SEEING & HEARING

Vision and Audiology Status of Foster Children in New York City

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Abstract

Between January, 1998, and July, 1999, 351 children in foster care placements in New York City received comprehensive vision examinations. One hundred and five of these children also received a hearing evaluation. The children from one of the sites (St. Christopher-Otillie, Brooklyn) were also examined in the audiology department of Brooklyn Hospital. The children were the charge of three different agencies at four sites. The aim of the study was to investigate the visual status of children in foster care placements and whether or not those children with significant visual problems were being identified and followed.

Visual acuity, ocular motor function, refractive error, ocular health status, eye vergence skills and stereopsis were evaluated in the vision examinations. Anomalies were rated mild, moderate and severe, newly or previously identified and whether they were likely or not likely to have been present one year earlier (the time of their last physical). In all areas tested, children in foster care had higher prevalences of visual and audiological anomalies, than their "normal" counterparts.

The results indicate that the vision and audiological screenings now being provided to these children at their mandated annual physical examination, are not sufficiently identifying children with moderate or severe vision and audiological dysfunctions.

Key Words

foster children, vision, audiology, refractive error, visual acuity, convergence, stereopsis, ocular motor function

There are more than 30,000 children currently in "out-of-home" placements in New York City and many are "at risk" for physical, psychological and/or developmental problems (Solan & Mozlin, 1997a/1997b). Yet information regarding the need for, and the delivery of, health care services to children in foster care is spotty. A recent report (Dicker & Gordon, 1999) has underscored this situation, noting that their review "found that foster children had serious, unmet health needs that were seldom the focus of any entity in the child welfare or court system."

More than twenty years ago Kavaler & Swire (1977 & 1983) studied the health needs of children residing in foster care supervised by eight New York City child welfare agencies. From this study they reported prevalence data for, among other things, visual anomalies. Nearly 25% of the 443 children who received a visual screening by a nurse had "poor" visual acuity. Information on the adequacy of correction was limited to 66 children who brought their glasses to the screening site. Of these 66 children, 61% were found to have inadequate correction. In addition, over 29% of those who reported they wore glasses were found not to require corrective lenses. The authors note that more of the foster home children had impaired vision than children of similar ages nationally who were tested using similar methods, although the findings were more in line with some studies of disadvantaged populations.

Foster home children screened by audiologists for hearing levels also performed less well than children from the general population. Three percent displayed a problem, and "examinees aged six to eleven were three times more likely to exhibit hearing difficulties in the speech range" (Kavaler & Swire, 1983). These findings were consistent with three other surveys of foster children, which found 5.5% with hearing problems (Schor, 1982), a 7% rate among children in kinship care (Dubowitz et al., 1992), and a 15% screening test failure rate at entry into foster care (Chernoff et al., 1994).

A search for other findings concerning vision and hearing among foster children revealed a dearth of studies focusing specifically on these areas, although they are touched upon as part of a larger portrayal of health. Thus, five recent reports on the health status of children and youths in the child welfare system (Dubowitz et al., 1992; DeWoody, 1994; Chernoff et al., 1994; Halfon et al., 1995; US General Accounting Office, 1995) present ample evidence showing that these children tend to be less healthy than other children and more likely to suffer from a range of health problems and disabling conditions. These studies note that children entering care are more likely to suffer from a variety of disorders, and multiple disorders, than those who entered care some years earlier, or when compared to children in the general population. These reports all point to the need for improvement in the provision of health care services for children in foster care. Furthermore, the DeWoody (1994) report, in line with the Child Welfare League of America standards (1988), sets forth the essential need for early screening for vision and hearing, in order to detect problems and provide early intervention.

In sighted individuals, more than 85% of learning takes place through the sensory modality of vision. Audition is second in importance. When there are undetected visual and hearing problems in children of school age, these problems, logically, must impact their ability to learn. Fairly consistent evidence exists showing that abused and neglected children, when compared to other children, function more poorly in school (National Research Council, 1993; Wodarski et al., 1990). These studies point to lower grades, poorer standardized test scores, and frequent retention in grades. Follow-up studies of adolescents and young adults from foster care have also documented educational deficits, when compared to those their age in the general population, although they more closely resemble youths living below the poverty level (Cook, 1991; Festinger, 1983).

METHODOLOGY

The aim of this study was to investigate the extent to which school-age children in foster home placements manifest vision and/or hearing problems — problems which would likely interfere with school performance in some way. The intent was also to learn whether existing problems had been detected and corrected. In order to address these objectives, the research team elicited the cooperation of three foster care agencies at four sites in New York City.

