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Myopia, contact lens use and self-esteem

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Abstract

Purpose—To evaluate whether contact lens (CL) use was associated with self-esteem in myopic children originally enrolled in the Correction of Myopia Evaluation Trial (COMET), that after five years continued as an observational study of myopia progression with CL use permitted.

Methods—Usable data at the six-year visit, one year after CL use was allowed (n = 423/469, age 12–17 years), included questions on CL use, refractive error measurements and self-reported self-esteem in several areas (scholastic/athletic competence, physical appearance, social acceptance, behavioural conduct and global self-worth). Self-esteem, scored from 1 (low) to 4 (high), was measured by the Self-Perception Profile for Children in participants under 14 years or the Self-Perception Profile for Adolescents, in those 14 years and older. Multiple regression analyses were used to evaluate associations between self-esteem and relevant factors identified by univariate analyses (e.g., CL use, gender, ethnicity), while adjusting for baseline self-esteem prior to CL use.

Results—Mean ($\pm$ SD) self-esteem scores at the six-year visit (mean age=15.3 $\pm$ 1.3 years; mean refractive error= -4.6 ± 1.5 D) ranged from 2.74 ($\pm$ 0.76) on athletic competence to 3.33 ($\pm$ 0.53) on global self-worth. CL wearers (n=224) compared to eyeglass wearers (n=199) were more likely

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to be female ($p < 0.0001$). Those who chose to wear CLs had higher social acceptance, athletic competence and behavioural conduct scores ($p < 0.05$) at baseline compared to eyeglass users. CL users continued to report higher social acceptance scores at the six-year visit ($p = 0.03$), after adjusting for baseline scores and other covariates. Ethnicity was also independently associated with social acceptance in the multivariable analyses ($p = 0.011$); African-Americans had higher scores than Asians, Whites and Hispanics. Age and refractive error were not associated with self-esteem or CL use.

Conclusions—COMET participants who chose to wear CLs after five years of eyeglass use had higher self-esteem compared to those who remained in glasses both preceding and following CL use. This suggests that self-esteem may influence the decision to wear CLs and that CLs in turn are associated with higher self-esteem in individuals most likely to wear them.

Keywords

myopia; contact lenses; self-esteem; eyeglasses; adolescents

Anecdotal reports as well as prior research^{1,2} indicate that myopic children wearing contact lenses (CLs) evaluate their physical appearance, athletic skills and social interactions more favourably than do eyeglass wearers. A randomised clinical trial¹ that compared the self-esteem of CL wearers to that of eyeglass wearers in a group of 10-13 year-olds found that, on average, CL wearers rated themselves higher over a three-year period on the appearance and popularity dimensions of the Piers-Harris Children's Self-Concept Scale. Similarly, 8-11 year-old myopic children who were randomised to wearing CLs had higher self-esteem compared to eyeglass wearers after three years on the physical appearance, social acceptance and athletic competence subscales² of the Self-Perception Profile for Children. Both studies attribute the higher self-esteem of CL wearers directly to CL use, suggesting that CLs enhance self-esteem in these particular areas. However, in a real world setting where individuals are not randomised to wearing CLs or glasses, but select their own lens wear correction, it is possible that self-esteem is associated with the decision to wear CLs, instead of the reverse - that higher self-esteem is solely the consequence of wearing CLs. Understanding and accounting for how initial levels of self-esteem might influence the motivation to wear CLs may provide valuable insight into how CLs may additionally impact the self-esteem of their wearers.

The Correction of Myopia Evaluation Trial (COMET) provided an excellent opportunity to examine this issue as it was designed as a multi-centre, randomised, double-masked clinical trial to evaluate whether progressive addition eyeglass lenses slowed the progression of juvenile onset myopia compared to single vision eyeglass lenses. After five years, the clinical trial phase ended and the study continued as a longitudinal, observational study with CL use allowed. At this point, participants were given the option of wearing CLs if they wished, in consultation with their study optometrist, and were neither encouraged nor discouraged from doing so. Self-esteem was assessed at baseline and over the course of the study to evaluate how participants viewed themselves in general as well as in several areas important to their lives, including appearance, academics and athletics. Examining self-esteem in the COMET cohort was pertinent because of its influence on psychological well-being as well as on motivation and behaviour.³ Thus, how these myopic participants perceived themselves could have important implications for their compliance with wearing their lens wear correction.

