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A follow-up of visual screening and referral outcomes in a school age population

Abstract

A Modified Clinical Technique (MCT) vision screening was performed on all first and fourth graders in a school district in Oregon. Of the 657 children screened, 108 failed due to the established referral criteria. Approximately one year later, the parents of the children who failed were contacted and a phone interview was conducted to determine if subsequent action was taken. Of the number failed, 69 (64.0%) were accounted for, of whom 63 (91.0%) were - compliant with recommendations made for follow-up evaluation. A discussion of possible contributing factors and issues surrounding vision screenings are examined. An outcome assessment and referral evaluation provides valuable information regarding the effectivity, ultimate treatment strategies, parental perceptions and reasons for non-compliance of follow-up care.

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A FOLLOW - UP OF VISUAL SCREENING AND REFERRAL OUTCOMES

IN A SCHOOL AGE POPULATION

A Thesis Submitted to

The Faculty of Education and Optometry

in Candidacy for the Degree of

Master of Education

Visual Function in Learning

By

Julie A. Schornack, O.D.

Forest Grove, Oregon

May 1987

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Julie A. Schornack, O.D.

accepted and approved by the thesis committee, May 1987



WILLARD B. BLEYTHING, O.D., M.S.



ANITA McCLAIN, Ed.D.

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ABSTRACT

A Modified Clinical Technique (MCT) vision screening was performed on all first and fourth graders in a school district in Oregon. Of the 657 children screened, 108 failed due to the established referral criteria. Approximately one year later, the parents of the children who failed were contacted and a phone interview was conducted to determine if subsequent action was taken. Of the number failed, 69 (64.0%) were accounted for, of whom 63 (91.0%) were compliant with recommendations made for follow-up evaluation. A discussion of possible contributing factors and issues surrounding vision screenings are examined. An outcome assessment and referral evaluation provides valuable information regarding the effectivity, ultimate treatment strategies, parental perceptions and reasons for non-compliance of follow-up care.

INTRODUCTION

The basic rationale for school vision screening programs is to uncover previously undetected visual problems that may degrade a person's quality of life or academic potential and then recommend appropriate actions to remediate the correctable visual deficiencies. Prevalence studies of visual anomalies among school children indicate that approximately 25% of school children (ages 5-19) have a significant visual anomaly.¹ It has further been shown that less than 20% of those children with correctable visual problems are under the care of a vision care practitioner.² With these figures in mind, the fundamental value of screening programs as an expedient, inexpensive, valid and effective device for detecting visual problems can clearly be seen.^{3,4,5}

A comprehensive evaluation of visual screening methods was performed in 1958 and called "Vision Screening for Elementary Schools: The Orinda Study". This study examined several methods of screening to determine which one was the most efficacious.² The results of this study point to a method referred to as the Modified Clinical Technique (MCT) as being 95 percent effective in screening for conditions affecting visual acuity, refractive error, binocular coordination and eye disease.⁶ Further, it was shown that the amount of under-referrals and over-referrals utilizing this technique is kept at an extreme minimum when compared to other screening techniques. The Modified Clinical Technique shows an

approximate 2 percent under-referral rate and a 7 percent over-referral rate.^{5,6} These facts clearly make the case that an effective method for screening children for visual anomalies has been developed.^{3,4,5}

Before we brand any program as an undeniable success, we must examine not only the initial results of a vision screening program, but also the degree to which screening caused subsequent care to take place. The real measure of success for any screening program is the resultant action taken. Mere detection of a visual anomaly is not enough. The specific target of this research is to determine whether visual screenings programs serve as a sufficient catalyst to follow-up care given the significant defects found.

