

HEALTH SERVICE APPLICATION

Eyes That Thrive in School: A Program to Support Vision Treatment Plans at School

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Uncorrected refractive errors are the leading cause of preventable vision impairment in the United States.¹ On average, 13% to 15% of all 3- to 5-year-old children have vision conditions including refractive errors, amblyopia, and strabismus,² with prevalence higher in poor urban neighborhoods.²⁻⁴ Untreated childhood vision conditions can result in permanent vision loss due to amblyopia. Uncorrected refractive errors and amblyopia have also been linked to learning difficulties and delayed sensory, motor, cognitive, and social-emotional development, as well as significant health risk due to injury.⁵⁻¹⁰ The optimal time to treat significant refractive errors and vision conditions leading to amblyopia in terms of visual outcomes is during the preschool years, and in most cases, these conditions are treated with prescription eyeglasses.² However, compliance with vision treatment can be challenging for young children and their families.

Effectively addressing a child's vision condition requires (1) early detection through vision screening; (2) a comprehensive eye exam for a child referred from screening; (3) acquisition of prescribed eyeglasses; (4) compliance with the treatment plan; and (5) ongoing care. With the exception of Head Start, there are no federal mandates standardizing vision screening practices for young children; if regulations exist, they are determined at the state level. The National Head Start Association mandate is that (1) all enrolled children receive a vision screening within the first 45 days of the school year, (2) results be

communicated to parents, and (3) communication be established with parents to facilitate implementation of follow-up.¹¹ Practice in Massachusetts is governed by 2005 legislation requiring documentation at kindergarten entry of (1) a passed Department of Public Health approved vision screening or (2) results of a comprehensive eye exam performed by an optometrist or ophthalmologist, and (3) detail of the prescribed treatment plan if one is required.¹²

Historically, few children progress beyond the first step of detection of a possible vision problem at screening.^{3,6,13-15} In response, significant efforts are underway to improve vision screening in schools and the connection with follow-up eye care, resulting in more children receiving diagnosis and prescriptions for eyeglasses.^{2,13,16-20} However, this success is only useful if children adhere to the prescribed treatment plans.

Beginning during the 2009-2010 school year, Action Boston Community Development Head Start (ABCD HS) collaborated with the New England College of Optometry, the New England Eye On-Sight Mobile Vision Clinic and Prevent Blindness, Northeast Region to introduce a coordinated initiative linking children referred from screening to easily accessible high-quality comprehensive eye exams. During the 2007-2008 school year, only 14% of children referred from screening received a follow-up comprehensive eye exam with an eye doctor. By the 2011-2012 school year, all children referred from screening

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received a comprehensive eye exam (unpublished). Although this was a significant accomplishment, many children did not benefit from diagnosis and prescriptions because eyeglasses were not purchased or ordered through insurance plans, eyeglasses were not worn consistently, eyeglasses were lost or broken, or eyeglasses were not available to wear at school. Whereas eye exam results were shared with ABCD HS centers, parents/guardians and pediatricians, the treatment plan was not explicitly communicated nor compliance monitored despite the fact that many of these children were being prescribed eyeglasses for the first time. Thus, school personnel were not aware of when, or for how long during the school day a child should wear eyeglasses, or how a child's vision condition might impact his or her behavior and performance at school. This is consistent with school-based vision care initiatives nationally: children are screened and may receive follow-up eye care, but families and school personnel do not have the support, information, or resources to make compliance with treatment plans prescribed by an eye doctor a priority.^{16-18,21} Recognition of these limitations provided the basis for development and implementation of the Eyes that Thrive in School (ETT) program at ABCD HS centers during the 2011-2012 school year.

Purpose

The purpose of the ETT pilot was to implement and evaluate a program designed to support compliance with vision treatment plans at school and thereby improve visual health. The preschool population was chosen because compliance with treatment at this age is crucial to the prevention of permanent vision loss due to amblyopia. Correcting vision problems in preschool-aged children allows their social, emotional, physical, and academic development to proceed without the barrier of impaired vision. Components of the ETT program were aimed at school-based education, communication, advocacy, facilitation, and supervision of vision interventions to link families, school health providers, teachers, eye doctors, and pediatricians.