Between January, 1998 and July, 1999 a total of 351 children received comprehensive vision examinations on site. The children were in the care of three agencies, one with two sites: St. Christopher-Ottilie Services for Children and Families - Brooklyn (N=173) and Jamaica (N=59), Brookwood Child Care (N=64), and Sheltering Arms Childrens Service (N=55). Examination appointments at each agency, scheduled by agency staff, were spread out in line with various scheduling considerations, and occurred once every one or two weeks. Appointments were not consistently made, however, and others were not kept. Therefore anywhere from zero to ten children were seen on a scheduled examination day.

At one of the agencies, St. Christopher-Ottilie in Brooklyn, arrangements were also made for hearing examinations by the Audiology Department of Brooklyn Hospital. A total of 105 children were evaluated by certified audiologists.

Data Collection Instruments

Four data collection instruments were devised for this study:

1) Vision Examination Checklist - This two-page form was completed by one of the authors, R.D., at the time each child was examined. It was done in triplicate so that one copy could be kept by the examiner, one copy added to the child's medical record, and one copy could be kept by the project for data entry purposes. All findings were recorded on this form including whether a problem existed in each of the areas, how severe it was, whether it was newly identified, and whether it was likely to have been there at an earlier annual visual screening. This form also provided recommendations regarding any follow-up care which might be needed.
2) Vision Examination Addendum Checklist - This two-page form was devised in order to capture numerous additional details from the main findings and hand-written examination notes which were recorded on the above checklist. It was completed on each child by Dr. Robert Duckman.
3) Agency Checklist - This one-page form was devised in order to collect basic information on each child, for descriptive purposes. It included placement data, information regarding schooling, and some ratings concerning each child's developmental, psychological, and behavioral status. Each form was completed by agency personnel (usually caseworkers). We hoped that all the information on these forms would be completed by those most knowledgeable about a given child. They were completed close to the time that children were seen for their vision examination.
4) Audiology Checklist - This one-page form was devised in consultation with the project's audiology consultant in order to collect basic information regarding each child's hearing status. It was completed in triplicate by each examining audiologist. One copy was added to the child's agency medical record, one copy remained in the child's audiology record at the hospital where examinations were conducted, and one copy was kept by the project for data entry purposes.

Vision Examinations

All 351 vision evaluations were provided by R.D. Vision examinations were completed after a review of each child's medical record and a review of the agency checklist form on that child. Vision examinations included as much of the following as possible for a given child:

1. Case history
2. Visual acuity at distance and near
3. Ocular motor function including assessment of extra-ocular musculature, strabismus, tracking and fixational skills
4. Ocular health status - external and retinal examinations including adnexa, pupils, media, and funduscopy
5. Refractive error - done without cycloplegia unless otherwise indicated
6. Eye vergence skills, eye focusing skills, binocularity and stereopsis

As already mentioned, findings were recorded on forms which were custom designed for this study. Whenever necessary, referrals were made for further evaluation and ongoing care. When glasses were prescribed, R.D. offered the services of the State University of New York, State College of Optometry, for fabrication of spectacles. Occasionally children would not find something they liked in the assortment of frames which were presented to them at the time of the examination, and a prescription would be written so they could get their glasses at some outside source.

Audiology Examinations

One part of the project concerned the hearing status of the children. Unlike the vision exam, audiology examinations could not be done at the foster care agencies because a soundproof room was needed to ensure the accuracy of such tests. Because of the logistics of arranging for audiology clinic appointments and arranging for foster parents to bring children for these appointments, we concentrated on coordinating the children's vision and hearing appointments at one agency: the Brooklyn office of St. Christopher-Ottilie Services for Children and Families. Audiology appointments were arranged at the Audiology Department of the Brooklyn Hospital Center which was in the general vicinity of the foster care agency. Even so, not all children were scheduled for an appointment, and not all appointments were kept. There were 173 children seen for vi-

sion examinations and 105 children examined by the staff audiologists at Brooklyn Hospital. Upon completion of the hearing exam, the audiologists completed a brief checklist on each child capturing the results of their examination. The checklist had been constructed with the help of the audiology consultant to this project.

Two components of hearing were assessed; the cochlear (the organ of hearing) and the middle ear (the middle ear is the area whereby fluid and/or congestion may exist). If the cochlear is affected, a permanent hearing loss occurs and this is referred to as a sensory neural hearing loss. If the middle ear is affected, a conductive loss exists and hearing loss is not permanent. Conductive hearing loss is treated by medication and/or surgery. It should also be stated that a sensory neural hearing loss from the most mild to the most profound will clearly and significantly affect a child's speech and language development. Research suggests that prolonged conductive hearing loss can affect a child's articulation, language development and possible processing capabilities.

FINDINGS

Description of the Children

This project focused on children between the ages of six and twelve, the early school years. At the time the 351 children were seen for vision exams they were on average 8.9 years old, with a handful of children slightly outside the specified range of six to twelve years. A slight majority (52.1%) of the 351 children were females. They had been in the care of the three agencies for nearly three years on average (median = 2.7 years), this ranging up to 12 years. All of the children were living in foster boarding homes, including 21.2% in kinship foster homes.