Since information regarding follow-up patterns is less than comprehensive in the optometric literature we will turn to general health screenings for reference. Lack of follow-up information does not seem to be unique to visual screenings. In a review of health screenings throughout the literature, Lesser found that the rate of compliance with recommendations made in screenings or establishing the number of over-referrals or under-referrals was not routinely done.⁷ When studies regarding outcome assessments are performed the compliance is shown to generally be disastrously low. A study performed on a school age population in New York City found that at the end of the year following a school health screening, 31 percent of the children referred for follow-up

care had not been evaluated for the problem(s) found.⁸ After a health screening at an elementary school in Harlem it was found that close to 75 percent of the children referred out for further evaluation or treatment had not received care, or care was delayed for extended periods of time, or no follow-up care was ever received.⁹ Cauffman, et al., found that compliance with recommendations to seek follow-care after a general health screening ran at 36 percent with one notification of the results to the parents. However, with multiple contact techniques, compliance with screening recommendations ultimately ran at 82 percent.¹⁰ In a similar manner, May Lan, et al., reported that two-thirds of those problems noted in a general health screening received attention. Once again, the reason for the higher compliance is due to the fact that if the parents failed to obtain care after several notification techniques, a paraprofessional, with parental consent, took the child for follow-up care or accompanied the parent for follow-up with the child.⁸ Therefore, it can be concluded, that with a single notification technique, compliance with recommendations for follow-up care following a health screening hovers at approximately 30 percent.

In opposition to the compliance rate found in other studies, Gabrielson, et al., found a surprising 92 percent rate of follow-up on referrals made from the school for vision difficulties uncovered in a comprehensive health screening.¹¹

The technique used for the vision screening or the failure criteria was not reported. The study also does not detail the methods used in the notification process to the parents, so direct comparisons to the compliance rates in the previous study are difficult. However, it is interesting to note this lone, dramatically different compliance pattern relating to failure in a vision screening.

If a low rate of follow through in screening recommendation compliance exists, then the major question becomes, "Why is action taken in some cases while in other cases there is none?" Once again, we must refer to general health screenings for possible trends and rationale. We find that Cauffman, et al., examined factors influencing the outcome of referrals from a school health program. He analyzed socioeconomic, attitudinal, and notification factors influencing the outcome of referrals. It was found that a child was likely to receive attention if they were from an upper class family, members of small families, had parents that were Caucasian or Oriental, had parents with an education beyond high school, their parents were employed in white collar occupations, were members of families with non-working mothers, had mothers over 35 years of age, and had parents with a Jewish religious preference.¹² These factors are built in and uncontrollable in terms of the health screening agency increasing the compliance of follow-up care. On the other hand, Cauffman discovered that notification techniques and

parental attitudes also showed as significant in ultimate referral outcomes. Follow-up care was found to be higher when the parents perceived the defect to be of high urgency, when they received more than one notification, when the parents were notified by more than one person, and when the parents were notified by more than one contact technique. Gabrielson, et al., went on to study how the parent's perception of the urgency/seriousness of the referral problem, the parent's belief in health care, and the availability of follow-up care impacted on referral outcomes. He found a positive relationship between the perceived seriousness of the problem uncovered and the subsequent action taken by the parents. A positive correlation was also established between the level of belief in the effectiveness of the health care system and the relative availability of health care services.¹² Three other factors that were implicated in having a positive influence on the rate of follow-up care were the presence of health insurance, the literacy of the parents, and the length of residence in the area.

Although some of the factors shown to have a positive correlation to follow-up care are socioeconomic issues that are unalterable, it would be useful to determine if the same issues that impact on compliance with recommendations made at general health screenings show the same relationship to vision screening recommendation follow-up. Also, notification techniques and parental attitudes and perceptions regarding the

recommendations made are possible areas of concern where we could potentially improve compliance by altering procedural techniques. These are some of the areas of concern that will be investigated in this study.

METHODS

Between April 15, 1985 and May 9, 1985, 657 Forest Grove public school children, in the first and fourth grade, were visually screened by Pacific University College of Optometry interns using the Modified Clinical Technique.¹ Of the total number of children screened, 108 failed the screening according to the established criteria. The criteria for the Modified Clinical Technique is listed in Appendix 1. The parents of the children who failed were notified of the results of the screening either by mail or by a hand carried letter by the child. The recommendation to seek further evaluation was made at that time.