METHODS

ETT was implemented during the 2011-2012 school year (Table 1). Four ABCD HS preschool programs were selected as pilot sites and were representative of the demographic among all ABCD HS centers. During 2011-2012 school year, 41.2% of children enrolled in ABCD Head Start programs were African American, 8.5% were White, 7.9% were Asian, 6.2% were biracial, and 36.2% were of unspecified/other race. All children came from families living at or

Table 1. Program Activities and Timeline

Phase	Activities
Planning (June-August 2011)	Planning with ABCD HS health managers and families; identification of 4 ETT pilot centers Development of education materials, Vision Action Plan, treatment tracker
Screening, exam, enrollment (October-November 2011)	School vision screening; referral to eye doctor Eye exams by eye doctor; eyeglasses prescribed Vision Action Plans and condition-specific education cards filled out by eye doctor and returned to school Identification of children diagnosed with vision conditions at pilot centers; enrollment in ETT (N = 28)
Eyeglasses (November 2011)	Visit #1 by ETT Team to pilot centers: Children chose frame for ETT eyeglasses; eyeglasses ordered
Education (November-December 2011)	Visit #2 by ETT Team to pilot centers; parents/guardian, health manager and classroom teacher attended: ETT eyeglasses provided to children Family and staff education by ETT team (in person) - general and child-specific; distribution of condition-specific education cards; question and answer session
Compliance monitoring and consultation (November 2011-June 2012)	Compliance monitoring by classroom teachers and health managers using treatment tracker Ongoing consultation between the ETT team and health managers (by phone)

ABCD HS, Action Boston Community Development Head Start; ETT, Eyes that Thrive in School.

below federal poverty guidelines; 71.3% of children came from single-parent households; the majority of single parents (95.8%) were mothers. Children received federally mandated vision screening during the first 45 days of school and those who did not pass the screening were referred for a comprehensive eye exam. Children who were prescribed eyeglasses were invited to participate in the ETT program.

The ETT program consists of 5 components that were developed in collaboration with all ABCD HS health managers. Each of these 5 components is comprised of action items required of the program partners (Table 2).

1. Vision Action Plan (VAP): Modeled after Individualized Health Plans for school-based care of children with diabetes and asthma, the VAP provides formal documentation to guide coordination and evaluation of the prescribed treatment plan.²² It includes diagnosis, treatment plan, follow-up, and optical. During the ETT pilot study, eye doctors were asked to complete the VAP at each child's eye exam and return it to ABCD HS health managers (Figure 1).
2. Condition-specific education cards: These cards include diagnosis, implications, and treatment for common childhood visual conditions. Each card is condition-specific and includes "frequently asked

Table 2. Responsibilities of Program Partners

Partner	Responsibilities
Parent/guardian	Facilitate a referred child's eye exam, treatments and follow-up care
Eye doctor (optometrist or ophthalmologist)	Prescribe and provide eyeglasses; provide eyeglass repairs Complete and send a copy of the Vision Action Plan to the school nurse/health manager Send copy of the eye exam results and recommendations to the primary care provider Consultation and education to families and school staff
School nurse/health manager	Maintain a current Vision Action Plan; obtain clarification from the eye doctor as needed Encourage family participation Provide the treatment tracker to the classroom teacher and discuss the Vision Action Plan with the classroom teacher
Classroom teacher	Maintain the treatment tracker at school With the parent/guardian, develop a family friendly version of the treatment tracker to support success with compliance at home Provide eyeglasses to children in the morning and store eyeglasses at the end of the school day
Primary care provider	Informed of a child's vision condition through the eye exam report from the eye doctor Serve as a resource and expert advocate in supporting compliance and ongoing vision care
Eyes that thrive team (or other available community resource)	Select and distribute education cards selected by eye doctor Provide a second pair of eyeglasses (when possible) Facilitate eyeglass repairs Consultation and education to families, school health and classroom teachers

questions” in vocabulary accessible to parents, guardians, and teachers. Cards specific to the diagnosis of each participant were selected by the eye doctor and/or ETT team, given to classroom teachers and mailed home to parent/guardians in the parent’s native language (English, Spanish, Chinese, and Haitian-Creole).

3. Eyeglasses (2 pairs): Each participant received one pair of eyeglasses through ETT. Parents/guardians were also encouraged to fill the child’s eyeglass prescription using insurance or community partnerships. One pair of eyeglasses was worn at school and the other was worn outside of school.
4. Treatment trackers: Designed for classroom use, classroom teachers recorded daily whether the participating child was wearing their eyeglasses as prescribed during each school day. Daily activities to promote positive feelings about wearing eyeglasses were incorporated by teachers, such as child putting sticker on a calendar.
5. Consultation and advocacy: On-site education sessions for participating children, families, and classroom teachers, and ongoing individual advocacy by the health managers and ETT team reinforced

important aspects of vision care. Issues discussed included the implications of vision conditions, how to encourage children to wear eyeglasses or eye patches, and what to do if there was a problem with the eyeglasses. Translation was available.