The present report investigated whether CL use was associated with self-esteem both prior to and subsequent to the choice of CL use by the myopic participants originally enrolled in COMET. In addition to CL use, gender, age and ethnicity were also examined for their

associations with self-esteem as these factors were previously found to be associated with self-esteem at baseline and at the three-year visit in the COMET cohort.^{4,5}

Methods

COMET recruited 469 children aged 6 to 11 years between September 1997 and September 1998 through four schools/colleges of optometry located in Birmingham, Alabama; Boston, Massachusetts; Houston, Texas and Philadelphia, Pennsylvania. The study and its protocols conformed to the tenets of the Declaration of Helsinki. Before enrolment, parental consent and child assent were obtained. The institutional review boards of each participating centre approved the research protocols. This report focuses on measures and results related to self-esteem and CL use at the six-year visit, one year after CL use was permitted. Details of the COMET study design, participant characteristics and main outcome results can be found elsewhere^{6,7} and are only presented here briefly, when relevant.

Data collection

Among other measurements, data collection at baseline (n=469) included refractive error measurements, demographic information (age, gender and ethnicity) and an assessment of self-esteem. At the six-year visit (n=435), information on CL versus eyeglass use and its frequency of wear was also collected. The present report is based on the 423 participants who provided usable data at both visits.

Refractive error

Cycloplegic refractive error was measured at baseline and at the six-year visit using the Nidek 700A autorefractor 30 minutes after two drops of 1% tropicamide five minutes apart were instilled in each eye. Five consecutive reliable measurements of sphere, cylinder and axis were obtained in each eye and the mean spherical equivalent cycloplegic autorefraction for each child was calculated based on the mean of the two eyes.

CL use and frequency of lens wear correction

At the six-year visit, participants were asked whether or not they currently wore contact lenses to which they responded “yes” or “no”. All participants also indicated how often they wore their lens wear correction by choosing one of the following five options: wears CLs all the time, never wears glasses; wears CLs most of the time, wears glasses once in a while; wears CLs and glasses an equal amount of time; wears CLs once in a while, wears glasses most of the time; wears glasses all the time, never wears CLs. For analysis purposes, the five response options were classified into three groups as follows: wears CLs all/most of the time, wears glasses all/most of the time, and wears CLs and glasses equally.

Self-esteem

Of the 423 participants who provided usable data at both visits, the Self-Perception Profile for Children (SPPC)⁸ was completed by all at baseline and by 67 of them at the six-year visit. The upward extension of the SPPC, the Self-Perception Profile for Adolescents (SPPA)⁹ was completed by those 14 years and older at the six-year visit (n=356). These developmentally appropriate child and adolescent instruments were selected because of their prior use in other populations,^{10,11} excellent psychometric properties^{11,12} and because they assessed both global self-worth as well as self-esteem in several areas important to participants' lives. These domains included scholastic competence (academic ability and school-related achievements), social acceptance (ability to make friends and popularity), athletic competence (ability to play sports), physical appearance (looks and specific physical characteristics) and behavioural conduct (appropriateness of behaviour). Thus, the SPPC and

