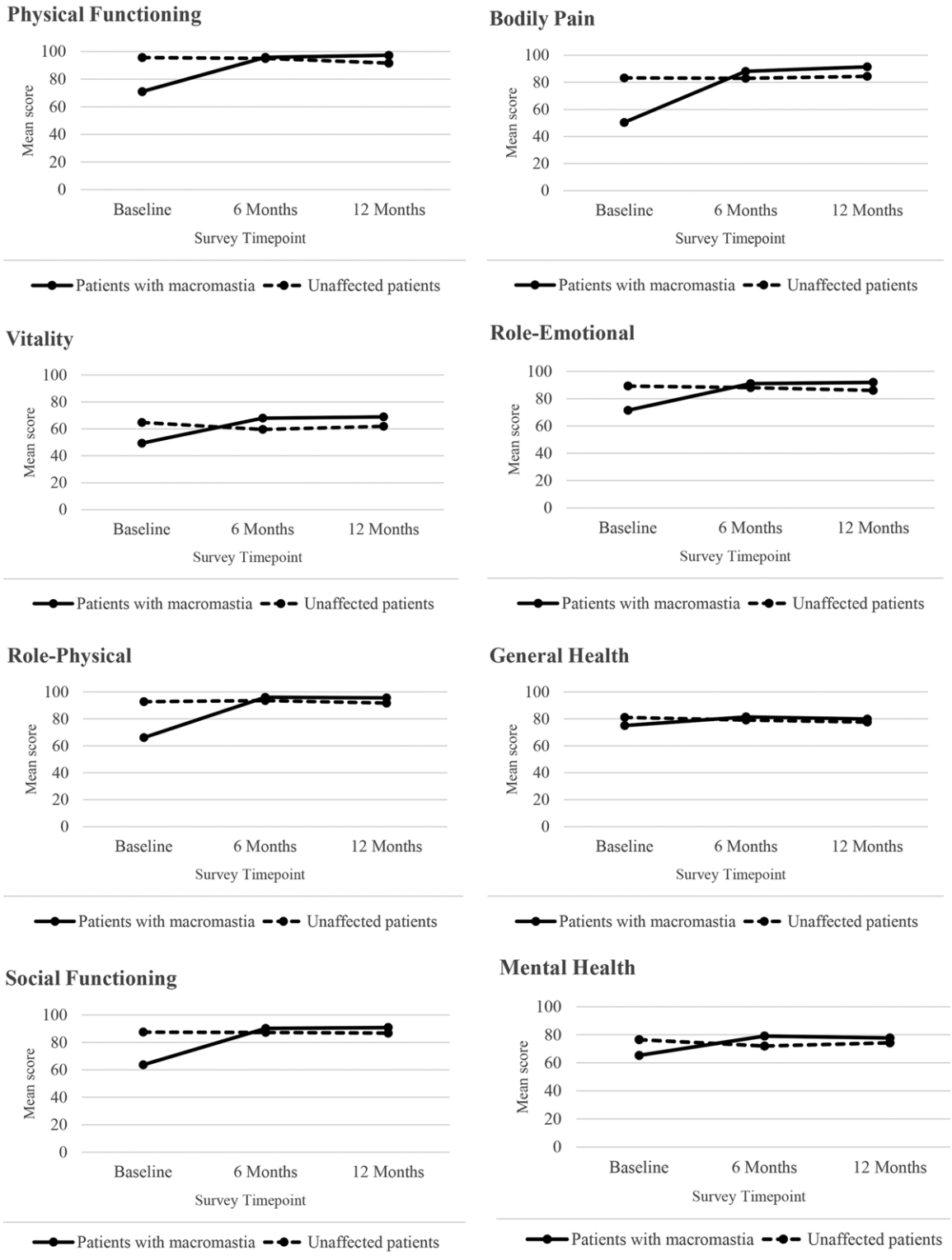

Fig. 1. Mean SF-36 survey scores at baseline, and 6 and 12 months in macromastia and unaffected cohorts. Patients with macromastia completed follow-up surveys at 6 and 12 months postoperatively. Unaffected patients completed follow-up surveys 6 and 12 months after their baseline surveys.

breast-related discomfort, they may still consider themselves generally healthy outside of these symptoms, and capable of engaging in common life activities (attending school, working, etc.). Despite the weak magnitude of this specific correlation, convergent validity with respect to the BRSQ was largely satisfied using the SF-36.

