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ORIGINAL ARTICLE

Randomized Trial of the Effect of Contact Lens Wear on Self-Perception in Children

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ABSTRACT

Purpose. To determine whether contact lens wear affects children's self-perceptions.

Methods. The Adolescent and Child Health Initiative to Encourage Vision Empowerment Study was a randomized, single-masked trial conducted at five clinical centers in the United States. Subjects were 8- to 11-year-old myopic children randomly assigned to wear spectacles (n = 237) or soft contact lenses (n = 247) for 3 years. The primary endpoint was the Self-Perception Profile for Children Global Self-Worth scale. Secondary outcomes included the Physical Appearance, Athletic Competence, Scholastic Competence, Behavioral Conduct, and Social Acceptance Self-Perception Profile for Children scales.

Results. Global self-worth was not affected by contact lens wear [analysis of variance (ANOVA), difference = 0.06; 95% CI, −0.004 to 0.117]. Physical appearance (ANOVA, difference = 0.15; 95% CI, 0.07 to 0.22), athletic competence (ANOVA, difference = 0.08; 95% CI, 0.01 to 0.15), and social acceptance (ANOVA, difference = 0.10; 95% CI, 0.03 to 0.17) were all greater for contact lens wearers.

Conclusions. Although contact lens wear does not affect global self-perceptions of 8- to 11-year-old myopic children their physical appearance, athletic competence, and social acceptance self-perceptions are likely to improve with contact lens wear. Eye care practitioners should consider the social and visual benefits of contact lens wear when choosing the most appropriate vision correction modality for children as young as 8 years of age.

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Key Words: contact lenses, self-perceptions, children, self-esteem, randomized

Self-perception refers to one's own sense of value and ability and it is formed by the age of 8 years.[1] Although self-perceptions are relatively stable during adolescence,[2–5] they are malleable into adulthood if an intervention is applied.[6] Poor self-perceptions during adolescence are associated with negative consequences during adulthood,[7] depression,[8–10] and isolation.[11]

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Many extrinsic factors have been associated with poor self-perception in children, such as obesity,[12–14] poor motor skills,[15,16] and being bullied.[17,18] Spectacles have also been associated with poorer self-perception in adults if they were first worn during childhood.[19] Spectacle wear has also been associated with negative attributes, primarily a feeling of less attractiveness.[20–24] Many studies have examined the effect of spectacle wear on self-perception[19,21,24–30] and the perception of others.[27,31,32] Overall, spectacles generally make others appear more intelligent,[27] but few studies have found that spectacles alter one's self-perceptions. Most of the studies examining self-perceptions of spectacle wearers have been conducted on adults.[19,21,24,25,27,29,33–35]

One exception is the study by Lyon et al.[26] The observational study compared 8 to 14-year-old children who wore spectacles to children who did not require vision correction and found no significant differences between the two groups in terms of self-perceptions measured by the Self-Perception Profile for Children (SPPC)[1] except that girls with spectacles had slightly higher social self-concept than girls without spectacles.[26] The potential for a

change in self-perception associated with a change in the type of correction was examined in a randomized clinical trial by Terry et al.[30] In this study, 10- to 13-year-old myopic children were randomly assigned to wear spectacles or contact lenses for 3 years. Self-concept was measured by the Piers-Harris Children's Self-Concept Scale, and they found that the two treatment groups exhibited no differences in self-concept changes. However, the Piers-Harris survey calculates a global self-perception score by summing various scales, which may not accurately describe what a child thinks about himself or herself as a whole. Neither investigation asked children how they felt about wearing spectacles. Children bothered by spectacle wear may be more likely to experience an improvement in self-perception after being fitted with contact lenses or they may be more likely to have self-perception issues than children who do not mind wearing spectacles.

The Adolescent and Child Health Initiative to Encourage Vision Empowerment (ACHIEVE) Study was conducted specifically to address limitations experienced by previous studies. The ACHIEVE Study used the SPPC because the SPPC includes a general self-worth scale that is not inferred from the summation of responses to a variety of specific items. In the SPPC, general self-worth is measured directly by asking a child to indicate his or her worth as a person. Furthermore, the response method of the SPPC avoids the inherent bias that two-choice formats incorporate because children tend to give socially desirable answers. The ACHIEVE Study was also designed to determine whether children who were dissatisfied with spectacle wear would benefit more from contact lenses than children who did not mind wearing spectacles.

METHODS

The protocols were approved by each clinical site's institutional review board, and the protocols adhered to the tenets of the Declaration of Helsinki. Parents of all subjects signed parental permission forms, and subjects signed informed assent forms.

Eligibility Criteria

Details of eligibility criteria and methods are available,[36] but they are described here briefly. The subjects were between 8 and 11 years old, inclusive, at the baseline examination. They had between −1.00 diopter (D) and −6.00 D myopia and <1.00 D of astigmatism, measured by cycloplegic autorefraction. They had 20/20 or better best-corrected visual acuity at distance in both eyes and had not worn contact lenses within the past month. Subjects had healthy eyes that were suitable for contact lens wear and were not participating in any other vision studies that prescribed treatments at the time of eligibility determination. Subjects also exhibited at least 250 s of arc global stereo acuity.

Clinical Sites

Consecutive subjects who met entry criteria were recruited from volunteers at optometric institutions in Boston, MA; Columbus, OH; Forest Grove, OR; Houston, TX; and Memphis, TN.

Interventions

Subjects were randomly assigned to continue wearing spectacles for 3 years or to wear contact lenses for 3 years. Children randomly assigned to wear spectacles were given a prescription annually and allowed to choose frames from the local dispensary at no charge or at a significant discount. At the end of the study, the spectacle wearers were given vouchers for a free 3-year supply of contact lens materials. Subjects randomly assigned to wear contact lenses were provided with a description of daily disposable contact lenses and 2-week disposable contact lenses.[36] The parent then chose which contact lens modality the child would wear, and the subject was fitted with either *1·DAY* ACUVUE or ACUVUE *2* (Vistakon; Jacksonville, FL) contact lenses. Contact lens subjects also received free spectacle prescriptions and were allowed to choose from the same frames as the spectacle wearers. They also received free Complete Moisture Plus Multi-Purpose Solution (Advanced Medical Optics, Santa Ana, CA) as needed.

Objectives and Hypotheses

The primary objective of the ACHIEVE Study was to determine whether children's self-perceptions improve more when they wear contact lenses than when they wear spectacles. We specifically tested the hypothesis that the contact lens wearers would experience a greater improvement in the Global Self-Worth scale from the SPPC than the spectacle wearers. An additional objective was to determine whether baseline spectacle satisfaction affected changes in self-perception throughout the study.