With regard to school, the children spanned grades one to seven, with a small group (4.6%) attending kindergarten or ungraded classes (1%). Roughly one in four of the children (27.8%) were attending special education classes. Caseworkers were asked to rate the children's reading and math levels. Unfortunately in many instances the information we requested was not known, was a "guesstimate," or was provided by staff who did not have particular knowledge of a child. In view of the problems, these ratings were not be used in later analyses. The data are reported here to provide a general rough sense only. When one considers only those age six and over at the time of the vision examinations, close to 60% were rated average or above average in reading level, while the rest (40.2%) were considered below average or non-readers. With respect to math level, 57.1% were considered to be at average or above average levels.

Caseworkers were also asked to rate the children from their caseload with respect to eight problem areas including physical health, neurological problems, mental retardation, learning disabilities, emotional and behavioral problems. Once again the ratings were in many instances completed by staff who did not know the child particularly well. Hence they are to be viewed with caution. The three most frequently noted problem areas were behavior problems (51.4%), emotional problems (41.3%), and learning disabilities (35.4%). When all eight areas were considered together to determine the number of problems per child, it showed that a third of the children (33.1%) were considered to have none of the problems, 38.6% were rated as having one or two problems, and the rest (28.2%) were thought to have three or more problems. Ratings of the severity of problems showed that of the 232 children with one or more problems, over one-half (56.9%) were considered to have one or more moderate or severe problem.

Audiology

Review of the results indicate that 21 (20%) of the 105 children had abnormal test results. One of the 21 children presented with a mild sensory neural component in one ear. Six of the 21 children presented with only abnormal middle ear test results. The abnormal middle ears did not affect hearing because normal hearing is a range and even with abnormal middle ears, these children fell within the range of normal. Fifteen children had abnormal hearing status. Within the fifteen children, eight children had abnormal middle ears and as a result, abnormal hearing. Seven children had abnormal hearing with normal middle ear status. Within this group, one child, as stated above, presented with the sensory neural hearing loss. The rest showed slight temporary hearing losses due to wax, inserted tubes, or due to a retracted eardrum.

Test reliability for all children with abnormal test results was judged as good by the audiologist testing that child. Test reliability was expected to be good for practically all children involved as the task was simple and the children were mature enough for such a task. Follow-up referrals were made on 19 of the 21 children. Two children were not referred because their middle ear status was just outside of the normal criteria and hence treatment was not indicated.

Review of the above data suggests that hearing loss is prevalent in the foster care population. The bulk of these children presented with conductive hearing loss, which is responsible for learning and language delays. This has been documented extensively in the literature (Bess, et al., 1986; Bess and Tharpe, 1988). As a result, it is strongly advised that foster care children receive, at a minimum, two times yearly (e.g. February and October), middle ear status testing by a trained professional. The cost of the middle ear equipment is not prohibitive as witnessed by many pediatricians who maintain this equipment in their offices. Nursing staff can be adequately trained to perform this test while pediatricians can administer treatment and make referrals to specialists, if indicated.

Vision

As mentioned previously, 351 children received comprehensive vision examinations over a 19-month period. The visual functioning of each child was rated by the examiner in two stages — during the exam itself and following the completion of the 351 examinations — resulting in ratings of each child in seven major areas of functioning. These seven areas are shown in Table 1. Within each of these areas ratings were completed with respect to a variety of sub-categories. In addition, in six of the seven major areas, the examiner rated the level of severity on a 3-point scale (mild - moderate - severe), whether the problem was newly identified or not, and whether it was likely that the condition existed at the time of an earlier annual screening.

Visual Acuity Dysfunction

Visual screenings at the foster care agencies are generally comprised of visual acuity testing and an ocular health examination by agency medical staff. Table 1 shows that of 349 testable children, 138 (39.5%) manifested a visual acuity dysfunction. It should be noted that many of

Table 1			
Vision Problems of Children (N = 351)*			
DYSFUNCTIONS	Percent	Number	% Mod/Severe
Visual Acuity Dysfunction	39.5	138	37.6
Ocular Motor Dysfunction	11.4	40	87.5
Quality of Ocular Motor Dysfunction**	13.7	48	—
Refractive Error	66.7	234	37.6
Ocular Health Status	4.6	16	56.3
Eye Vergence Dysfunction	40.8	141	22.0
Stereopsis	17.2	59	61.0

* In a few instances N varies because a child was not testable.
** Rating of severity not done.

