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What do kids think about kids in eyeglasses?

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Abstract

Purpose—Previous studies have examined how people feel about others who wear glasses, but no studies of children have been published on the subject. We conducted the Children’s Attitudes about Kids in Eyeglasses (CAKE) study to determine how children feel about other children who wear glasses.

Methods—Subjects compared a series of 24 picture pairs and answered six questions regarding which child ...he or she would rather play with, looks better at playing sports, appears smarter (more intelligent), appears nicer, looks more shy and looks more honest. The children in each pair of pictures differed by gender, ethnicity and spectacle wear. Logistic regression was performed to determine the probability and confidence interval that a subject would pick a particular child.

Results—Eighty subjects between the ages of 6 and 10 years participated. The average ($\pm$ SD) age of the subjects was 8.3 ± 1.3 years, 42 (53%) were females, 51 (64%) were whites, 21 (26%) were blacks, and 30 (38%) wore glasses. The spectacle wearer appeared smarter (0.66, CI = 0.60–0.71) and more honest (0.57, CI = 0.50–0.64), and children who wore glasses looked smarter regardless of whether the child picking wore glasses. Both boys (0.66, CI = 0.68–0.79) and girls (0.77, CI = 0.71–0.82) thought that boys looked better at playing sports.

Discussion—The old adage ‘Boys never make passes at lasses who wear glasses’ may be outmoded, but glasses may tend to make children look smarter and slightly more honest to their peers.

Keywords

children; peers; perceptions; spectacles

Many studies have been conducted to examine the effects of glasses on people’s perceptions. These studies either evaluated how others felt about people with glasses (Terry and Hall, 1989; Harris, 1991; Terry and Krantz, 1993) or how people wearing glasses felt about themselves (Gording and Match, 1968; Terry and Brady, 1976; Terry, 1981, 1989; Terry *et al.*, 1983, 1997; Harris, 1991; Kidd *et al.*, 1997; Lyon *et al.*, 2002).

Some studies used pictures or videos of subjects with and without glasses to determine the effects of glasses on others' perceptions through a survey. Using a 135-item survey, undergraduate students rated pictures of people based on social value, social forcefulness and mental competence. People wearing glasses were rated with diminished forcefulness and heightened competence (Terry and Krantz, 1993). Under the guise of forming first impressions during job interviews, undergraduate students watched a video tape in which either a man or a woman entered an office and sat at a desk across the room; one time wearing glasses and another time not wearing glasses. When wearing glasses, the people were considered more artistic, fearful, mild, timid, dependent, soft, gentle, kind and sensitive (Terry, 1989). Two studies using picture comparisons also found people wearing glasses to be judged as more intelligent (Thornton, 1943, 1944), industrious (Thornton, 1943, 1944), dependable (Thornton, 1943) and honest (Thornton, 1943, 1944).

Some studies also asked people who wear visual correction about themselves. One study measured changes in shyness and facial satisfaction for two groups: subjects changing from glasses to contact lenses and subjects changing from no correction to glasses. There was no difference in the change in shyness or the change in facial satisfaction when subjects switched visual correction in either group (Hadjistavropoulos and Genest, 1988). Another study used the House-Tree-Person drawing method to measure changes in a subject's personality. Positive changes after contact lens fitting were observed in 70% of the subjects (Gording and Match, 1968).

All of the previous studies were performed in adults, but one study found that self-esteem was lower for people who first received their glasses when they were children (younger than 13 years) or adults (older than 20 years), rather than when they were adolescents (age 13–20 years; Terry *et al.*, 1983). A study of children found no significant differences in self-perceptions between children who wore glasses and children who did not wear glasses (Lyon *et al.*, 2002). In another study, in which children were randomly assigned to wear glasses or contact lenses for 3 years, no difference in the rate of change of self-concepts between the spectacle and contact lens wearers was detected (Terry *et al.*, 1997). Terry and Stockton (1993) also asked first grade children to rate pictures of children with and without glasses, and they found that children were more likely to be less attractive, poorer at school and more deviant when they wore their glasses.

The only two studies performed on children have not found an effect of spectacle wear on self-perception, but no studies have examined the effect of spectacle wear on children's perceptions of other children with glasses. We conducted the Children's Attitudes about Kids in Eyeglasses (CAKE) study to determine whether spectacle wear affects children's perceptions about their peers.