Primary and Secondary Outcome Measures

The primary outcome of the ACHIEVE Study is the mean difference in SPPC Global Self-Worth scale between spectacle wearers and contact lens wearers. Secondary outcome measures include comparison of all SPPC scales and the effect of the baseline Spectacle Satisfaction score.

Details of Outcome Measures

The SPPC is a revised version of the Perceived Competence Scale for Children developed by Harter.[1] There are six scales: Scholastic Competence, Social Acceptance, Athletic Competence, Physical Appearance, Behavioral Conduct, and Global Self-Worth. Each scale consists of six questions, with half of the questions phrased as a positive self-description and half as a negative self-description. The child was asked to decide which kind of child was most like him or her, and then to decide if this was "sort of" true or "really" true. If capable, the child read the questions and marked an answer independently; otherwise the masked examiner read the questions and asked which answer the child felt was appropriate. Each question was scored from 1 (low perceived competence) to 4 (high perceived competence). The score from each question in the scale was averaged to determine the final score.

Refractive error was measured by cycloplegic autorefraction using the Grand Seiko WR-5100K (Grand Seiko Co., Fukuyama, Japan). Cycloplegia was achieved using 1 drop of 0.5% proparacaine followed by 2 drops of 1.0% tropicamide, separated by 5

min. Measurements were taken 25 min after the second drop of tropicamide was instilled. At least 10 spherocylindrical autorefractions were taken while the subject fixated 6/9 (20/30) size letters on a nearpoint test card viewed through a +4.00 D Badal lens. The letters were presented at optical infinity, then moved to a slightly blurred position to ensure relaxation of residual accommodation.[37] The 10 printed spherocylindrical autorefractions were hand-edited by the masked examiner to eliminate sphere or cylinder readings that were more than 1.00 D from the mode, and the remaining readings were averaged using the power vector analysis described by Thibos et al.[38]

The Spectacle Satisfaction Survey, developed for the ACHIEVE Study, determines how spectacles affect children's daily activities. The survey consists of 37 statements, and the subjects mark one of five possible answers: "strongly disagree," "disagree," "neutral," "agree," or "strongly agree." Each question is scored from 1 (negative attitude toward spectacles) to 5 (positive attitude toward spectacles), then scaled from 0 (low spectacle satisfaction) to 100 (high spectacle satisfaction) by subtracting one from the raw score of each question and then multiplying by 25. There are seven scales: Physical Appearance, Athletic Competence, Social Acceptance, Scholastic Competence, Discomfort/Inconvenience, Other Correction, and Satisfaction. The mean score from the questions in all of the scales except Other Correction and Satisfaction yields the Overall Spectacle Satisfaction score.[36]

Determination of Sample Size

Sample size calculations were made to determine the required sample size to identify the effect of contact lens wear on children's perceptions of themselves and to determine the effect of spectacle satisfaction. All computations were completed using the PASS software (NCSS, Kaysville, UT).

Based on the literature using the Self-Perception Profile for Children, a difference of 0.2 units on the Global Self-Worth scale is meaningful.[3,14,39–41] A sample size was calculated to detect a 0.2 ± 0.6 unit difference in the change from baseline to the 3-year assessment of Global Self-Worth between the spectacle wearers and the contact lens wearers. The calculation was based on a t-test model for comparing two means. To control for covariates in an analysis of covariance model, the adjustment provided by Fleiss[42] was used to account for the correlation between the outcome and the covariate. The correlation used was 0.5, which would be the conservative choice. The sample size, assuming an alpha level of 0.05, a two-sided test, and a power of 80%, resulted in a group size of 107 per group after the adjustment for the correlation. To examine the effect of high vs. low spectacle satisfaction, we recruited 107 subjects in each of the following groups: spectacles with high spectacle satisfaction, contact lenses with high spectacle satisfaction, spectacles with low spectacle satisfaction, and contact lenses with low spectacle satisfaction. Using a 10% inflation for loss to follow-up, this yields a total sample size of 471.

Explanation of Interim Analyses and Stopping Rules

No predefined stopping rules were developed because of the low risk of serious adverse events during the study. One interim analysis was provided to the Data Safety and Monitoring Committee. The O'Brien and Fleming[43] approach for repeated significance testing was applied, so the final analyses are interpreted using a significance level of 0.048.

Method of Random Allocation

Data regarding inclusion criteria and Spectacle Satisfaction Survey data were entered by the baseline examiner or the study coordinator into a secure web site accessible only to study personnel. Once the eligibility was verified, the clinic received a study identification number and a computer-generated randomization assignment. The randomization assignment was stratified by the Spectacle Satisfaction Survey score (67.0 or less vs. >67.0), amount of myopia (spherical component of the cycloplegic autorefraction of −3.50 D or less myopia vs. more than −3.50 D myopia), and gender. The level used to determine spectacle satisfaction represents the mean spectacle satisfaction score from a sample of 200 spectacle wearers between the ages of 8 and 11 years from six locations across the United States. The myopia division was empirically determined by the investigators. Within each stratum, a permuted block design was employed using a block size of four.

Masking

Masked examiners administered the SPPC, and they performed cycloplegic autorefraction, corneal curvature, and axial length measurements. All subjects removed their vision correction before the masked examiner's measurements. Success of masking was assessed by asking the examiner what treatment group he or she believed the subject belonged to and then asking how sure (very sure, somewhat sure, somewhat unsure, very unsure) he or she was about the treatment group.

Statistical Methods

Mean (±SD) and frequencies are presented for continuous and categorical variables, respectively. SPPC questionnaire data were collected from the subject at baseline, at 1 month, and at 6 month intervals thereafter. To maximize the use of the data, repeated measures analysis of variance (ANOVA) models were fit. All analyses were done based on the intent-to-treat methodology.[44,45] Initial models were fit to assess the overall treatment group (spectacle or contact lens) effect, the time effect, and the effect of baseline spectacle satisfaction. The interactions of interest were prespecified and were as follows: spectacle satisfaction * treatment, gender * spectacle satisfaction, and treatment * time. Interactions that were not statistically significant were dropped from the models. Baseline SPPC scale score, site, gender, and level of myopia were included as covariates in all models.

RESULTS

We examined 674 subjects for eligibility and enrolled 484 subjects at five clinical sites between September 2003 and October 2004. The most common reasons subjects were excluded were not enough myopia (n = 118) and too much astigmatism (n = 46). The baseline demographic and clinical data of the subjects are listed in Table 1. Masking was maintained throughout the trial.