Analysis

Compliance was monitored using treatment trackers and calculated based on the proportion of days that participants wore eyeglasses as prescribed during the school day (numerator) relative to number of days they attended school during the study period (denominator). Monitoring began on the day that the child received his/her eyeglasses and continued for 6 months.

RESULTS

Of the 603 children enrolled at the ETT pilot sites, 52 were referred after school vision screening. All referred children were examined through the New England Eye (NEE) On-Sight Mobile Clinic or an eye doctor in the community within 3 weeks of screening. Twenty-eight children required eyeglasses due to diagnosis of significant refractive error, and all eyeglasses were prescribed for full time wear (Table 3). No child required follow-up care for an ocular pathology. All 28 children were enrolled in the ETT program; 26 who had received their eyeglass prescription through NEE On-Sight and 2 from an eye doctor in the community.

All participants received a VAP and one pair of ETT eyeglasses. Overall, 26 participants received a second pair of eyeglasses at no charge through the On-Sight program and 2 participants accessed a second pair through their insurance benefit, although 25 participants had insurance that covered eyeglasses. During the 6-month study period, 2 participants had ETT eyeglasses replaced within 2.5 weeks of being lost or broken. In addition to planned in-person education sessions, 10 phone consultations between the health managers and the ETT team regarding the vision or eyeglasses of individual children were provided.

The VAP for all participants included full time eyeglass wear. Compliance with the treatment plan was 93% over the study period. Noncompliance was associated with broken or lost eyeglasses, or eyeglasses that had been left at home after the “school pair” was worn home by mistake. Circumstances surrounding noncompliance for individual children varied (eg, twin who would not wear glasses until her twin sister got “pretend” eyeglasses).

DISCUSSION

Historically, school-based vision intervention programs focused on early identification of vision

Figure 1. Vision Action Plan



VISION ACTION PLAN

TO BE FILLED OUT BY THE EYE DOCTOR AND RETURNED TO THE SCHOOL NURSE OR HEALTH MANAGER

This form was completed (MM/DD/YYYY): _____ A follow-up eye exam is needed (MM/YYYY): _____

Please update the Vision Action Plan annually or when the treatment plan changes. This Plan is designed for use at home and school, and also as a supplement to eye exam results provided to the primary care provider. Its goal is to facilitate support of the treatment plan.

Student Name: _____ Date of Birth: _____

School (Name/Address/Fax): _____

Primary Care Provider (Name/Address/Fax): _____

Date of eye exam (MM/DD/YYYY): _____

Eye doctor (Name/Practice/Phone/Fax): _____

Office or store where eyeglasses were obtained (if known): _____

CURRENT DIAGNOSIS: _____

BEST VISUAL ACUITY (circle one: with eyeglasses without eyeglasses)

Right Eye- _____ Left Eye - _____ Both Eyes - _____

CURRENT TREATMENT PLAN:

Eyeglasses are not needed at this time

Eyeglasses should be worn:

All of the time when awake

Only when the child needs to see clearly at distance

Only when the child needs to see clearly up close

An eye patch should be worn:

To cover right eye To cover left eye

Total of _____ hours per day (_____ hours at home, _____ hours at school)

*If the child has been prescribed eyeglasses, eyeglasses should be worn when they wear the patch.

Eye drops will be used instead of a patch and will be given by _____. These eye drops will cause the pupil to get larger and the vision to blur in the better-seeing eye.

Other: _____

ADDITIONAL NOTES AND RECOMMENDATIONS: _____

TO BE COMPLETED BY PARENT/GUARDIAN: I give permission for this completed form to be sent to the school nurse or health manager at my child's school and for s/he to share the information with my child's teacher and other school professionals who are directly involved with my child. Also, I give permission for this completed form to be sent to my child's primary care provider.

Parent/Guardian Signature: _____ Date: _____

Table 3. Refractive Error of Participants

Condition	Number of Children (Total N = 28 [†])
Astigmatism > 2.5 D	8
Amblyogenic anisometropia	7
Hyperopia > 2.75 D	6
Hyperopia > 1.50 D with astigmatism > 2 D	6
3 D myopia with 3.5 D astigmatism	1

*N = 15 had amblyogenic refractive error.

†N = 3 had strabismus.

problems through screening or eye exams, community-based approaches to improve access to care, and family education. These programs made great strides in connecting children to comprehensive eye exams, but had limited success in monitoring or improving compliance with eyeglass wear. Typically, new school policies with ongoing support for treatment plans had not been included in the interventions.¹⁶⁻¹⁸

The ETT program was successful in achieving excellent compliance with eyeglass wear, with participating children wearing their glasses as prescribed on 93% of school days during the study period. Further, few eyeglass replacements were needed during the study period. This high level of compliance supports good visual health outcomes and minimizes visual barriers to learning and development, particularly crucial given the high levels of refractive error in the study group.