Table 2		
Visual Acuity Dysfunctions* (N = 138)		
DYSFUNCTIONS	Percent	Number
Refractive Error (not amblyopia)	86.2	119
Refractive Amblyopia	22.5	31

*Dysfunctions with fewer than 10 children not shown

the children who had glasses and had lost them, broke them or did not bring them to the examination, are counted in this group of 138. Over half of the 138 children (51.4%) were newly identified and of these, 13 (18.3%) were rated likely to have been present one year earlier. The fact that so many children were newly identified as having a visual acuity dysfunction is notable because visual acuity testing is part of each child's annual physical examination. However, this is likely to reflect a combination of confounding factors which include: a) children often peek out of the "occluded" eye while having acuity tested if one eye sees better than the other, b) children who are having difficulty reading the eye chart often squint which effectively gives them a much higher acuity value than they would have had without squinting, c) head tilts and turns often make letters easier to read for children with visual acuity problems. This suggests that visual acuity testing may not be sufficiently controlled at the annual screening exams. It also reflects the very important fact that, in children of this age, one year is sufficient time for changes in refraction, binocularity or ocular health status to occur which can significantly impact visual acuity.

Further, of the 138 children diagnosed with a visual acuity dysfunction, 37.7% of the problems were rated moderate or severe. A considerable number, 20 children (14.5% of 138), were at the time of the exam newly identified with a moderate or severe visual acuity dysfunction. Of the 20 children, half were rated likely to have been there at the time of an earlier annual screening.

The two most frequent dysfunctions, refractive error (not amblyopia) and refractive error amblyopia, are shown in Table 2, diagnosed in, respectively, 86.2% and 22.5% of the 138 children with a visual acuity dysfunction. Smaller sub-categories showed the following diagnoses: strabismic amblyopia (4.3%), pathology (1.4%), malingering (6.5%), and a handful of children (3.6%) rated to have "other" visual acuity problems.

Some of the children (n=26) had a combination of refractive error (not amblyopia) and refractive amblyopia. This group consisted of children with considerable refractive error who, when corrective ophthalmic lenses were placed in front of their eyes during examination showed a substantial improvement in visual acuity. However, they still manifested a residual visual acuity dysfunction, i.e., less than 20/30. An expectation would be that as these children wore their glasses, there would be further improvement in their vision.

Ocular Motor Dysfunction

Referring again to Table 1, it can be seen that of the 351 children examined, 40 (11.4%) were diagnosed as exhibiting a dysfunction with respect to ocular motility, 87.5% of which were rated moderate or severe rather than mild (12.5%). Of the 40 with an ocular motor problem, 27 (67.5%) were rated newly identified at the time of the exam and of these, 23 (85.2%) were rated as likely to have existed at the time of an earlier annual screening.

The most common sub-category of ocular motor dysfunction, strabismus, affected 35 (87.5%) of the 40 children. Smaller sub-categories showed the following diagnoses: restriction of gaze (7.5%), noncomitancy (17.5%), and three children (7.5%) rated to have "other" problems with respect to ocular motility.

Of the 351 children, 35 (10%) manifested a strabismus. In a normal population of children, prevalence of strabismus ranges from 1% - 4%. This means that this group of foster children manifested strabismus at least 2.5 times as often as the normal child, and up to ten times more frequently. The diagnosis of strabismus was further classified by type: exotropia (65.7%), esotropia (34.3%), and hypertropia (2.9%). Most of the strabismic children (74.3%) manifested an intermittent strabismus, while the rest (25.7%) showed a constant strabismus. In addition, 25.7% of the strabismics were unilateral and the rest (74.3%) were alternating. An alternating strabismus is less problematic than a unilateral strabismus. In the former case, the fixating eye changes and both eyes (though at different times) receive good sensory stimulation. In a unilateral strabismus the fixating eye is constant and the deviating eye never receives normal stimulation, resulting in amblyopia ("lazy eye"). When unilateral strabismus results in amblyopia, it is likely that without early enough intervention there will be irreversible loss of visual function. It is therefore important to identify unilateral strabismus as early as possible to maintain normal vision. Our examinations found nine children with unilateral strabismus, all newly identified, all likely to have been there one year earlier.

Quality of Ocular Motor Dysfunction

Of the 351 children examined, 48 (13.7%) were diagnosed as exhibiting a dysfunction with respect to the quality of ocular motility (see Table 1). Smaller sub-categories included: inability to sustain fixation (100%), poor pursuit ability (97.9%), poor saccadic ability (66.7%), and one child (2.1%) rated to have "other" problems with respect to the quality of ocular motility.

Refractive Error

Table 1 shows that the most prevalent visual dysfunction in these 351 children was refractive error. Thus, 234 (66.7%) were diagnosed as exhibiting refractive error, 37.6% of which were rated moderate or severe rather than mild (62.4%). Of the 234 with refractive error anomalies, 115 (49.1%) were rated newly identified at the time of the exam and of these, 40 (34.8%) were rated as likely to have existed at the time of an earlier annual screening.