TABLE 1.
Baseline demographic and clinical data for each treatment group. Refractive error data are for the right eye only

	Spectacle (n = 237)	Contact lens (n = 247)
Gender (% female)	57.4	59.5
Age (yr)		
Mean ± SD	10.4 ± 1.1	10.4 ± 1.1
Race/ethnicity (%)		
American Indian or Alaskan Native	0.4	0.8
Asian or Pacific Islander	8.0	5.3
Black, not of Hispanic origin	21.1	21.9
Hispanic	21.1	21.9
White, not of Hispanic origin	46.8	47.4
Other or unknown	2.5	2.8
Cycloplegic refractive error (D)		
Spherical equivalent	−2.38 ± 0.98	−2.43 ± 1.1
J_0	−0.06 ± 0.13	−0.06 ± 0.13
J_{45}	0.00 ± 0.11	+0.01 ± 0.10
Spectacle satisfaction survey score at baseline	60.3 ± 13.1	60.5 ± 13.8

Out of the 3755 masked measures performed, the masked examiners reported that they were "very sure" or "somewhat sure" only 9.4% of the time, and, in those cases, they correctly guessed the treatment assignment 82.4% of the time. Overall, the masked examiner may have been unmasked at 7.7% of the visits.

Fig. 1 shows the flow of subjects during the ACHIEVE Study. Some subjects switched treatment groups during the study, but all data analyses were conducted according to the intent-to-treat analysis to decrease the risk of bias.[44,45] Thirty-two subjects (6.6%) switched treatment groups over the 3-year period and approximately equal numbers switched from spectacles to contact lenses (n = 17) or vice versa (n = 15). Subjects wore their originally assigned treatment to 96.3% of the semiannual visits, and 96.5% of the subjects were examined at the final visit. Contact lens wearers were fitted with 1-Day Acuvue contact lenses 93.3% of the time.[36]

The mean ± standard deviation SPPC scale scores at baseline and 3 years are provided in Table 2. The primary outcome of the ACHIEVE Study was change in the Global Self-Worth scale. Change in Global Self-Worth was statistically significant over 3 years for both treatment groups (ANOVA, p = 0.05), but the change was not significantly different between treatment groups (ANOVA, difference = 0.057; 95% CI, −0.004 to 0.117; p = 0.07) (Fig. 2). Across time, the Global Self-worth score was 0.08 points lower (95% CI, −0.15 to −0.02) for those with lower spectacle satisfaction than for those with higher spectacle satisfaction (ANOVA, p = 0.01) and this difference was consistent across

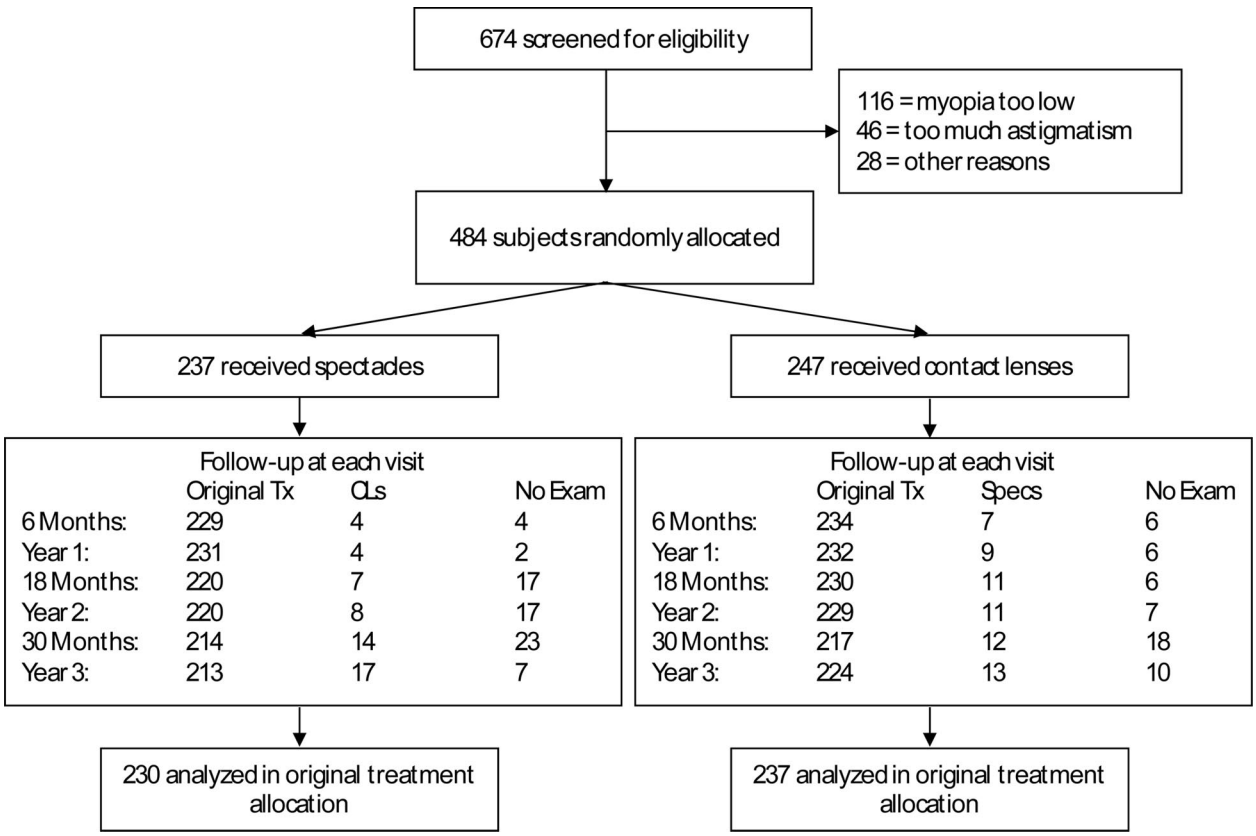

FIGURE 1.
Flow diagram of subjects participating in the ACHIEVE Study. Data were examined according to the intention-to-treat analysis. Tx, treatment; CLs, contact lenses; Specs, spectacles.