SPPA provided a comprehensive and differentiated picture of self-esteem which is important because individuals who have identical levels of global self-esteem might have different levels of domain-specific self-esteem. Each item in both instruments consisted of two logically opposed statements (e.g., “Some kids are happy with the way they look, BUT other kids are not happy with the way they look”). To reduce response bias, half of the items started with the more positive statement whereas the other half started with the more negative statement. Respondents had to first decide whether they were more like the children described in the first statement or more like those described in the second statement. After making this decision, they had to indicate whether the chosen statement was “really true” or “sort of true” for them. Responses to each item were scored from 1 (lowest self-esteem) to 4 (highest self-esteem). Global and specific self-esteem domain scores were computed by summing the responses to each item and then dividing the total score by the number of items in each domain. Thus, the self-evaluated domain scores also ranged from 1-4, lowest to highest. The SPPC and SPPA have been used in several different ethnic groups^{10,11} and their psychometric properties, including reliability and validity have been independently established.^{11, 12} These instruments also have excellent internal consistency; Cronbach alpha coefficients ranged from 0.71 to 0.86 for the SPPC domains⁸ and 0.77 to 0.92 for the SPPA domains⁹ in the normative samples. In the COMET cohort, similar Cronbach alpha coefficients were obtained, ranging from 0.74 to 0.81⁴ for the various SPPC domains and from 0.74 to 0.90 for the SPPA domains.

Data analyses

Self-esteem domain scores were evaluated at baseline and at the six-year visit based on CL use at the latter visit. Demographic and ocular characteristics were summarised by frequencies, means ($\pm$ SD) and medians. Univariate analyses (ANOVA) were then conducted between demographic (gender, ethnicity and age at the six-year visit) and ocular factors of interest (original eyeglass lens assignment, CL use, frequency of CL use and refractive error at the six-year visit) and six-year visit self-esteem to select relevant factors for inclusion in the subsequent multivariable analyses. Multiple regression analyses were subsequently performed to evaluate whether significant univariate associations continued to remain significant after adjusting for baseline self-esteem (five years prior to CL use) and other relevant factors. Separate regression models were run on each self-esteem domain to examine these associations and their magnitude. Tukey's studentised range test which corrects for experiment-wise error was used for post-hoc significance testing of multiple comparisons. All analyses were performed using SAS software version 9.2 (www.sas.com).

Results

Description of the COMET cohort (n=423)

At enrolment, COMET children were between 6 and 11 years (mean age = 9.3 ± 1.3 years), ethnically diverse, equally balanced between male and female and their mean baseline spherical equivalent refractive error was -2.4 ± 0.8 D.

At the six-year visit, COMET participants ranged from 12 to 17 years of age (mean age = 15.3 ± 1.3 years), 53% were female, and 53% wore contact lenses. Overall, the mean spherical equivalent refractive error was -4.6 ± 1.5 D; the mean refractive error of CL users (-4.6 ± 1.5 D) did not differ significantly from that of eyeglass users (-4.5 ± 1.5 D). Self-reported ethnicity in this cohort was as follows: 46% White, 26% African-American, 15% Hispanic, 8% Asian and 4% Mixed/Other.

Self-esteem and CL use

Overall, self-esteem domain scores at baseline ranged from 2.82 (± 0.70) on athletic competence to 3.32 (± 0.60) on global self-worth while at the six-year visit, they ranged from 2.74 (± 0.76) on athletic competence to 3.33 (± 0.53) on global self-worth. Self-esteem changed significantly from baseline to the six-year visit in all domains except behavioural conduct and global self-worth. Scholastic competence and social acceptance scores increased from baseline to the six-year visit; $t(422) = 4.74$, $p < 0.0001$ and $t(422) = 9.24$, $p < 0.0001$, respectively. Physical appearance and athletic competence scores decreased during this period; $t(422) = -2.71$, $p = 0.0070$ and $t(422) = -2.06$, $p = 0.040$, respectively. However, these changes were not associated with CL use at the six-year visit.

Those who reported CL use at the six-year visit had higher self-esteem scores at baseline (5 years preceding CL use) on social acceptance ($F_{1, 421} = 5.84$, $p = 0.016$), behavioural conduct ($F_{1, 421} = 5.49$, $p = 0.020$) and athletic competence ($F_{1, 421} = 5.09$, $p = 0.025$) than eyeglass users (Figure 1a). Their higher self-esteem on social acceptance ($F_{1, 421} = 6.74$, $p = 0.0097$) and behavioural conduct ($F_{1, 421} = 5.99$, $p = 0.015$) persisted at the six-year visit compared to eyeglass users (Figure 1b).