The consequences of uncorrected refractive error include blurred vision at distance and/or near viewing, eye strain, double vision, headaches, and/or eye fatigue as a result of doing near vision tasks such as reading, writing, or computer work.

The two most frequent refractive error problems, astigmatism and hyperopia can be seen in Table 3, diagnosed in, respectively, 76.1% and 67.5% of the 234 children with a refractive error problem. Smaller sub-categories included: myopia (23.9%) and anisometropia (13.7%).

Anisometropia, a refractive anomaly where the refractive error of one eye is significantly different than the refractive error in the other eye, is of particular concern. In children it is not unusual for one eye to be normal and without refractive error while the other eye has a very significant amount of myopia, hyperopia, and/or astigmatism. Anisometropia is urgently important to identify because, undiagnosed and untreated, the eye with the refractive error is deprived of clear vision over an extended period of time. Therefore, if diagnosed too late, it can result in irreversible loss of visual function. It is particularly problematic because children with anisometropia are asymptomatic. That is, one eye will see well and the child will not have any problem seeing. In our sample, 32 children had an anisometropia of which 17 were newly identified, and five of the newly identified were likely to have been there a year earlier.

Ocular Health Status

Table 1 shows that of 349 testable children, 16 (4.6%) exhibited abnormal ocular health status, 56.3% of which were rated moderate or severe rather than mild (43.8%). Of the 16 with a problem of ocular health, 9 (56.3%) were considered newly identified at the time of the exam and of these, 4 (44.4%) were rated as likely to have existed at the time of an earlier annual screening.

Table 3
Refractive Error
(N = 234)

DYSFUNCTIONS	Percent	Number
Myopia	23.9	56
Hyperopia	67.5	158
Astigmatism	76.1	178
Anisometropia	13.7	32

Eye Vergence Dysfunction

Under normal conditions, the visual system has to perform different visual skills when viewing at distance than when viewing at near. When concentrating at near the individual must focus (accommodation) on the material and maintain ocular alignment at near through the mechanism of convergence. If a person has difficulty with vergence, they may have to "strain" their extra-ocular muscles to maintain single, clear, binocular vision. When this occurs they are said to have an eye vergence problem. Very often people with eye vergence problems manifest ocular symptoms and have great difficulty attending to work at near viewing distances (Daum, 1988; Scheiman, et al., 1996; Borsting, et al., 1999).

As can be seen in Table 1, a large number (n=141 or 40.8%) of the children exhibited an eye vergence problem, 22% of which were rated moderate or severe rather than mild (78%). Most of these 141 children (96.5%) were classified as "newly identified at the time of our exam" and of these, 38 (27.9%) were rated as likely to have existed at the time of an earlier annual screening. This finding is not surprising since screening exams don't usually look at vergence abilities, and many children manifest deficiencies of vergence eye skills only at near viewing.

The most common sub-category of eye vergence dysfunction was "convergence insufficiency" which was diagnosed in 92.2% of the 141 children. Smaller sub-categories showed the following diagnoses: binocular instability other than convergence (2.1%) and strabismus - eye vergence not quantifiable (5.7%).

Only 20 children with an eye vergence dysfunction were referred for an on-going program of vision therapy to improve their vergence skills. There were many other children who needed to be referred, but where the foster parent indicated that it would be impossible for them to take the child for weekly therapy. In addition, there are other reasons why children who had vergence dysfunctions were not referred immediately for vision therapy. When a child has a considerable refractive error, glasses should be applied first to see if they have any impact on the vergence system. Glasses are sometimes sufficient, by themselves, to eliminate a vergence dysfunction and therefore no further referral is needed. In addition, some of the children with vergence dysfunction were doing well and did not manifest symptoms typical of this problem such as: blurred vision, double vision, eye fatigue, headaches, eye aches, and avoidance of reading and other near tasks. In these latter cases the foster parent was advised to be aware of the problem and that if symptoms arose, they should return for a follow-up examination.

Stereopsis

Table 1 shows that of 343 testable children, 59 (17.2%) exhibited a problem with respect to stereopsis, 61% of which were rated moderate or severe rather than mild (39%). Of the 59 with a stereopsis problem, 50 (84.7%) were considered newly identified at the time of the exam and of these, 28 (56%) were rated as likely to have existed at the time of an earlier annual screening.

Vision Dysfunctions: Totals

When all seven problem areas were considered together, to determine the number of vision problems per child, 56 (16.5%) of 339 children on whom information was available for all areas had no problems in any of the seven areas examined. There were 183 (54%) children with dysfunctions in one or two areas, 88 (26%) with problems in three or four areas, and 12 (3.5%) with problems in five to seven areas. There were no differences with respect to gender, and the number of vision problems was unrelated to age.