TABLE 2.
Mean ± standard deviation SPPC scale scores at baseline and final visit, separated by spectacle satisfaction

	Baseline		3 yr	
SPPC scale/spectacle satisfaction	Spectacle	Contact lens	Spectacle	Contact lens
Global self-worth				
High spectacle satisfaction	3.47 ± 0.49	3.41 ± 0.52	3.36 ± 0.47	3.40 ± 0.49
Low spectacle satisfaction	3.06 ± 0.65	3.12 ± 0.63	3.17 ± 0.60	3.28 ± 0.48
Overall	3.19 ± 0.63	3.22 ± 0.61	3.23 ± 0.57	3.32 ± 0.49
Physical appearance				
High spectacle satisfaction	3.18 ± 0.72	3.27 ± 0.60	2.98 ± 0.58	3.21 ± 0.60
Low spectacle satisfaction	2.75 ± 0.75	2.72 ± 0.75	2.77 ± 0.70	2.91 ± 0.58
Overall	2.89 ± 0.76	2.91 ± 0.75	2.84 ± 0.67	3.01 ± 0.60
Athletic				
High spectacle satisfaction	2.95 ± 0.60	2.92 ± 0.63	2.91 ± 0.64	2.97 ± 0.67
Low spectacle satisfaction	2.63 ± 0.65	2.76 ± 0.66	2.80 ± 0.67	2.93 ± 0.62
Overall	2.74 ± 0.65	2.81 ± 0.65	2.83 ± 0.66	2.95 ± 0.64
Scholastic				
High spectacle satisfaction	3.07 ± 0.64	3.20 ± 0.53	3.21 ± 0.47	3.17 ± 0.57
Low spectacle satisfaction	2.87 ± 0.69	2.93 ± 0.58	2.96 ± 0.59	3.12 ± 0.58
Overall	2.94 ± 0.65	3.02 ± 0.58	3.04 ± 0.56	3.13 ± 0.58
Behavior				
High spectacle satisfaction	3.21 ± 0.71	3.18 ± 0.60	3.28 ± 0.49	3.17 ± 0.57
Low spectacle satisfaction	2.94 ± 0.65	3.03 ± 0.59	3.08 ± 0.56	3.13 ± 0.49
Overall	3.03 ± 0.68	3.08 ± 0.60	3.14 ± 0.55	3.15 ± 0.52
Social acceptance				
High spectacle satisfaction	3.17 ± 0.59	3.11 ± 0.63	2.96 ± 0.59	3.12 ± 0.58
Low spectacle satisfaction	2.88 ± 0.67	2.73 ± 0.69	3.01 ± 0.61	3.05 ± 0.51
Overall	2.98 ± 0.66	2.86 ± 0.69	3.02 ± 0.58	3.09 ± 0.52

treatment groups. There was no interaction with spectacle satisfaction and treatment or gender.

The change in the Physical Appearance scale score (Fig. 3) was significantly greater for the contact lens wearers than for the spectacle wearers (ANOVA, $p < 0.01$). On average, the contact lens wearers had Physical Appearance scale scores that were 0.15 (95% CI, 0.07 to 0.22) units higher than spectacle wearers. After an initial increase at month 1, Physical Appearance scores decreased significantly with time (ANOVA, $p < 0.01$). Spectacle satisfaction score did not significantly affect the physical appearance scale (ANOVA, estimate = −0.08, 95% CI, −0.17 to 0.002, $p = 0.06$). There was no interaction with spectacle satisfaction and treatment or gender.

The Athletic Competence scale demonstrates a more complicated model than the others (Fig. 4). On average, both treatment groups increased over time, but the groups exhibited a different increase over time resulting in a significant interaction between treatment and time (ANOVA, $p = 0.02$). *Post hoc* analysis determined contact lens wearers had significantly higher Athletic Competence scale scores at 30 months (estimate = 0.17, 95% CI, 0.07 to 0.26; $p < 0.01$), and a borderline difference at 24 months (estimate = 0.09, 95% CI, 0 to 0.19; $p = 0.05$). Averaged over 3 years, the effect of contact lenses was a 0.08-unit (95% CI, 0.01 to 0.15) increase in the Athletic Competence score ($p = 0.03$). There was no interaction with spectacle satisfaction and treatment or gender.

The Scholastic Competence scale increased significantly over time (ANOVA, $p < 0.01$), and there was a significant spectacle satisfaction * treatment interaction (ANOVA, $p = 0.01$) (Table 2, Fig. 5). Those subjects with low spectacle satisfaction who were assigned to the contact lens group had, on average, scholastic competence scores 0.10 units (95% CI, 0.02 to 0.18) higher than those with low spectacle satisfaction who were assigned to the spectacle group ($p = 0.01$). There was no difference between the treatment groups among those with high spectacle satisfaction ($p = 0.19$).

The Behavioral Conduct scale showed no significant effect of time or treatment (Table 2, Fig. 6). However, the Behavioral Conduct score was 0.07 units lower (95% CI, −0.14 to −0.01) for subjects with low spectacle satisfaction scores (ANOVA, $p < 0.03$) compared with those with high spectacle satisfaction scores. There was no interaction with spectacle satisfaction and treatment or gender.

The Social Acceptance scale also showed both a significant effect of time ($p < 0.01$) and treatment ($p < 0.01$) (Table 2). Those subjects assigned to the contact lens group showed, on average, a Social Acceptance score of 0.10 units higher (95% CI, 0.03 to 0.17) than the spectacle group. During the course of the study, both groups experienced an increase in their Social Acceptance scores (Fig. 7). There was no effect of spectacle satisfaction nor were there any interactions with spectacle satisfaction and treatment or gender.