Other results of the six-year visit univariate analyses

Besides CL use, age, gender, ethnicity, original eyeglass lens assignment, refractive error and frequency of CL wear were also evaluated for their associations with self-esteem at the six-year visit. The results of these analyses, presented in Table 1, indicated that only gender and ethnicity were associated with self-esteem in several domains at the six-year visit. Boys had higher self-reported mean athletic competence ($F_{1, 421} = 29.78$, $p < 0.0001$) and physical appearance scores ($F_{1, 421} = 8.21$, $p = 0.0044$) than girls, while girls had higher self-reported behavioural conduct scores ($F_{1, 421} = 11.45$, $p = 0.0008$) than boys. Several ethnicity differences in the different domains were also noted, including physical appearance ($F_{4, 418} = 6.94$, $p < 0.0001$), scholastic competence ($F_{4, 418} = 5.25$, $p = 0.0004$) and behavioural conduct ($F_{4, 418} = 4.75$, $p = 0.0009$). African-Americans rated themselves higher than White and Hispanic participants on physical appearance and Hispanics evaluated themselves lower than Whites, African-Americans and Asians on scholastic competence and behavioural conduct based on Tukey's studentised range test at a significance level of 0.05.

Results of the six-year visit multivariable analyses

Separate multiple regression models were run on each of the six self-esteem domains. Each model included the three factors found to be significant in the univariate analyses (CL use, gender and ethnicity), while also adjusting for baseline self-esteem in that domain. Results shown in Table 2 indicate that CL users had higher mean social acceptance scores than eyeglass users at the six-year visit ($F_{1, 415} = 4.73$, $p = 0.03$), even after adjusting for baseline social acceptance scores, gender and ethnicity. Ethnicity was also associated with several self-esteem domains, including social acceptance ($F_{4, 415} = 3.30$, $p = 0.011$), athletic competence ($F_{4, 415} = 3.86$, $p = 0.0043$), physical appearance ($F_{4, 415} = 7.38$, $p < 0.0001$) and global self-worth ($F_{4, 415} = 5.03$, $p = 0.0006$). African-Americans evaluated themselves higher than Whites, Hispanics and Asians in these domains ($p < 0.05$). Mirroring the univariate findings, boys reported higher mean athletic competence ($F_{1, 415} = 27.55$, $p < 0.0001$) and physical appearance scores ($F_{1, 415} = 9.34$, $p = 0.0024$) than girls in the multivariable analyses, and girls reported higher behavioural conduct scores ($F_{1, 415} = 6.90$, $p = 0.0089$). These observed self-esteem differences for CL wear, ethnicity and gender were similar in magnitude to those obtained in previous studies.^{2, 5}

Discussion

The present study evaluated the self-esteem of CL users five years prior to CL use and up to one year following CL use and found that compared to eyeglass users, CL users had higher self-esteem at both time points in the domains of social acceptance and behavioural conduct. After adjusting for baseline self-esteem in these domains and the other covariates, CL users continued to have higher social acceptance scores at the six-year visit, one year after beginning CL wear. Frequency of CL wear, original eyeglass lens assignment (single vision or progressive addition eyeglass lenses), refractive error and age at the six-year visit were not associated with self-esteem in any domain at this visit.