Methods

The CAKE study followed the tenets of the Declaration of Helsinki and was approved by The Ohio State University Biomedical Institutional Review Board. A release form was signed by one parent of all children whose pictures appeared in the photograph book. The release form allowed for publication of the pictures in the photograph book and in

publications resulting from the research. All parents provided informed consent and child assent was obtained from all subjects.

Twelve children between the ages of 6 and 10 years were chosen to pose for pictures. Half of the subjects were females and equal numbers of white, black and Far East Asian children were chosen. The children were allowed to wear their own glasses or they picked a pair of glasses from the Eyewear Gallery at The Ohio State University College of Optometry. The children were asked to pose without any facial expression for two pictures, one while wearing glasses and one while not wearing glasses.

In order to create the same facial expressions by children while wearing glasses and not wearing glasses, the pictures of the children without glasses were digitally altered. The glasses worn during the picture taken while the child was wearing glasses were digitally removed from the child and placed on the picture of the child without glasses. This way we had one picture of the child with glasses and a picture of the child without glasses, and both pictures had exactly the same expression (Figure 1).

Twenty-four pairs of color pictures were arranged in a photograph book, and always presented in the same order. The two pictures always differed by gender, spectacle wear and ethnicity; and these three variables were presented randomly on the left or right side of the photograph book. The children in the pictures were unknown to the subjects who were choosing. One example of a picture pair is shown in Figure 2. Subjects were asked to look at the pairs of pictures and pick which child would best answer each of six questions.

1. Which child would you rather play with?
2. Which child looks smarter?
3. Which child looks better at playing sports?
4. Which child do you think is better looking?
5. Which child looks more shy?
6. Which child looks more honest?

The child chose to either read the questions for each pair then answer the questions alone, or to have an investigator read the questions and allow the child to point at the picture he or she chose. Survey administration took place in a variety of settings, depending on where the child was when he or she was approached; the administrations each lasted approximately 20 min, and the children were allowed to take breaks as necessary. Answers were recorded for each of the six questions on all 24 comparisons. Note: data were collected in the United States, where 'smarter' typically means more intelligent and is rarely used to mean better dressed; although the definition was not clarified to the subjects, it is unlikely the definition was confused. The data were double entered in a Microsoft Excel spreadsheet and compared for discrepancies. All discrepancies between the two data entries were corrected after looking at the original hard copy, and a final data set was created for analysis.

Statistical analyses were performed in SAS using the GLIMMIX procedure. GLIMMIX handles data with both a binary response and repeated measures, two of the features of our

data. Models were fit independently for each of the six questions posed and for each predictor. Possible correlation in the 24 responses from a child, one for each picture pair, was accommodated by fitting models permitting residual correlation in responses from the same child.

The pictures were from 12 children. Each child appeared in four picture pairs, twice wearing glasses and twice not wearing glasses. To account for systematic effects of the particular children selected for the images, random intercepts were fitted for each imaged child.

One aspect of our research was to investigate the chance of picking a child wearing glasses and how that chance might be affected by the picking child's background characteristics. For this analysis, the outcome was whether or not the subject picked the image of the child wearing glasses. The background characteristics considered were the subject's age, gender, spectacle-wearing status and race (white or not white). We also considered the spectacle-wearing status of the subject's siblings and parents.

Another aspect of our research was to investigate the chance of a child picking someone like him- or her-self in terms of spectacle-wearing status or gender. For this analysis, the outcomes were whether or not the subject picked an image whose gender or spectacle wearing status matched his or her own. Predictors were the subject's gender and spectacle-wearing status.

A final aspect of our research was to investigate how the chance of picking a child wearing glasses might be affected by the characteristics of the imaged pair of children. For this analysis, the outcome was whether or not the subject picked the image of the child wearing glasses and the predictors were the sex of the child wearing glasses and the ethnicities of the children in the pair of pictures.

All of the modeled outcomes were binary, so we modeled the chance of occurrence in all cases. Models were used to generate estimates of the chance of occurrence as well as 95% confidence intervals for the true chance of occurrence. We present the estimates and confidence intervals in tables and figures. If the confidence interval includes 0.50, then no preference for the variable being compared is exhibited by the subjects. If the confidence interval is entirely above or below, then the subjects significantly prefer one of the choices presented. The significance levels of the statistically significant predictors are also presented in the text. The criterion to distinguish statistically significant effects was set at 0.01 to account for multiple comparisons.