Approximately one year after the screenings, the parents of the children who failed were contacted and a phone interview was conducted by a single interviewer using a standard set of questions. In general, the questions probed compliance with the vision screening recommendations, the general results of the follow-up care, reasons for non-compliance if it existed, vision care treatment patterns, parental perceptions of the screening results, and selected demographic information. The questionnaire in its entirety can be found in Appendix 2.

Seventy-five interviews were completed. There were 0 refusals to participate and 39 families were not interviewed because they had moved from the area or were not found at home after repeated attempts. The 69 families interviewed represent 65 percent of the failing children in the sample.

RESULTS

Professional help was obtained in 63 of the 69 families that were contacted representing 91.0 percent of the children referred. Of the first graders contacted 29 (93.5%) sought further care while 2 (6.5%) did not. The fourth grade children showed a total of 34 (89.5%) of the families that complied with visual screening recommendations while 4 (10.5%) chose not to. (See Table 1).

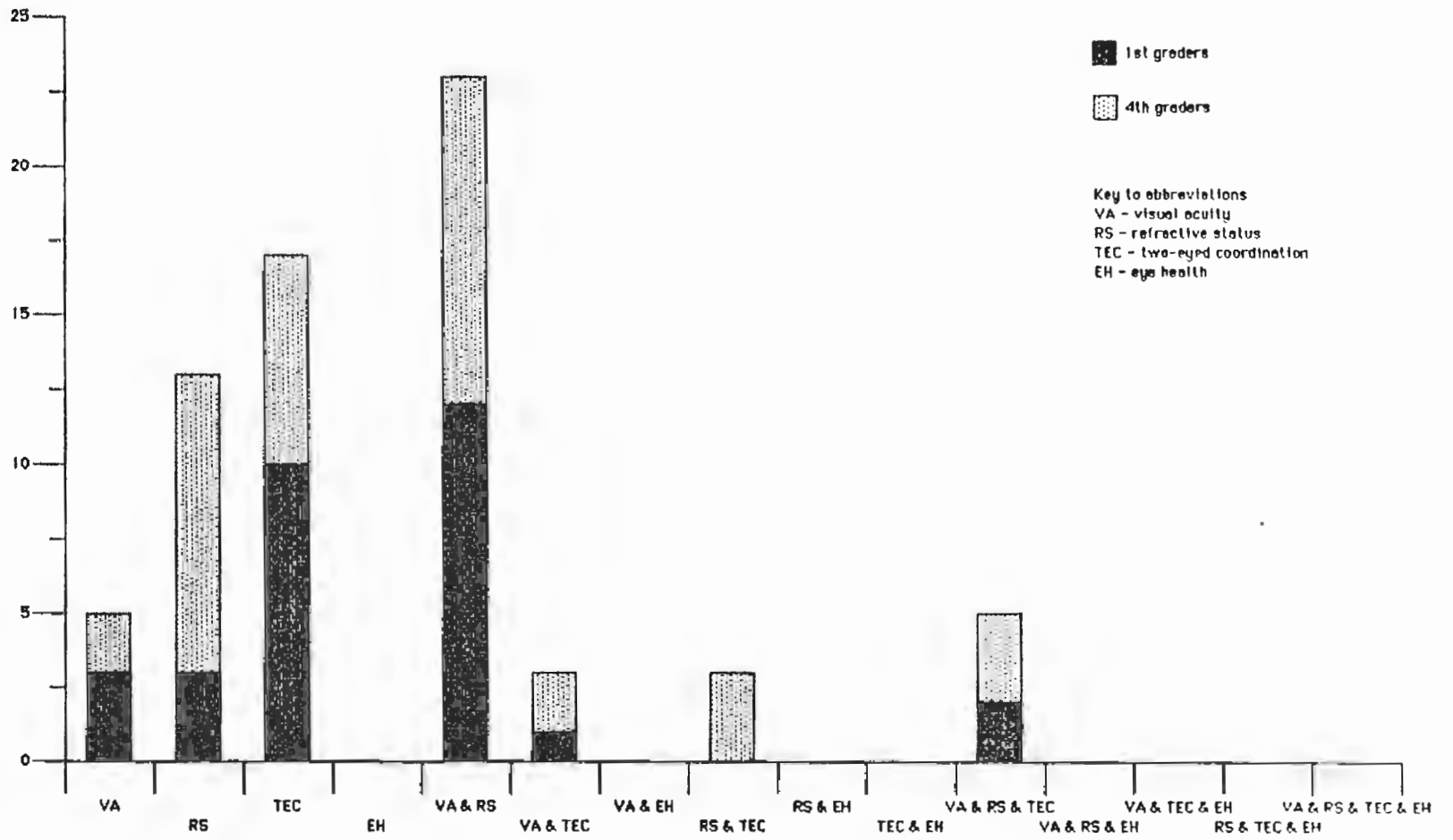
The children included in the study fell into seven categories which were determined by the visual anomaly or multiple anomalies that caused them to fail the screening. Out of a total of fifteen possible reasons to fail, the only seven categories that the children failed for were: visual acuity, refractive status, two-eyed coordination, visual acuity and refractive status, visual acuity and two-eyed coordination, refractive status and two-eyed coordination and visual acuity in combination with refractive status and two-eyed coordination. (See Figure 1). When a comparison was made between the visual difficulties that caused first graders to fail and those that caused fourth graders to fail, the only two areas that showed a very weak significance ($p = .10$) were refractive status and refractive status and two-eyed coordination, with the fourth graders showing the higher failure rate. (See Table 2).