Our finding that COMET participants who chose to wear CLs had higher self-esteem, particularly in the domain of social acceptance even before the start of CL wear, is contrary to that suggested by conventional wisdom and prior research which is the exact opposite – that higher self-esteem is entirely the result of CL use and does not precede it. Of closest relevance is the clinical trial² that randomised 8-11 year-old myopic children to wearing either CLs or eyeglasses for three years and also used the SPPC to measure global and domain-specific self-esteem. Those results showed that social acceptance scores increased over time for both groups, as we also found. However, in the Walline et al.² study, the mean increase over three years was more pronounced for CL wearers (difference from baseline=0.23), while eyeglass wearers showed less change (difference from baseline=0.04). In our study, both CL and eyeglass users showed similar increases in social acceptance scores from baseline (0.33 and 0.35, respectively), although CL users had significantly higher scores than eyeglass users both preceding and following CL use. Interestingly, in the Walline et al.² study, CL users had notably lower mean scores at baseline (2.86 ± 0.69) compared to eyeglass users (2.98 ± 0.66), while the reverse was true for our study (2.98 ± 0.67 for CL users versus 2.82 ± 0.67 for eyeglass users). It is possible that the lower baseline scores of the CL users (2.86 ± 0.69) in the Walline et al.² study contributed to most of the average difference observed between the two groups over the three-year period; the mean social acceptance scores at the end of three years were similar for the two groups: 3.09 ± 0.52 for CL users and 3.02 ± 0.58 for eyeglass users.

In the present study, higher self-esteem on social acceptance also persisted up to one year following CL use, after adjusting for baseline self-esteem in that domain, gender and ethnicity. Although CL use was significantly associated with higher levels of social acceptance one year after CL use began (i.e., at the six-year visit), increases in these scores cannot be directly attributed to CL use, as self-esteem was not measured immediately preceding CL wear (i.e., at the five-year visit). Myopic individuals who choose to wear CLs instead of glasses might be more outgoing or wish to appear to be so; eyeglass wearers are stereotypically perceived by others as shy and introverted¹³ compared to non-wearers, irrespective of reality.¹⁴ Although we have no direct evidence, we do know that those who chose CLs had higher social acceptance scores both preceding and following CL use, suggesting that they perceived themselves to be more popular and well-liked by their peers compared to those who opted to remain in glasses.

The association between CL wear and self-esteem was observed using the Harter Self-Perception Profiles to evaluate self-esteem in the COMET cohort. These instruments provide global and domain-specific self-esteem scores by summing responses to the items comprising each subscale; i.e., by Likert scoring¹⁵ traditionally used in psychology and the norm when these measures were developed, validated and selected for use in COMET at the beginning of the study. However, due to issues with Likert scoring¹⁶ (e.g., assuming that the response choices for each item represent uniform increments or equal intervals between choices when that may not necessarily be the case), questionnaires based on contemporary

statistical approaches such as Rasch analysis are now increasing in use. Although our results regarding CL wear and higher self-esteem were obtained using Likert scoring-based measures, a study using an instrument based on Rasch analysis also noted a similar association between CL wear and quality of life,¹⁷ thus bolstering our confidence in the present findings.

Besides CL use, ethnicity was also associated with social acceptance scores at the six-year visit in the multivariable analyses. African-Americans had higher scores compared to White, Hispanic and Asian participants in this self-esteem domain, as well as in the areas of physical appearance, athletic competence and global self-worth. Our findings are in line with a growing body of literature suggesting that African-Americans, particularly adolescents and young adults, have higher self-esteem compared to Whites^{18, 19} and can be explained by social identity theory²⁰ as follows: Group identity, including ethnic/racial identity or the perception of being a member of a particular ethnic or cultural group, is an important correlate of individual self-esteem.²¹ This identity is more salient for African-Americans who emphasise the distinctiveness of their racial identity more than Whites²² and this increased emphasis is associated with higher individual self-esteem.^{23,24} It should be noted though that the social identity explanation relates to the African-American versus White self-esteem comparison only, not to that of other ethnicities or races. Much of the research to date has focused on African-Americans and Whites and although this is starting to change,¹⁹ additional research is required to understand the meaning of ethnicity across various groups and its relationship with self-esteem.²⁵