The total number of problems per child which were newly identified at our examination and rated as "likely to have existed at the time of an earlier annual screening" was also analyzed. Ratings of this were available for six problem areas. Of the 277 children who had been diagnosed with at least one problem in one of the six problem areas, and on whom data

was available for all six areas, 65.3% had no problems likely to have existed at an earlier annual screening, 30.3% had one or two problems, and 4.3% had three to five problems which were rated as likely to have existed at an earlier annual screening.

Glasses Provided and Referrals Made

Following the vision examination a total of 156 (44.4%) of the 351 children were provided with glasses by the project (some, if they wished, were referred elsewhere for glasses) and/or referred for another reason (see Table 4).

Table 4
Children Referred Following Vision Exam (N = 351)

REFERRALS	Percent	Number
Total Referred	44.4	156
For Glasses	36.8	129
For Other Reasons	13.4	47

A total of 129 children were provided with or referred for glasses, some needing new glasses, others new prescriptions. Of these 129 children, 59 already had glasses and 70 did not. Another 42 already had glasses but were not referred. Thus, a total of 101 (28.8%) of the 351 children already had glasses but only 22 came to the examination with their glasses. The remaining 79 children reported that they had lost them, broken them, threw them away or just refused to wear them.

As noted above, 101 children had previously been given glasses. Nearly half of these (59 or 45.7%) were referred for new prescription lenses. Unfortunately, records of what prescriptions the children had previously been given were not available. Therefore, it is not possible to state with any degree of certainty how many children who had been given glasses previously had been wearing the appropriate lenses. Children requiring glasses who reported that the glasses had been lost, broken or discarded, were given glasses according to the findings of our examinations. In addition, 70 children were referred for glasses who had not previously been given them. There were also 42 children who had been given glasses previously who, at the time of our examination, did not need, or no longer needed, them. A small number (n=10) of children needed glasses but refused to wear them. In all such cases, glasses were strongly recommended and again refused.

As an interesting aside, there were also nine children who did not need glasses, but wanted them. Typical of these children was a child who could not read the 20/400 "E" on the eye chart at a 20 foot test distance. Walking her closer to the chart produced no improvement, although it would ordinarily do so. All other findings of the examination fell well within normal limits. A trial frame was placed on the child with "plano" lens power (plain glass) and the child was advised that the lenses were strong so she might feel dizzy. She proceeded to read the 20/15 acuity line with each eye and both eyes together at the 20 foot test distance with ease. These children were classified as malingerers. In eight of these cases no glasses were given. However, one child seemed to be so needy for glasses and so emotionally upset when told she was not going to get them, that a pair of "reading" glasses with minimal power were given to her.

Returning again to the total group of 129 children who were referred for glasses. Reasons for referral were, in descending order: astigmatism (71.3%), hyperopia (58.9%), myopia (25.6%), anisometropia (12.4%). Some of the children (12.4%) received near vision glasses to relieve near point symptoms typical of accommodative and/or binocular instabilities. In addition, 47 children (20 of these had also been referred for glasses) were referred for one or more other reasons. These included: convergence insufficiency (40.4%), esotropia (23.4%), exotropia (21.3%), ocular health (10.6%), visual acuity (10.6%), oculo-motor dysfunction (6.4%), eye vergence anomaly other than convergence insufficiency (4.3%), abnormal stereopsis (2.1%), hypertropia (2.1%), and a few children referred for "other" reasons (8.5%).

SUMMARY AND CONCLUSIONS

A recent report (Dicker & Gordon, 1999) states that "study after study..... reveals that the vast majority of foster children have far more fragile health and are far less likely to receive health care that can improve their lives and life chances than other children." In short, foster children are considered an "at risk" group with respect to issues of health, which can affect their functioning in many areas of life. Therefore, identifying problems, and effecting remediation where possible, need to be of the utmost concern to any health and child welfare provider in order to maximize the potential of these children.

The study reported here focused on two aspects of health, vision and hearing, since research attention to these two important areas has been spotty at best. Vision and hearing problems can interfere with development, with academic performance, with self-esteem, with perception and, in general, make these children's worlds more difficult to negotiate. In both these areas foster children between the ages of six and eleven were examined. Here are highlights of some of the results.

The audiology examinations on a subgroup of 105 children showed that one of five children had abnormal test results, including 14.3% with abnormal hearing status. Hence, as noted earlier, hearing loss is prevalent among these children. As a result, the audiology consultant strongly advised that foster children receive middle ear status testing by a trained professional, such as nursing staff, at least twice each year.