Of the families that followed the recommendations for follow-up care after their children failed the vision

Table 1 - Compliance with Screening Recommendations
Was the child taken for further evaluation?

	1st graders		4th graders		Total	
	%	No.	%	No.	%	No.
Yes	93.5	(29)	89.5	(34)	92	(63)
No	6.5	(2)	10.5	(4)	8	(6)

Number of Failures



Reason for Failure

Table 1

Table 2 - Significance of Reasons for Failure

1st vs. 4th grade

Reason for Failure	1st grade	4th grade	z	Level of Significance
VA	3	2	.698	p=.490
RS	3	10	-1.64	p=.101
TEC	10	7	1.37	p=.171
VA & RS	12	11	.860	p=.390
VA & TEC	1	2	-.429	p=.667
RS & TEC	0	3	-1.61	p=.107
VA & RS & TEC	2	3	-.238	p=.810
	<hr/> 31	<hr/> 38		

screening, the majority went to an optometrist for further evaluation. The optometry clinic at Pacific University was utilized by 49% of the families, while 32% went to private optometrists for consultation. There were 6% of the families that were enrolled in a Health Maintenance Organization (Kaiser-Permanente) and follow-up examinations were conducted at those facilities. Only 3% of the families pursued ophthalmologic care as a follow-up to the screening. Interestingly, 10% of the families contacted who did take their child for further evaluation, were unable to identify exactly what type of eye care practitioner they consulted. (See Table 3/Figure 2). For further distinctions concerning specific doctors that were seen, see Appendix 4.

Of all the children who were evaluated, 86% of them were identified as having a significant visual problem upon comprehensive evaluation. A disparity existed between positive identification of visual anomalies detected in the screening versus visual anomalies confirmed on further evaluation between the first and fourth graders. A higher percentage of first graders who failed the visual screening were thought to be visually "normal" when compared to fourth graders who failed the screening. Ultimately, 94% of the fourth graders went on to have a confirmed visual deficit on further examination, while only 76% of the first graders were confirmed as having problems. (See Table 4)

When examining the treatment patterns for the children

Table 3 - Type of Practitioner Delivering Follow-Up Care

What kind of health care practitioner did you take them to?