Surprisingly, we did not find an increase in physical appearance scores after the start of CL wear for CL users compared to eyeglass users, as did other studies.^{1, 2} Physical appearance scores decreased from baseline (mean age = 9.3 ± 1.3 years) to the six-year visit (mean age = 15.3 ± 1.3 years) which has also been noted in other studies^{2,26} and is likely due to children's heightened self-consciousness²⁷ and awareness of physical changes as they approach and go through puberty. This is even more pronounced in girls as we found in our study as they reported lower physical appearance scores than boys, although they were more likely to wear CLs than boys. It is most likely a result of society's increased emphasis on the female appearance²⁸; consequently, girls experience more dissatisfaction with their looks when they fail to meet these cultural expectations. The results obtained in our self-selected cohort of adolescent CL wearers indicate that CL use per se did not alleviate the decreases in physical appearance scores brought on by puberty and societal expectations.

Adolescence is a developmental stage when peers exert substantial influence on young people²⁹ and being popular is of utmost importance. In the COMET cohort, CL wear contributed more positively to social interactions with peers and feelings of likeability than it did to physical appearance perceptions which might be more influenced by other factors such as weight considerations,³⁰ particularly in adolescent girls. Our findings call into question the conventional wisdom regarding which teens pursue and are most likely to psychologically benefit from CL wear in terms of enhanced self-perceptions of their popularity with peers. Thus, they may provide the practitioner with a different perspective of these young people, which may ultimately influence the final decision of whether to recommend CL wear to an individual expressing interest in wearing CLs.

One of the strengths of the present study is that COMET participants chose whether to switch to CLs or remain in glasses; i.e., they were not randomised to wearing either correction. Thus, our cohort is more typical of real life and our results more generalisable. Our findings suggest that self-esteem may influence the decision to wear CLs and that CLs in turn are associated with higher self-esteem in those individuals most likely to wear them.

The results of the present study also indicate that caution should be used when attributing higher self-esteem solely to CL use as these differences might exist prior to CL use.

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Figure 1.
Mean Self Esteem Domain Scores at Baseline & at the Six-Year Visit based on Contact Lens (CL) Use at the Six-Year Visit

- CLs at Six-Year Visit (n=224)
- Glasses at Six-Year Visit (n=199)
- CLs at Six-Year Visit (n=224)
- Glasses at Six-Year Visit (n=199)

Table 1

6-year Visit Self-esteem Scores by Ocular/Demographic Factor [Univariate Analyses, n=423]