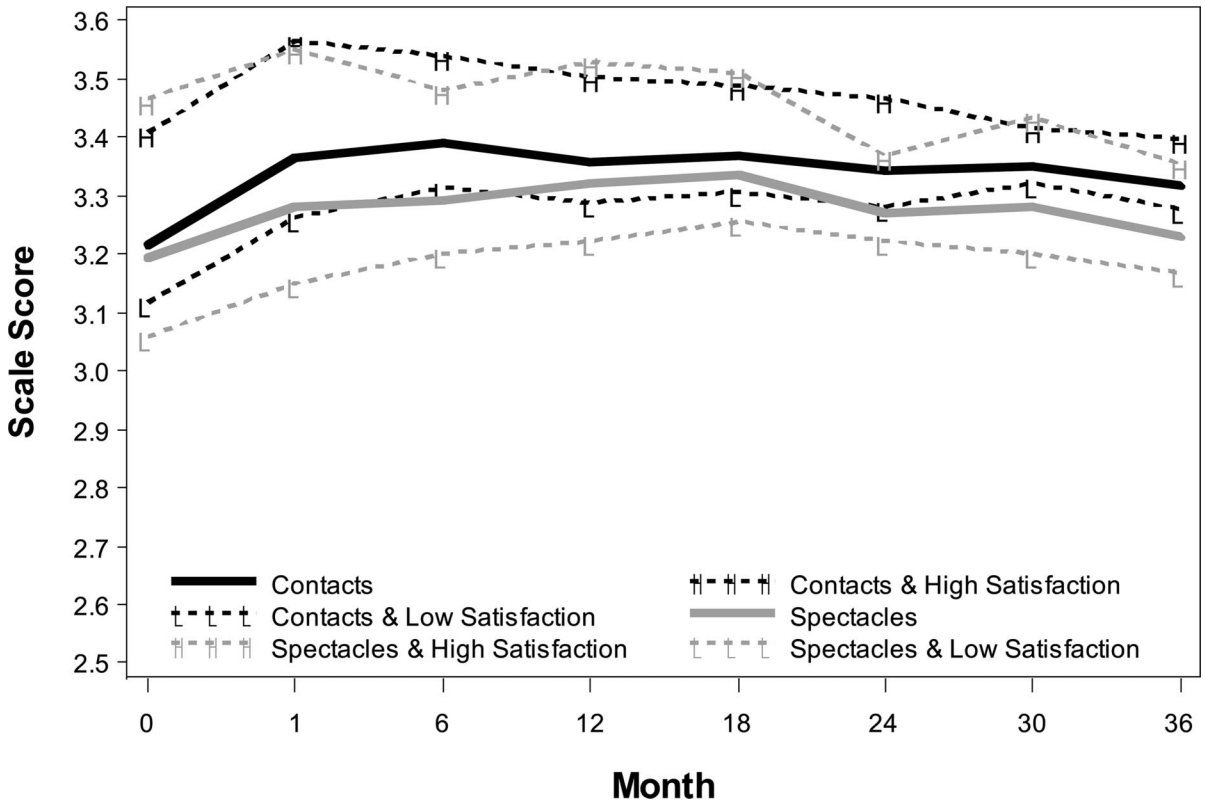

FIGURE 2.

SPPC Global Self-Worth scale scores for contact lens wearers (solid red line) and spectacle wearers (solid black line), divided between subjects with high baseline spectacle satisfaction (H) and low baseline spectacle satisfaction (L).

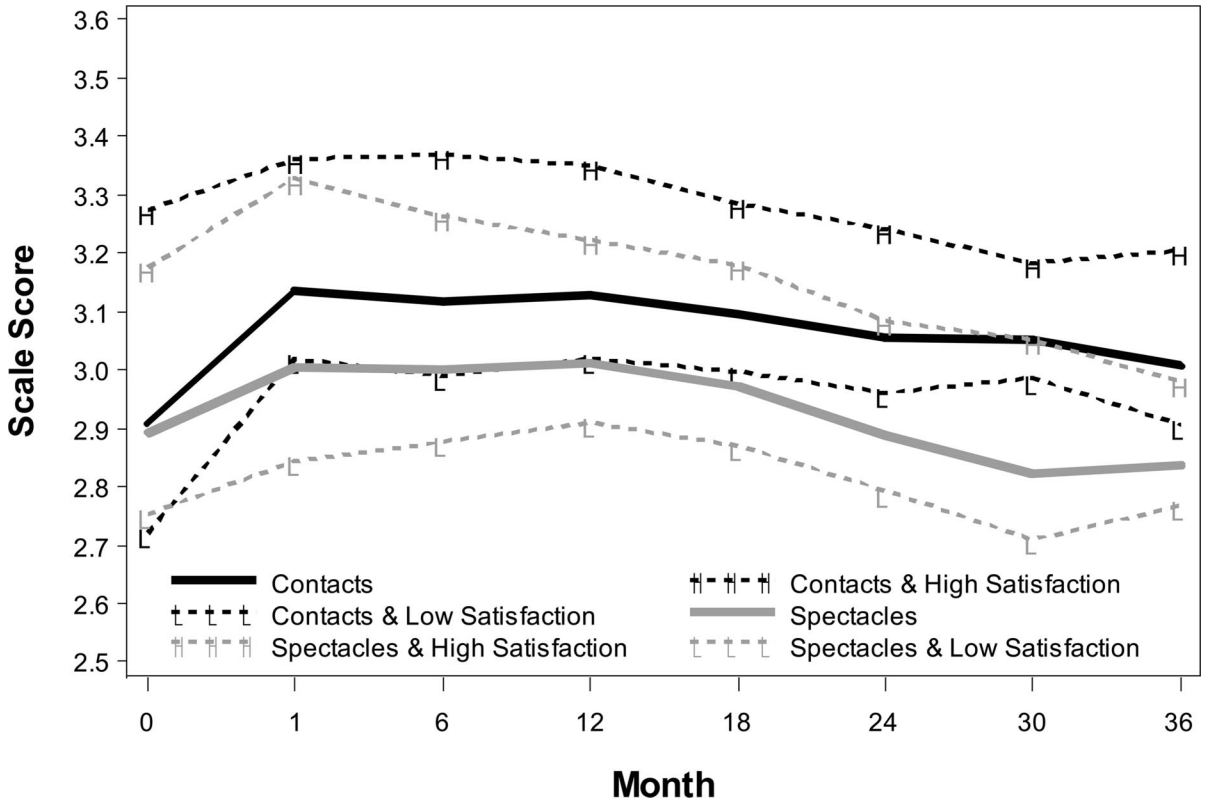

FIGURE 3.

SCCP Physical Appearance scale scores for contact lens wearers (solid red line) and spectacle wearers (solid black line), divided between subjects with high baseline spectacle satisfaction (H) and low baseline spectacle satisfaction (L).