	1st graders		4th graders		Total	
	%	No.	%	No.	%	No.
Optometrist	83	(24)	91	(31)	87	(55)
Ophthalmologist	14	(4)	3	(1)	8	(5)
MD/DO	0	(0)	0	(0)	0	(0)
Not sure	3	(1)	6	(2)	5	(3)

Figure 2 - Type of Practitioner
Delivering Follow-Up Care

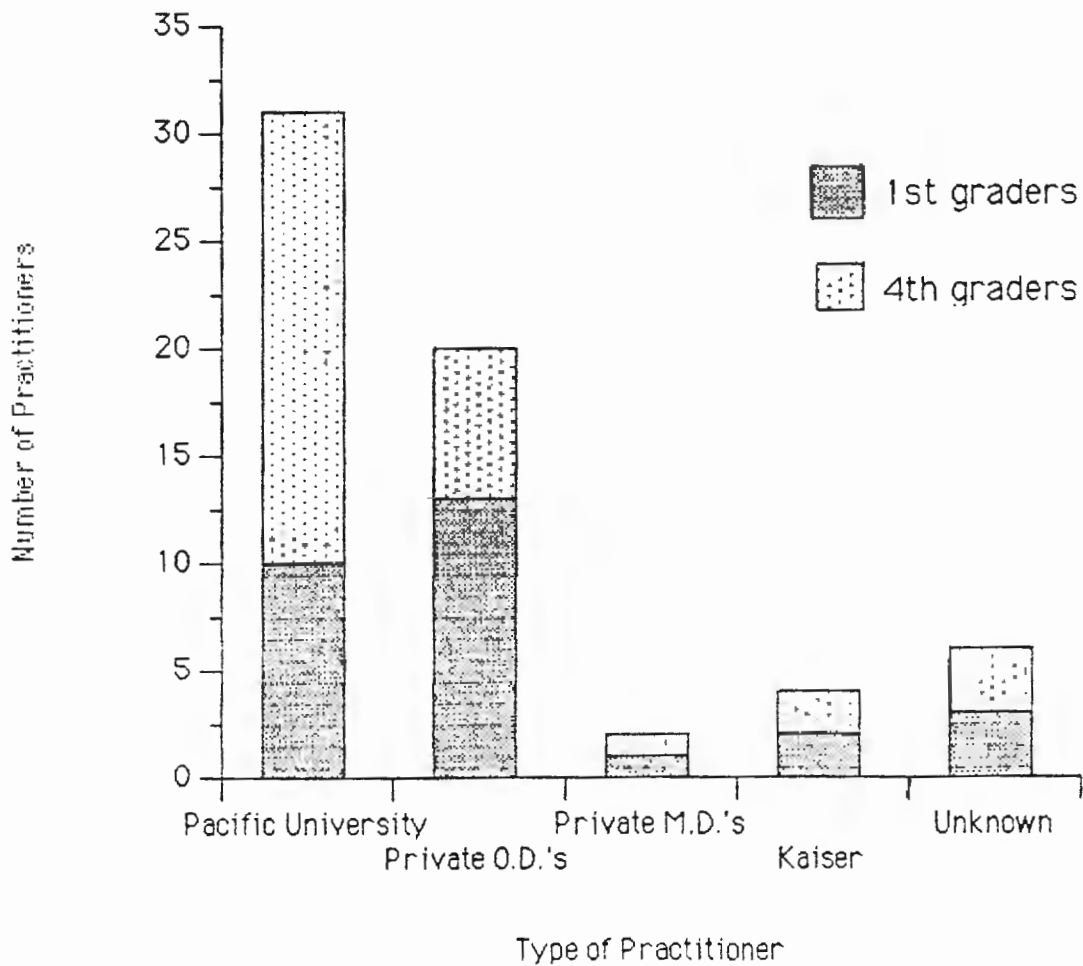


Table 4 - Results of the Follow-Up Examination

Did the practitioner agree that a visual problem existed?