These findings suggest that providing an extra pair of glasses for use at school, along with a daily routine surrounding eyeglass wear in the classroom, limits the number of days a child experiences impaired vision due to lack of eyeglasses at school. Providing a VAP and education cards increased awareness around each child's vision condition with parents, health managers, and teachers. Daily treatment tracking involving the child and teacher also appeared to promote compliance, while helping to create positive messaging and feelings surrounding eyeglass wear. In other communities, an extra pair of eyeglasses may be purchased, or obtained through certain insurance benefits, grant programs, or community partners depending on available resources.

Whereas this pilot program was completed in the preschool setting, program components were designed for replication across age cohorts and ETT tools and approaches can be adapted to diverse settings with variable resources.^{19,23} In addition to the beneficial aspects described above, essential program components include commitment from school leadership; informed and motivated health managers or school nurses and teachers who are supported by school policy and formal documentation; and the establishment of relationships with community eye doctors who complete the VAP, who are available for consultation and

education efforts and who can provide and replace eyeglasses in a timely manner. Eyeglass events engage families, children, classroom teachers, eye doctors, health managers, and school nurses to establish these relationships while providing an opportunity for education and questions. These events also provide children with the chance to relate to other children who need glasses, creating an atmosphere of excitement and positive attitudes toward eyeglass wear.

Limitations

The limitations of this study include the small sample size, results that are descriptive, and lack of control group or baseline data for compliance with eyeglass wear in this specific study group. However, the in-school compliance rate found in this study is strikingly higher than those reported in similar settings^{16-19,23} and compliance data from this study do reflect daily self-report from teachers rather than limited random classroom check-ins by study personnel.^{16,19,23} Although compliance was monitored only up to 6 months, the VAP ensured that the vision treatment plan could be communicated the following year. Finally, at-home compliance was not monitored as part of the ETT program.

Conclusions

Adherence to the full spectrum of vision care is essential to good visual outcomes for children. Vision health status has the potential to have a significant impact on a child's education and well-being throughout life.^{5-10,13} The early identification of vision conditions and access to comprehensive eye exams represent crucial first steps in addressing correctable vision impairment due to refractive error. However, children must access and comply with eyeglass wear if treatment is to be effective. This requires communication among parents/guardians, health managers, school nurses, teachers, eye doctors, and pediatricians.^{19,23} It includes carefully crafted policy and communication tools, clearly defined responsibilities, integration of compliance monitoring to engage teachers and children, strong community relationships, and access to timely, affordable, high-quality, and appealing eye glasses. Future studies are needed to assess the long-term impact of this comprehensive and coordinated program, as well as the impact of higher quality eyeglass frames on compliance.

IMPLICATIONS FOR SCHOOL HEALTH

School-based health personnel play a central role in identifying children at risk for vision conditions, managing referrals, and monitoring interventions. Compliance with eyeglass wear for treatment of refractive errors and amblyopia will minimize preventable

vision loss and improve a child's ability to participate in classroom activities.⁵⁻¹⁰ Application of ETT tools and action items creates a framework for communication and case management for those directly involved in the care of the child, specifically to advocate for and facilitate compliance with eyeglass wear at school. This pilot study suggests that the following actions can promote compliance with eyeglass wear at school:

1. Use Individualized Health Plans for vision (VAPs) to: (1) add crucial information about a child's vision and related interventions to his or her permanent school health record, (2) ensure that vision treatment information can be communicated to school nurses or health managers as the child advances in school, and (3) allow health staff to inform teachers who are in a position to support eyeglass use or other vision interventions in the classroom.
2. Encourage teachers to monitor eyeglass wear in the classroom through brief daily check-ins with children. "Treatment Trackers" or other fun adaptations help engage children in the process.
3. When possible, keep one pair of glasses at school to ensure that a child always has access to eyeglasses in the classroom.
4. Establish relationships with community eye doctors who are willing to provide consultation, eye glasses, and eye glass repair or replacement in a thorough and timely manner.¹³
5. Establish clearly defined responsibilities and lines of communication for parents and guardians, eye doctors, school nurses or health managers, classroom teachers, and pediatricians.

Human Subjects Approval Statement

This study was approved by and abided by the tenets of the Institutional Review Board of the New England College of Optometry, Boston, MA.

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