Lastly, disordered eating, which can occur among adolescents with macromastia, has been previously documented using the EAT-26.[1,2,4] Associations between poor mental health (such as depression) and disordered eating in adolescents have also been reported.[36–38] Given this, we anticipated that EAT-26 scores would correlate with SF-36 mental health domain scores. Recognizing that higher EAT-26 scores suggested disordered eating habits, and lower SF-36 domain scores indicated poor HRQoL, we expected a negative correlation between the two survey measures. However, only a weak negative correlation was observed. Although the correlation trended in the expected direction, the weak magnitude could be the result of the general nature of the mental health domain (lack of specificity to disordered eating), and potential confounding by BMI category, as previously described by our group.[1]

Although the magnitude of predicted correlations between the SF-36 and the RSES, BRSQ and EAT-26 were variable at baseline, they all trended in expected directions. In total, these correlations provide evidence of convergent validity for the SF-36.

To further establish construct validity, we evaluated whether the SF-36 satisfied known-groups validity. Earlier work demonstrated that adolescents with macromastia have significantly lower baseline SF-36 scores in all domains, except general health, compared to unaffected patients, even after controlling for BMI category.[2] As such, we anticipated lower scores in our macromastia sample. Results from the present study showed significantly lower mean baseline scores in seven of the eight domains as previously reported, but the macromastia cohort also manifested significantly lower mean scores in the general health domain. The significantly lower general health score may be due to the larger sample of patients with macromastia who completed questions related to general health in the current study (n = 250 patients) compared with the previous (n = 102 patients). Most importantly, this finding provides strong evidence of known-groups validity, further strengthening construct validity.

Longitudinal Validity

Longitudinal validity was also examined. Health-related quality of life gains experienced by adolescents after reduction mammaplasty are reported to be sustained for a minimum of 5 years postoperatively.[2] In the present study, analysis was confined to 6 and 12 months postoperatively to maintain a robust sample size. As with a prior publication, significant HRQoL improvements in all SF-36 domains were observed at 6 months and 12 months postoperatively from baseline.[2] This provides strong evidence that the SF-36 can measure expected clinical improvement in the macromastia patient group over time. It should also be noted that the SF-36 domain scores remained stable in unaffected patients over these periods. The SF-36's ability to detect changes in the macromastia cohort relative to the unaffected group further strengthens evidence of longitudinal validity.

SF-36 versus BREAST-Q

Although the SF-36 satisfies content, construct, and longitudinal validity, it is important to clarify our use of this measure, rather than the BREAST-Q, for our sample. We acknowledge that the BREAST-Q has become a widely used instrument for patient-reported outcomes following breast-related surgery. It contains a quality of life domain (including a sexual well-being component) and satisfaction measures; however, it was validated for adult women, and has yet to be validated for adolescents.[5,39] Consequently, topics covered in this survey are less likely to directly apply to the adolescent experience. Specifically, studies have reported significant increases in the sexual well-being BREAST-Q domain for adults following reduction mammaplasty, but the same has not been observed in the adolescent population.[40–42]

Furthermore, the BREAST-Q sexual well-being domain had little to no correlation with outcome satisfaction in adolescent patients undergoing reduction mammaplasty.[41] Sexual well-being questions were deemed "not applicable" by approximately 36% of adolescent patients in the above study, further suggesting a lack of relevance to this population.

Thus, although the BREAST-Q is a strong measure of patient-reported outcomes, the mental and physical HRQoL areas covered by the SF-36 are more directly applicable to adolescents with macromastia undergoing reduction mammaplasty.

LIMITATIONS

This work was conducted at a tertiary care hospital in the Northeastern United States, and was limited to English-speaking patients. Thus, results may not be directly generalizable to all related studies. Additionally, our longitudinal validity analysis was limited by our use of unaffected patients (patients without macromastia) followed over time. The ideal comparison group would have consisted of patients with macromastia who did not undergo surgery. Although the current study does not adjust for BMI category, our previous work demonstrates that relative to unaffected patients, baseline scores for the macromastia cohort are significantly lower in nearly all SF-36 domains (excluding general health), even after adjusting for BMI category.[1,2]

CONCLUSIONS

The rationale for surgical correction of macromastia in adolescents/young women is based on anticipated improvements in HRQoL. Unlike adult women, there has been no validated tool by which to reliably measure changes in HRQoL in this population. The SF-36 is a popular, well-tested instrument across a variety of adolescent and adult medical and surgical conditions. Our results demonstrate that the SF-36 also fulfills content, construct, and longitudinal validity for adolescents with macromastia. The authors suggest that this instrument be used in

future studies of this growing population of patients with macromastia.

Brian I. Labow, MD, FACS, FAAP
Department of Plastic and Oral Surgery
Boston Children's Hospital and Harvard Medical School
300 Longwood Avenue, Hunnewell 1
Boston, MA 02115
E-mail: brian.labow@childrens.harvard.edu

DISCLOSURES

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