<u>Ocular/ Demographic Factor</u>	<u>Self-esteem Domains</u>					
	<u>Scholastic Competence</u> Mean ^a ($\pm$ SD)	<u>Social Acceptance</u> Mean ^a ($\pm$ SD)	<u>Athletic Competence</u> Mean ^a ($\pm$ SD)	<u>Physical Appearance</u> Mean ^a ($\pm$ SD)	<u>Behavioral Conduct</u> Mean ^a ($\pm$ SD)	<u>Global Self-Worth</u> Mean ^a ($\pm$ SD)
Treatment Group						
PAL (n=206)	3.21 ($\pm$ 0.52)	3.27 ($\pm$ 0.57)	2.79 ($\pm$ 0.74)	3.00 ($\pm$ 0.62)	3.07 ($\pm$ 0.56)	3.37 ($\pm$ 0.53)
SV (n=217)	3.24 ($\pm$ 0.58)	3.22 ($\pm$ 0.54)	2.69 ($\pm$ 0.77)	2.99 ($\pm$ 0.63)	3.09 ($\pm$ 0.58)	3.32 ($\pm$ 0.53)
Myopia at 6 year visit						
More myopic (< Median of -4.4D)	3.23 ($\pm$ 0.58)	3.23 ($\pm$ 0.59)	2.68 ($\pm$ 0.77)	2.96 ($\pm$ 0.61)	3.08 ($\pm$ 0.58)	3.31 ($\pm$ 0.54)
Less myopic ($\geq$ Median of -4.4D)	3.22 ($\pm$ 0.53)	3.27 ($\pm$ 0.52)	2.80 ($\pm$ 0.74)	3.03 ($\pm$ 0.65)	3.07 ($\pm$ 0.56)	3.38 ($\pm$ 0.51)
Frequency of wear of lens correction						
CLs most/all the time (n=180)	3.22 ($\pm$ 0.52)	3.30 ($\pm$ 0.54)	2.76 ($\pm$ 0.77)	2.97 ($\pm$ 0.58)	3.16 ($\pm$ 0.52)	3.39 ($\pm$ 0.48)
Glasses most/all the time (n=216)	3.21 ($\pm$ 0.59)	3.20 ($\pm$ 0.58)	2.70 ($\pm$ 0.75)	3.03 ($\pm$ 0.66)	3.02 ($\pm$ 0.61)	3.32 ($\pm$ 0.55)
CLs and glasses equal (n=27)	3.33 ($\pm$ 0.48)	3.29 ($\pm$ 0.46)	2.84 ($\pm$ 0.78)	2.89 ($\pm$ 0.71)	3.04 ($\pm$ 0.56)	3.24 ($\pm$ 0.62)
Age at 6 year visit						
$\leq$ Median of 15 years (n=218)	3.26 ($\pm$ 0.57)	3.28 ($\pm$ 0.56)	2.78 ($\pm$ 0.76)	3.03 ($\pm$ 0.60)	3.05 ($\pm$ 0.57)	3.35 ($\pm$ 0.54)
>Median of 15 years (n=205)	3.18 ($\pm$ 0.53)	3.21 ($\pm$ 0.55)	2.70 ($\pm$ 0.76)	2.96 ($\pm$ 0.66)	3.10 ($\pm$ 0.57)	3.34 ($\pm$ 0.52)
Gender						
Female (n=223)	3.25 ($\pm$ 0.57)	3.25 ($\pm$ 0.56)	2.55 ($\pm$ 0.77)	2.91 ($\pm$ 0.66)	3.17 ($\pm$ 0.58)	3.34 ($\pm$ 0.57)
Male (n=200)	3.19 ($\pm$ 0.54)	3.24 ($\pm$ 0.55)	2.94 ($\pm$ 0.70)	3.09 ($\pm$ 0.58)	2.98 ($\pm$ 0.55)	3.36 ($\pm$ 0.48)
Ethnicity						
White (n=196)	3.22 ^b ($\pm$ 0.57)	3.21 ($\pm$ 0.53)	2.68 ($\pm$ 0.77)	2.91 ^c ($\pm$ 0.63)	3.12 ^b ($\pm$ 0.56)	3.34 ^d ($\pm$ 0.52)
African-American (n=110)	3.34 ^b ($\pm$ 0.50)	3.38 ($\pm$ 0.57)	2.93 ($\pm$ 0.78)	3.24 ^c ($\pm$ 0.57)	3.11 ^b ($\pm$ 0.56)	3.50 ^d ($\pm$ 0.43)
Hispanic (n=65)	2.98 ^b ($\pm$ 0.53)	3.17 ($\pm$ 0.56)	2.63 ($\pm$ 0.67)	2.82 ^c ($\pm$ 0.66)	2.81 ^b ($\pm$ 0.61)	3.12 ^d ($\pm$ 0.65)
Asian (n=33)	3.36 ^b ($\pm$ 0.48)	3.11 ($\pm$ 0.62)	2.61 ($\pm$ 0.76)	2.98 ($\pm$ 0.49)	3.23 ^b ($\pm$ 0.52)	3.31 ($\pm$ 0.47)
Mixed (n=19)	3.18 ($\pm$ 0.65)	3.36 ($\pm$ 0.45)	2.79 ($\pm$ 0.74)	3.08 ($\pm$ 0.70)	3.15 ($\pm$ 0.54)	3.36 ($\pm$ 0.53)

^aNumbers in bold denote significantly different values^bHispanics differed significantly from African-American, Asian and White participants^cAfrican-Americans differed significantly from White and Hispanic participants^dHispanics differed significantly from African-American and White participants