The vision examinations were completed on 351 children at four New York City sites. The data showed that the vision care provided foster care children, based on the experience in these agency sites, needs to be enhanced. This in no way reflects negatively on the foster care agencies nor on the medical departments that participated in our study. All were genuinely concerned about their children and provided everything required of them by official mandates. Our examinations were comprehensive and therefore included tests that are not part of routine primary care vision screening. Our results showed that current standards of care are not adequate to meet the needs of these children.

The examinations identified a total of 676 visual dysfunctions among the 351 children (Table 1). The number of dysfunctions per child was also reviewed. Because 12 children who were not testable in all seven areas of functioning were not included in this calculation, the results are based on 339 children. Only 56 children (16.5%) had no visual dysfunction at all, whereas 100 (29.5%) children were diagnosed with three to seven visual dysfunctions.

Ratings of the severity of dysfunctions were made with respect to six areas of

functioning. In each of these the examiner also rated whether, according to the medical records of each child, the problem was newly identified at the time of our examination and if so, whether it was likely to have existed at an earlier screening roughly a year ago. It is to be noted that although all the children had been in care at least one year, it is not known whether a problem was not detected earlier because the earlier screening was omitted, the screening test was done but inadequately, or whether a referral was made to a vision specialist but not followed through, or the specialist did not make the same determination. Here are the result for the six areas:

a) there were 52 children with moderate or severe visual acuity dysfunctions, of which 20 were newly identified. Of these 20, half were rated as likely to have been there one year earlier;

b) there were 35 children with moderate or severe ocular motor dysfunctions, of which 23 were newly identified. Of these 23, almost all (91.3%) were rated likely to have been there one year earlier;

c) there were 88 children with moderate or severe refractive error dysfunctions, of which 33 were newly identified. Of these 33, there were 27 (81.8%) rated likely to have been there one year earlier;

d) there were 31 children with moderate or severe eye vergence dysfunctions, of which 26 were newly identified. Of these 26, there were 21 (80.7%) rated likely to have been there one year earlier;

e) there were nine children with moderate or severe ocular health problems, of which five were newly identified. Of these five, there were four (80%) rated likely to have been there one year earlier;

f) there were 36 children with moderate or severe stereopsis dysfunctions, of which 27 were newly identified. Of these 27, there were 20 (74.1%) rated likely to have been there one year earlier.

The above numbers are not additive since any one child could have been diagnosed as having more than one moderate or severe problem. In fact, a total of 133 children had one or more moderate or severe dysfunctions, including 27 with three or more such ratings. And, of this group of 133 children, 70 of the problems were newly identified and rated likely to have been present one year earlier.

To return for a moment to the 88 children with moderate or severe refractive error. This level of refractive error can significantly lower visual acuity. Although 45 of these children said they had glasses, only 15 had glasses which were sufficient for the degree of refractive error. Hence, 73 of the 88 children needed to be referred for glasses.

There were 141 children who manifested eye vergence problems, 136 (96.5%) of which were newly identified. It was considered likely that 27.9% of these were long-standing. Also, forty children were identified with ocular motor dysfunctions. Most of these, 35 (87.5%), had strabismus. Of the 35 children with strabismus, 23 were exotropic and of these 14 were newly identified and likely to have been there one year earlier. Of the 12 children with esotropia, half were newly identified and likely to have been there earlier.

The numbers above clearly indicate that:

1) The screenings now being provided are not sufficiently identifying children with moderate or severe visual dysfunction, and
2) In this age group of children, significant changes in visual status can occur in a one year time period.

As mentioned earlier, visual problems can interfere with a child's progress in school. The child who cannot see what the teacher is writing on the board, cannot accurately copy down information. The child who tries to sit and read for any length of time in the presence of a binocular vergence problem may see double or experience asthenopia (eye fatigue) (Daum, 1988; Scheiman et al., 1996; Borsting, et al., 1999). Such children cannot sustain at near visual tasks and will avoid them. These are children who are often observed as having short attention spans or the parent will complain that the child will not sit and do his/her homework, nor sit and read for more than five minutes at a time. Children with eye focusing problems will not be able to see clearly at near or must "overwork" the eyes to do so. This overworking of the accommodative mechanism can negatively impact the child's ability to concentrate and learn (Flax, 1994). All of the above are most likely going to be compounded when there is an overlying uncorrected refractive error. For the ordinary child it is important that the input to the visual system is clear, that the eyes are healthy, that the eye coordination is sufficient for demands placed on it by school work and daily activities, and that the two eyes work together in a binocularly coordinated fashion. All of this is of great importance for children in foster care. Here we see a sample of children manifesting a greater prevalence of ocular dysfunctions than the general population of children within this age range. Yet visual services for these children, in general, appear to fall below the standards of care advocated for all children of this age.