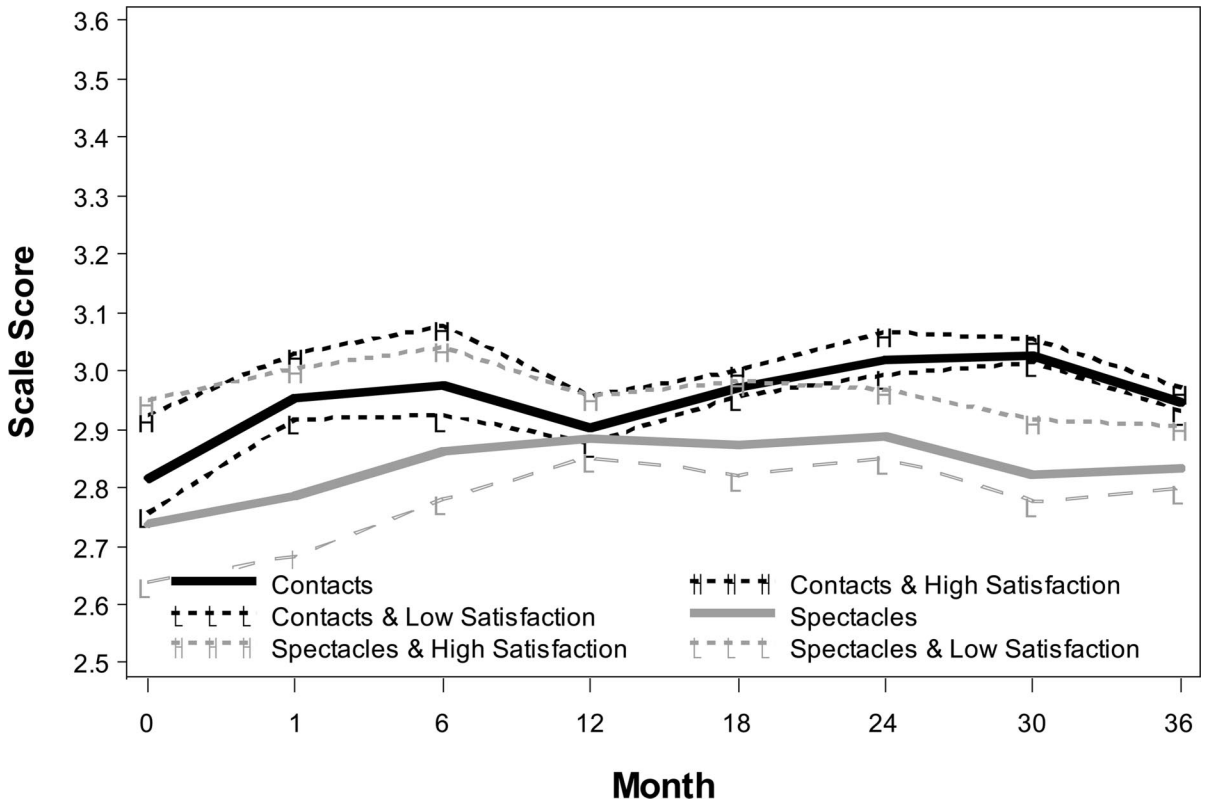

FIGURE 4.

SPPC Athletic Competence scale scores for contact lens wearers (solid red line) and spectacle wearers (solid black line), divided between subjects with high baseline spectacle satisfaction (H) and low baseline spectacle satisfaction (L).

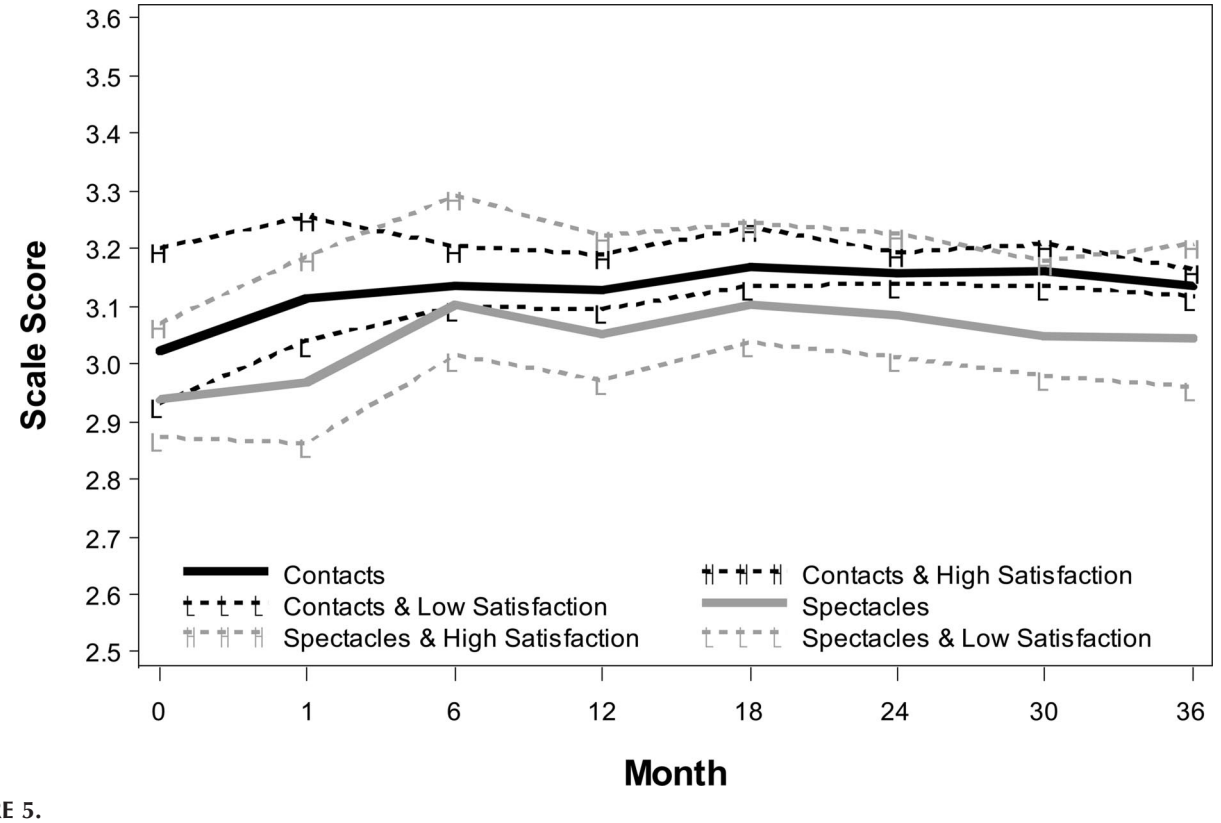

FIGURE 5.

SPPC Scholastic Competence scale scores for contact lens wearers (solid red line) and spectacle wearers (solid black line), divided between subjects with high baseline spectacle satisfaction (H) and low baseline spectacle satisfaction (L).