Results

Eighty subjects between 6 and 10 years old were enrolled between September 2003 and September 2005. They were recruited primarily from eye clinics or investigations taking place at The Ohio State University College of Optometry. The average ($\pm$ SD) age was 8.3 ($\pm$ 1.3) years, and 42 (53%) of the subjects were female. Parents reported that 21 (26%) were black and 51 (64%) were white. Thirty (38%) of the subjects wore glasses, 34 (43%) of the subjects had at least one sibling who wore glasses and 52 (65%) had at least one parent who wore glasses.

We conducted several analyses to answer six important questions as indicated below.

Do spectacles play a role regarding how 6–10-year-old children answer the six questions presented?

The overall fitted probability (and 95% confidence interval) of picking a child who wears glasses for each of the six questions is shown in Figure 3. Spectacle wear did not play a role when asked any of the questions except, ‘Which child looks smarter?’ When asked this question, children chose the spectacle wearer as the smartest looking of the pair more often than by chance alone ($p = 0.001$).

Do characteristics of the child choosing affect whether or not the child chooses the spectacle wearer?

We looked at the effect of characteristics of the child choosing on whether that child picked a spectacle wearer or not. We considered age, gender, ethnicity (white vs non-white), whether or not the child wore glasses, whether or not the child had at least one sibling who wore glasses, and whether or not the child had a parent who wore glasses.

Only the age of the child choosing had a significant effect on whether the spectacle wearer was chosen ($p = 0.006$). Age played a factor only when asking, ‘Which child looks better at playing sports?’ Younger children were more likely to pick the spectacle wearer as looking better at playing sports, but the confidence bands included chance at every age (Table 1), so the differences are not of practical significance.

Does gender or ethnicity of the child in the picture affect the chance of picking the spectacle wearer?

Ethnicity of the child in the picture did not affect how often the spectacle wearer was chosen for any of the questions. The gender of the pictured spectacle wearer did not affect how often the spectacle wearer was chosen when the children were asked, ‘Which child would you rather play with?’ or ‘Which child looks more shy?’. However, gender of the imaged spectacle wearer did affect responses to the other four questions (Table 2). When asked, ‘Which child looks smarter?’ both boy and girl spectacle wearers were chosen significantly more often than non-spectacle wearers, but girl spectacle wearers were chosen more often than boy wearers ($p = 0.0006$). Whether they were wearing glasses or not wearing glasses, boys tended to be selected more often than girls when children were asked, ‘Which child looks better at playing sports?’ ($p < 0.0001$). Girl spectacle wearers (contrasted with boy non-wearers) were more likely than boy spectacle wearers (contrasted with girl non-wearers) to be chosen in response to the questions: ‘Which child do you think is better looking?’ ($p < 0.0001$) and ‘Which child looks more honest?’ ($p = 0.001$).

Do children tend to pick children with the same glass wearing status?

Whether or not the child choosing wore glasses did not affect who the child picked when asked, ‘Which child would you rather play with?’ or ‘Which child looks better at playing sports?’ (Table 3). There were statistically significant differences in the responses of children wearing and not wearing glasses associated with the questions ‘Which child do you think is better looking?’ ($p = 0.005$) and ‘Which child looks more shy?’ ($p = 0.006$).

However for both questions the confidence intervals for the true chance of picking a child with the same glass wearing status included 0.5 for those wearing and not wearing glasses. Thus, the detected statistical differences are not of practical significance. Both children who wore glasses and those who did not tended to pick a spectacle wearer as the one who looked more honest ($p < 0.0001$) and smarter ($p < 0.0001$).

Do girls pick girls and do boys pick boys?

We looked at whether children picked their own gender, and whether the child's gender had an effect on that tendency. On two of the questions, there were no gender effects (Table 4). Boys would much rather play with boys and girls would much rather play with girls; and both boys and girls thought the opposite gender looked more shy. There were statistically significant gender differences associated with the other questions. Girls were more likely than boys to pick their own gender when asked which child looks more honest ($p = 0.0002$) or is better looking ($p = 0.0005$). Boys were more likely to pick girls as looking smarter ($p = 0.002$). Girls did not have a bias. Both boys and girls thought boys looked better at playing sports ($p < 0.0001$).