Table 26-year Visit Self-esteem Scores by Ocular/Demographic Factor [Multivariable Analyses,^a n=423]

<u>Ocular/ Demographic Factor</u>	<u>Self-esteem Domains</u>					
	<u>Scholastic Competence</u> Mean ^b ($\pm$ SE)	<u>Social Acceptance</u> Mean ^b ($\pm$ SE)	<u>Athletic Competence</u> Mean ^b ($\pm$ SE)	<u>Physical Appearance</u> Mean ^b ($\pm$ SE)	<u>Behavioral Conduct</u> Mean ^b ($\pm$ SE)	<u>Global Self-Worth</u> Mean ^b ($\pm$ SE)
Contact Lens (CL) Use						
Yes	3.18 ($\pm$ 0.04)	3.30 ($\pm$ 0.04)	2.80 ($\pm$ 0.06)	3.02 ($\pm$ 0.05)	3.09 ($\pm$ 0.04)	3.34 ($\pm$ 0.04)
No	3.24 ($\pm$ 0.05)	3.18 ($\pm$ 0.05)	2.68 ($\pm$ 0.06)	3.03 ($\pm$ 0.05)	3.04 ($\pm$ 0.05)	3.31 ($\pm$ 0.04)
Gender						
Female	3.25 ($\pm$ 0.04)	3.23 ($\pm$ 0.04)	2.56 ($\pm$ 0.06)	2.93 ($\pm$ 0.05)	3.14 ($\pm$ 0.04)	3.31 ($\pm$ 0.04)
Male	3.17 ($\pm$ 0.05)	3.25 ($\pm$ 0.05)	2.92 ($\pm$ 0.06)	3.12 ($\pm$ 0.05)	2.99 ($\pm$ 0.05)	3.34 ($\pm$ 0.04)
Ethnicity						
White	3.21 ^c ($\pm$ 0.04)	3.19 ^d ($\pm$ 0.04)	2.66 ^d ($\pm$ 0.05)	2.90 ^d ($\pm$ 0.04)	3.11 ^e ($\pm$ 0.04)	3.33 ^f ($\pm$ 0.04)
African-American	3.35 ^c ($\pm$ 0.05)	3.39 ^d ($\pm$ 0.05)	2.96 ^d ($\pm$ 0.06)	3.25 ^d ($\pm$ 0.06)	3.11 ^e ($\pm$ 0.05)	3.50 ^f ($\pm$ 0.05)
Hispanic	3.01 ^c ($\pm$ 0.07)	3.20 ^d ($\pm$ 0.07)	2.67 ^d ($\pm$ 0.08)	2.85 ^d ($\pm$ 0.07)	2.83 ^e ($\pm$ 0.07)	3.15 ^f ($\pm$ 0.06)
Asian	3.32 ^c ($\pm$ 0.09)	3.11 ^d ($\pm$ 0.09)	2.66 ^d ($\pm$ 0.12)	3.00 ^d ($\pm$ 0.10)	3.17 ^e ($\pm$ 0.10)	3.30 ^f ($\pm$ 0.09)
Mixed	3.16 ($\pm$ 0.12)	3.29 ($\pm$ 0.12)	2.75 ($\pm$ 0.16)	3.13 ($\pm$ 0.14)	3.10 ($\pm$ 0.13)	3.34 ($\pm$ 0.12)

^aBased on separate multiple regression models for each self-esteem domain that included baseline self-esteem in that domain, contact lens use, gender and ethnicity (factors found relevant on univariate analyses).

^bNumbers in bold denote significantly different values

^cHispanics differed significantly from Asians, Whites and African-Americans; African-Americans and Whites also differed significantly from each other.

^dAfrican-Americans differed significantly from Asian, White and Hispanic participants.

^eHispanics differed significantly from Asian, White and African-American participants.

^fAfrican-Americans differed significantly from Asian, White and Hispanic participants; Hispanics and Whites also differed significantly from each other.