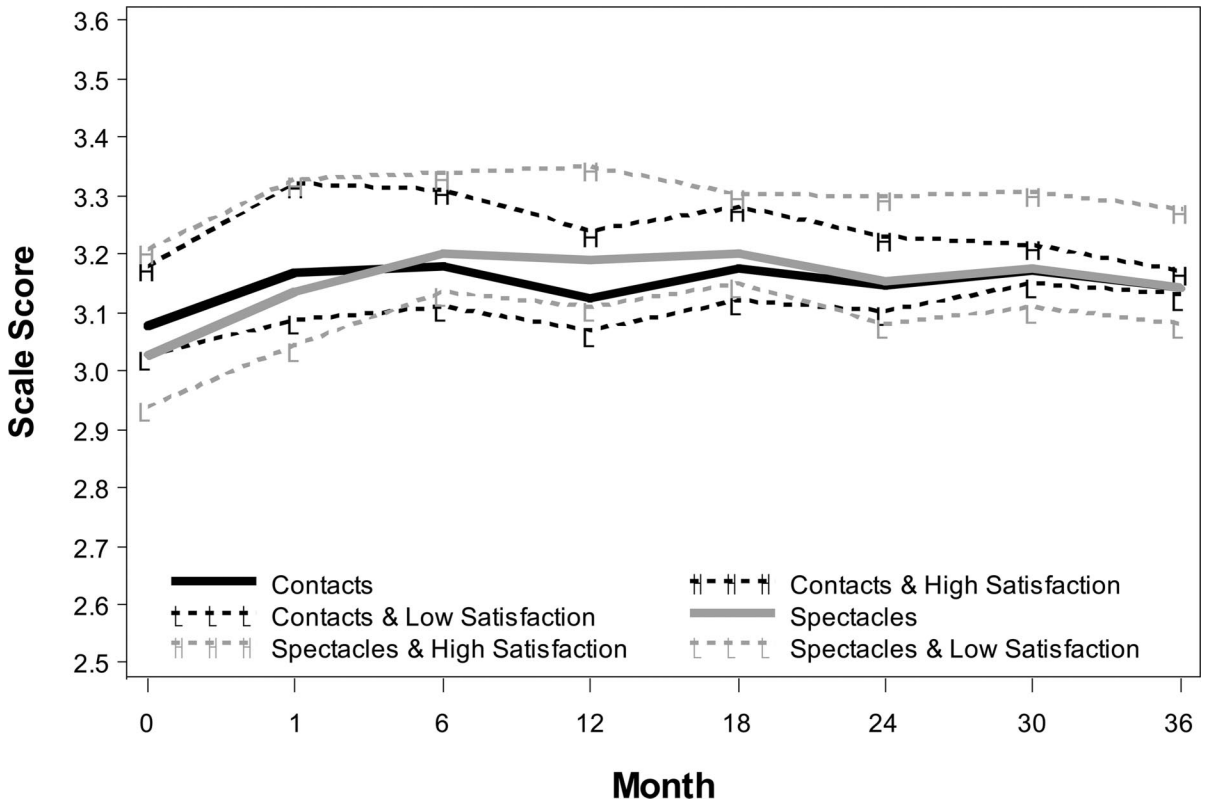

FIGURE 6.

SPPC Behavioral Conduct scale scores for contact lens wearers (solid red line) and spectacle wearers (solid black line), divided between subjects with high baseline spectacle satisfaction (H) and low baseline spectacle satisfaction (L).

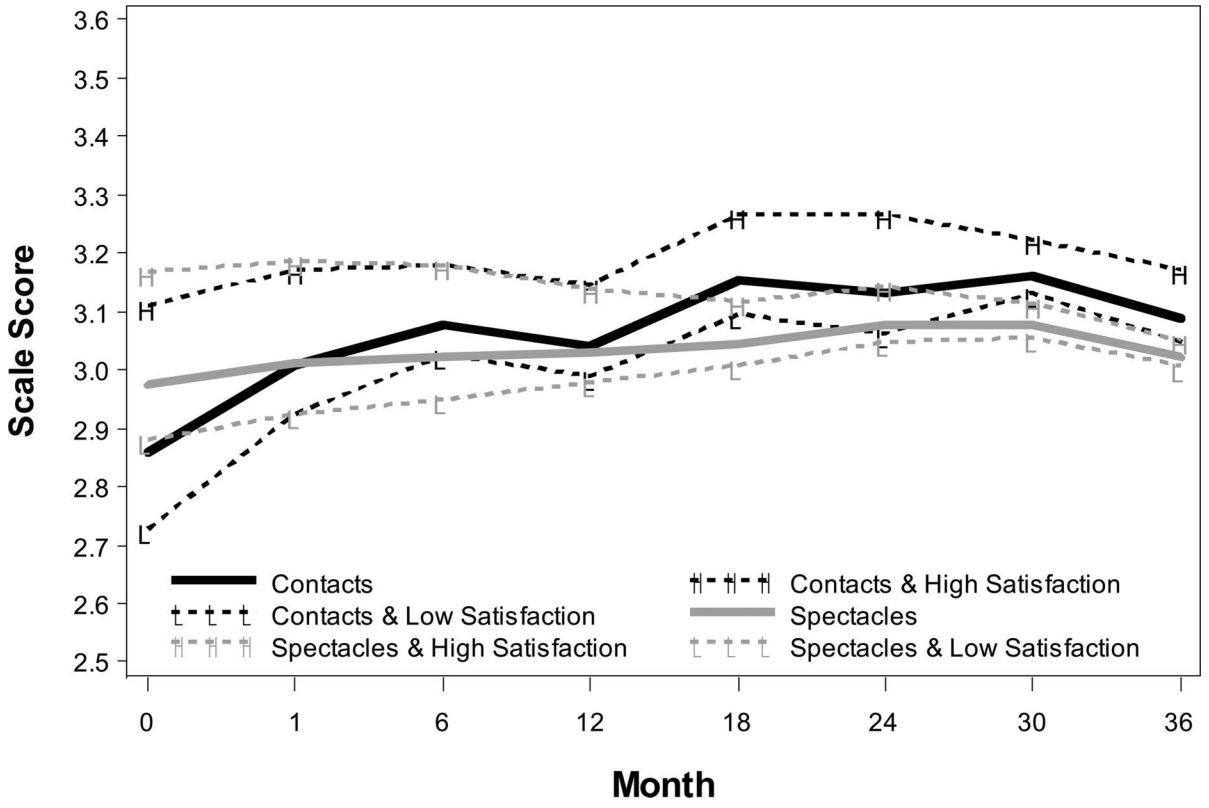

FIGURE 7.

SPPC Social Acceptance scale scores for contact lens wearers (solid red line) and spectacle wearers (solid black line), divided between subjects with high baseline spectacle satisfaction (H) and low baseline spectacle satisfaction (L).