Were some of the kids in the pictures chosen more often than other kids in the pictures?

As indicated in the description of methods, to account for systematic effects of the particular children selected for the images, random intercepts were fitted for each imaged child. In order to determine whether some kids were more 'popular' than other kids and therefore had the potential to bias the results, we examined how often each child was chosen (Table 5). An Asian female and an Asian male were chosen less often than by chance alone ($p = 0.0001$ and $p = 0.003$, respectively). A White male was also chosen less often than by chance alone ($p = 0.005$), and a White female was chosen more often than by chance alone ($p = 0.01$). The other eight children were not chosen more or less than by chance alone, indicating that their 'popularity' would not bias the results.

Discussion

According to our study, children between the ages of 6 and 10 years typically do not make judgments of their peers based on spectacle wear, but they believe that their peers who wear glasses appear smarter. This finding has been confirmed by studies of adults (Thornton, 1943, 1944; Boshier, 1975). Previous studies have found associations between myopia and intelligence (Grosvenor, 1970; Rosner and Belkin, 1987) so children may have picked up on the association of myopia and intelligence from their own experience or via media portrayals of 'intelligent nerds' wearing glasses. It is interesting to note that this stereotype manifests at a relatively early age. Furthermore, the stereotype of the smart person wearing glasses was held both by children wearing glasses and children not wearing glasses. The intelligence and spectacle wear theme continued when looking at the characteristics of the children in the pictures. Although girl spectacle wearers were chosen more often as appearing smarter than boy spectacle wearers, both boy and girl spectacle wearers were chosen significantly more often than non-spectacle wearers, indicating that spectacle wear plays a more important role than gender of the child in the picture when determining which child looks smarter. In essence, spectacle wearers appear to be smarter than non-spectacle wearers to all children,

regardless of the gender or ethnicity of the child in the picture. This finding is not universal though. Terry and Stockton had first-grade subjects rate pictures of similar-aged children on how well they thought they performed in school. Children with medium- and low-cognitive abilities did not base their decision about school performance on spectacle wear, but children with high-cognitive abilities judged children with glasses to perform less positively at school than children who do not wear glasses (Terry and Stockton, 1993). Determining a cause for this discrepancy in findings between two similar studies is difficult.

Another area in which children have relatively strong beliefs is that of gender and sports. Both boys and girls between the ages of 6 and 10 years believe that boys appear to be better at playing sports than girls. Other studies have found that boys have higher self-perception of athleticism than girls (Dias *et al.*, 2002), and that adolescents (age 14 to 18 years) hold gender stereotypes when it comes to certain sports (Alley and Hicks, 2005). These findings confirm the perceived stereotype that boys are better athletes than girls.

The only factor examined in this study that determined who a child would rather play with was gender. Boys would rather play with boys and girls would rather play with girls. This finding has been previously documented (Koch, 1957; Alexander and Hines, 1994; Hoffmann and Powlishta, 2001). A study designed similarly to the current study found that children's choice of playmates was not affected by an eye turn (Johns *et al.*, 2005), and another study of first-grade children also found that spectacles do not play a role in choosing their friends (Terry and Stockton, 1993). Boys and girls tend to play with other children who have similar play styles, and this is often determined, in part at least, by the gender of the child (Alexander and Hines, 1994). Children do not tend to use demographic or feature information, such as gender, ethnicity, spectacle-wear or strabismus to choose a playmate.

Potential limitations

In this study, equal proportions of gender, ethnicity and spectacle wear were compared in the photographs, but the distribution of children choosing was not equally distributed. Less than 10% of the children choosing were Asian, which may have contributed to the fact that two Asian children were picked significantly less often than by chance alone (Table 5). No black children were picked more or less often than by chance alone and one white child was picked more often and one less often than by chance alone. Perhaps a larger proportion of Asian children would have more equally distributed the popularity of the children. However, neither ethnicity of the child in the picture nor ethnicity of the child choosing played a role in answering any of the six questions. Future studies may examine the 'popularity' of each child prior to the investigation and use only children who are not picked more or less than by chance alone to decrease the potential for bias in the sample.