Although the children in our sample were all school age, it is important to realize that many of the dysfunctions which presented themselves during our examinations could have been present for many years prior to the time we saw them. One of the most important factors in whether or not a child with a visual deprivation eventually achieves good visual function is the time at which the problem is identified and the age at which intervention begins. In general, the earlier the deprivation is diagnosed and intervention is begun, the better the prognosis for restoration of normal function.

It is not surprising therefore that the standard of care for school-age children is an annual comprehensive eye examination. Not only is an annual eye examination recommended by the American Academy of Pediatrics (1996), the American Academy of Ophthalmology, and the American Optometric Association, but all three believe these evaluations should begin in infancy. As recently as twenty years ago, eye care professionals thought a child's first eye examination should be at about five years of age, or just before a child entered school. The reasons were simple: there were no available testing procedures and it was believed that children could not see "normally" until they approached five years of age. Over these past twenty years, the field of visual development has grown enormously. Research has shown that the infant's visual system is "adult-like" in function as the child approaches six months of age. This research has led to the development of good clinical tools to measure the various aspects of visual function to assess its normalcy in children. It has also led to subse-

quent changes in the standard of care for children with regard to vision.

Annual comprehensive eye examinations for school-age children, preceded by visual examinations at six months and two to three years, is now considered the standard of care for all children. The reasons for this are simple - there are several conditions such as strabismus, refractive error, anisometropia and some pathologies, which, if not treated at an early enough age, can result in permanent loss of visual function. As mentioned above, early intervention is the key to restoration of normal visual function in the presence of early vision anomalies.

It is necessary to reconsider what services are needed for foster care children. In all areas, from refractive error to visual acuity dysfunction and ocular motor status, the children in our sample manifested a higher prevalence of anomalies than do "non-foster placement" children of roughly equivalent ages (Roberts, 1978; Scheiman et al., 1996; Chen et al., 1996). It was mentioned earlier that the prevalence of strabismus was at least two and a half times greater for the foster children we examined than for other children, but could be as high as ten times greater. Refractive errors, visual acuity dysfunctions, ocular motor dysfunction, and vergence dysfunctions all occur at a higher prevalence in our sample than in a general population sample. Leaving aside the mild dysfunctions, the moderate and severe dysfunctions are being missed too often. These children need more comprehensive vision care than they are currently receiving. We are strongly recommending that children in foster placement in New York City receive comprehensive visual evaluations upon entering the foster care system and periodically thereafter.

Acknowledgements

This study was funded by a grant from The New York Community Trust. The authors are deeply grateful to the officers of the foundation for their trust and patience. In addition, we want to thank and acknowledge all those without whose invaluable assistance this project would not have been possible. First, we thank the executive directors of the three agencies we visited: Robert J. McMahon, St. Christopher-Ottilie Services for Children and Families, Wayne R. Mucci, Sheltering Arms Childrens Service, and Fatima Goldman, Brookwood Child Care. They eagerly embraced this project to examine the issues of vision within their agency populations. Special thanks to St. Christopher-Ottilie Services for making it possible also to examine the hearing status of their children, and to Dr. Darius Kohan, Chairman of the Ear, Nose and Throat Department and to Alexandra Heinson-Combs, S.L.P., Director of the Speech and Hearing Center, the Brooklyn Hospital Center, for their cooperation. Many members of agency medical and other departments need to be cited for their support and assistance: Linda Spriggs, Dr. Edgar Ednalino, Fran Guy, and Ruth Fulton (St. Christopher-Ottilie); Dr. Douglas Hudson and Patricia Peters (Sheltering Arms); Dr. Joseph Saccoccio, Barbara Pettus, Dr. Diane Aquino and Leslie Banks (Brookwood). Their help in overseeing administrative, scheduling, and data collection issues was an invaluable aid in ensuring the smooth running of the project. Though too numerous to mention by name, many nursing, administrative, casework, and office staff at all three agencies went beyond the call of duty to see that forms were completed, that follow-up was carried out, and assisted wherever possible to make the clinic sessions and data collection as easy as possible. A special thanks to: a) Louise Levy M.S., our audiology consultant, who helped to develop the screening form, interpreted all the audiological findings and summarized them for us, and b) Swati Lotliker-Kamath and Philip Vasquez, Chiefs of Audiology at Brooklyn Hospital Center for their continuous efforts to see that the audiology testing was done and that clinical findings were submitted to us. One final thanks to Amy Sousa for her endless hours of data input, to Mayra Dominguez who also helped with this task, and to Kathy Miller for her efforts in overseeing various budgetary matters. If we have omitted anyone, it is not by intention. We are very grateful to all who participated in our project, whether in a major or minor way, because without the help of everyone this project could not have been completed.

Editor's notes

1. All checklists referred to in this article are available from Dr. Robert Duckman.
2. At the authors' request we are using the author-date system of documentation.

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Date accepted for publication:
February 4, 2000