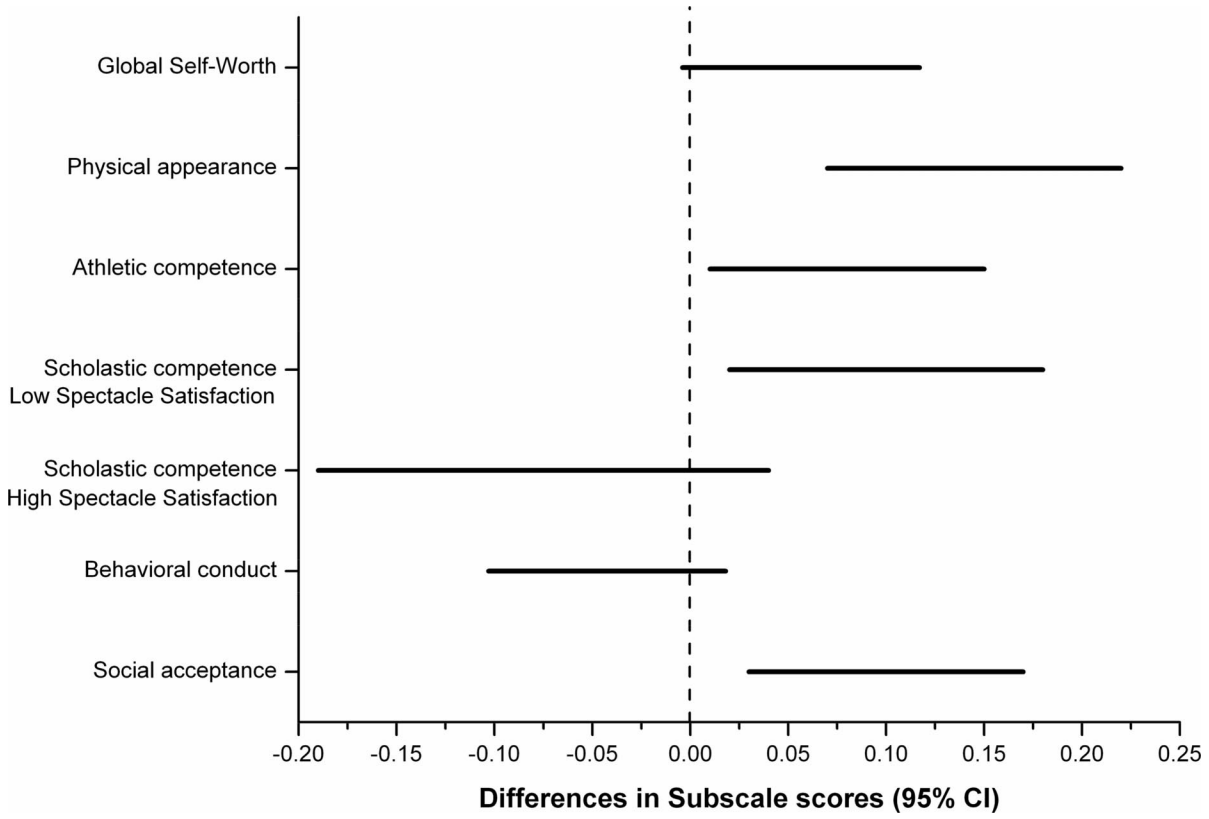

FIGURE 8.

Ninety-five percent confidence intervals for the mean difference over 3 years between contact lens wearers and spectacle wears for each SPPC scale. If entire line is right of zero, then the contact lens wearers have significantly higher scores.

DISCUSSION

A diverse sample of 8- to 11-year-old children were fitted with contact lenses or they continued to wear spectacles for 3 years. Of the 247 originally assigned to wear contact lenses, 224 (90.7%) continued to wear their contact lenses for the entire 3 years. This success rate is better than that experienced by a group of adults followed for just 1 year while wearing 30-D continuous wear or 7-D extended wear contact lenses (82.9% success rate).[46]

Although children were very successful contact lens wearers, contact lenses did not affect the children's perception of their global self-worth. Global self-worth is relatively stable throughout childhood for boys and declines slightly for teenage girls.[2–5] It is important to realize that global self-worth is a multidimensional assessment of one's value to society, and it is difficult to change with a treatment that is not directly attempting to alter global self-perception, such as contact lenses. One other randomized clinical trial of children also found that contact lens wear did not alter children's overall self-concepts.[30]

Although contact lenses do not affect children's global self-worth, they do affect children's self-perceptions in several other areas. Fig. 8 shows that the Physical Appearance, Athletic Competence, and Social Acceptance scores were all significantly greater for contact lens wearers than spectacle wearers at the end of the study. Scholastic Competence was also higher for contact lens wearers than spectacle wearers, but only for those who were not satisfied with spectacle wear initially.

The largest difference between contact lens wearers and spectacle wearers was for Physical Appearance, regardless of whether or not the subjects initially liked to wear spectacles. This indicates that children's physical appearance self-perception is likely to improve with contact lens wear, even if they do not mind wearing spectacles. Spectacle wear has been associated with negative attributes, such as disfigurement and less attractiveness,[24,27] so it is not surprising that children's physical appearance self-perception benefits from contact lens wear. A study of 8- to 12-year old children and 13- to 17-year old teens also found that one of the largest benefits of contact lens wear reported by both age groups was improved appearance.[47]

The magnitude of the effect on the Physical Appearance scale deserves some comment. Self-concepts change very little over time, even for children as they become teens.[3,48] With this frame of reference, the average difference between the final Physical Appearance scores for contact lens wearers and spectacle wearers of 0.15 units is noteworthy. The change of 0.15 units found in this study for physical appearance is greater than the change found for Social Acceptance exhibited by children with cystic fibrosis who underwent an intervention specifically designed to improve psychosocial adjustment.[49]

Averaged over 3 years, contact lenses also improved children's perceptions of their athletic competence. A study of children and teens who switched from spectacle wear to contact lens wear found that one of the greatest improvements in quality of life was in the area of athletics.[47] Anecdotally, children may participate in recreational activities without vision correction rather than risk breaking their spectacles. If they wear their spectacles, they often complain of

poor peripheral vision. Contact lenses provide clear vision without impairing peripheral vision, so children may feel that their athletic competence improves because they can see more clearly while participating in recreational activities.

Children's scholastic competence self-perceptions were affected by contact lens wear more if they initially disliked wearing spectacles than if they were satisfied with spectacle wear. Perhaps children who are dissatisfied with spectacle wear chose to remove their vision correction more often than children who do not mind wearing spectacles. Myopic correction not worn at school negatively affects the child's ability to obtain information presented at the front of the room on dry erase boards, overheads, or digital projection systems. On the other hand, contact lens wearers are unlikely to remove their vision correction during the day, resulting in clear vision for distance classroom activities.

Throughout the study, social acceptance self-perceptions were stable for spectacle wearers, but they increased for contact lens wearers. This finding is somewhat consistent with a cross-sectional study that found that girls without vision correction reported greater social acceptance self-perceptions than girls wearing spectacles.[26] Spectacle wear has been associated with shyness, introversion, and less social forcefulness.[22,29] These stereotypes may play a role in children's self-perceptions, especially for girls.[29]

In summary, contact lenses provide collateral benefits to children beyond simply correcting their myopia. Contact lenses significantly improve how children feel about their physical appearance, their acceptance among friends, and their ability to play sports. Contact lenses even make children more confident about their academic performance if they initially dislike wearing spectacles. Parents and eye care practitioners should consider the social benefits of contact lens wear and the visual benefits of contact lens wear when choosing the most appropriate vision correction modality for children as young as 8 years of age.

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