Anecdotally, 6- to 10-year old children found it difficult to answer six questions regarding 24 picture pairs. Their attention may have waxed and waned throughout the investigation. Although this is unlikely to create a bias, it may have negated any effect that may have surfaced if the children were more attentive and less likely to be picking a picture randomly. We do not believe that the attention of the children in this sample was insufficient because we found stereotypical behaviour in our sample. The children chose to play primarily with

their own gender and they thought boys appeared more athletic. This indicates that the children were not randomly answering the questions.

In summary, this study found that spectacles make children appear to be smarter to their peers, but they do not change children's attitudes about shyness, honesty, attractiveness, athleticism or whether or not they would play with them.

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Figure 1.

One picture was taken of the child without glasses (a) and one picture of the child with glasses (b). The glasses were digitally transferred to the picture of the child without glasses (c) so that we had identical pictures of the child without (a) and with (c) glasses.

Figure 2.
An example of one of the 24 picture pairs differing by gender, ethnicity and spectacle-wearing status.

Figure 3.

The probability and 95% confidence interval that a child will pick a child who wears glasses. The dashed line indicates a 50% chance of picking either the spectacle wearer or the non-spectacle wearer.

Table 1

The probability and confidence band of choosing the child wearing spectacles given the age of the child choosing

Which child...	Age	Probability of choosing spectacle wearer	95% Confidence interval
...looks better at playing sports?	6	0.57	0.39, 0.74
	7	0.53	0.36, 0.70
	8	0.49	0.33, 0.66
	9	0.46	0.29, 0.63
	10	0.42	0.26, 0.60

Note that all confidence intervals include 0.50.

Table 2

Probability and confidence intervals that a subject picks the spectacle wearer based upon the gender of the child in the picture

Which child...	Gender of spectacle wearer	Probability of choosing spectacle wearer	95% Confidence interval
...looks smarter?	Female	0.72	0.66, 0.77
	Male	0.60	0.53, 0.65
...looks better at playing sports?	Female	0.23	0.18, 0.29
	Male	0.74	0.68, 0.79
...do you think is better looking?	Female	0.64	0.57, 0.71
	Male	0.43	0.36, 0.51
...looks more honest?	Female	0.65	0.58, 0.72
	Male	0.49	0.41, 0.56

There was no difference between male and female in the picture for the questions, 'Which child would you rather play with?' and 'Which child looks more shy?'

Table 3

Probability of a subject picking a child of the same spectacle-wearing status

Which child...	Spectacle status of subject	Probability of choosing same spectacle status	95% Confidence interval
...would you rather play with?		0.47	0.44, 0.50
...looks smarter?	No glasses	0.36	0.32, 0.41
	Glasses	0.69	0.63, 0.75
...looks better at playing sports?		0.50	0.45, 0.55
...do you think is better looking?	No glasses	0.47	0.44, 0.51
	Glasses	0.55	0.50, 0.59
...looks more shy?	No glasses	0.53	0.50, 0.57
	Glasses	0.45	0.40, 0.50
...looks more honest?	No glasses	0.42	0.38, 0.47
	Glasses	0.56	0.50, 0.61

Table 4

Probability and confidence intervals that a subject picks a child of the same gender

Which child...	Gender of subject	Probability of choosing same gender	95% Confidence interval
...would you rather play with?		0.75	0.70, 0.79
...looks smarter?	Female	0.54	0.49, 0.59
	Male	0.42	0.37, 0.47
...looks better at playing sports?	Female	0.30	0.24, 0.37
	Male	0.82	0.75, 0.86
...do you think is better looking?	Female	0.74	0.66, 0.80
	Male	0.55	0.47, 0.63
...looks more shy?		0.44	0.40, 0.48
...looks more honest?	Female	0.62	0.56, 0.68
	Male	0.46	0.40, 0.52

Table 5

The probability and confidence intervals that each child in the pictures was chosen

	Probability of choosing	Confidence interval
Asian female ¹	0.44	0.40, 0.47
Asian female	0.49	0.46, 0.52
Asian male	0.50	0.47, 0.54
Asian male ¹	0.45	0.42, 0.48
Black female	0.54	0.50, 0.57
Black female	0.52	0.49, 0.55
Black male	0.53	0.50, 0.56
Black male	0.52	0.49, 0.56
White female	0.49	0.46, 0.53
White female ²	0.54	0.51, 0.57
White male	0.52	0.50, 0.55
White male ¹	0.45	0.42, 0.49

¹ Child chosen significantly less often than by chance alone.

² Child chosen significantly more often than by chance alone.