	1st graders		4th graders		Total	
	%	No.	%	No.	%	No.
Positive	76	(22)	94	(32)	86	(54)
Negative	24	(7)	6	(2)	14	(9)

$$x_2 = 2.906 \quad .05 < p < .10$$

that were positively identified as having visual deficits, the prescribing of a spectacle prescription was by far the most common form of therapy. A full 75% of the children had a spectacle correction recommended to them. The combination of vision therapy and a prescription was suggested in 6% of the above cases. Vision therapy alone was considered in only one instance and surgery was suggested in only one instance. In 21% of the cases, monitoring of the child's visual status was the only action taken. Additionally, eye care professionals were more likely to monitor the visual status of a first grader than a fourth grader ($p = .06$). (See Table 5). For more specific information comparing exactly what types of therapy were utilized versus the reason the child was referred for further evaluation based on the results of the vision screening, consult Tables 6 and 7.

Of the 69 children referred for follow-up evaluation following their failure at the vision screening, only 6 children were not taken for further evaluation. When the parents were questioned regarding the reason for their non-compliance with the recommendations made, one family sighted financial problems as the reason for the non-compliance. Two sets of parents did not perceive the failure at the vision screening as important and three families indicated that the significance of the failure and the recommendations made about further action to be taken was unclear to them. (See Table 8).

Table 5 - Modes of Treatment
1st vs. 4th grade

Treatment	1st grade	4th grade	z	Level of Significance
Rx	17	25	-1.25	p=.211
VT	0	1	.093	p=.928
Rx & VT	2	4	-.656	p=.516
Developmental	0	0	0	_____
LV	0	0	0	_____
Monitor	9	4	1.88	p=.060
Refer	1	0	1.09	p=.276
Other	0	0	0	_____

Key to Abbreviations

Rx = Spectacle prescription
 VT = Vision therapy
 DV = Developmental therapy
 LV = Low vision aids
 VA = Visual acuity
 RS = Refractive status
 TEC = Two eyed coordination

Table 6 - 1st Grade
Reason for Failure vs. Therapy Regime Prescribed

Reason for Failure	Therapy Prescribed							
	Rx	VT	Rx&VT	DV	LV	Monitor	Refer	Other
VA	1	0	0	0	0	1	0	0
RS	3	0	0	0	0	1	0	0
TEC	3	0	2	0	0	4	0	0
VA & RS	8	0	0	0	0	3	0	0
VA & TEC	1	0	0	0	0	0	0	0
RS & TEC	0	0	0	0	0	0	0	0
VA & RS & TEC	1	0	0	0	0	0	0	1*
Total	17	0	2	0	0	9	0	1

* Surgical recommendation for strabismus

Key to Abbreviations

Rx = Spectacle prescription
 VT = Vision Therapy
 DV = Developmental Therapy
 LV = Low Vision Aids
 VA = Visual Acuity
 RS = Refractive Status
 TEC = Two-eyed Coordination

Table 7 - 4th Grade

Reason for Failure vs. Therapy Regime Prescribed

Reason for Failure	Therapy Prescribed							
	Rx	VT	Rx&VT	DV	LV	Monitor	Refer	Other
VA	1	0	0	0	0	1	0	0
RS	7	0	1	0	0	1	0	0
TEC	1	1	1	0	0	2	0	0
VA & RS	9	0	1	0	0	1	0	0
VA & TEC	2	0	0	0	0	0	0	0
RS & TEC	3	0	0	0	0	0	0	0
VA & RS & TEC	1	0	1	0	0	0	0	0
total	24	1	4	0	0	5	0	0

Key to abbreviations

Rx = Spectacle Prescription
 VT = Vision Therapy
 DV = Developmental Therapy
 LV = Low Vision Aids
 VA = Visual Acuity
 RS = Refractive Status
 TEC = Two-eyed Coordination

Table 8 - Reasons for Non-Compliance with Recommendations

Reason given	No.
Dr. was too far away	0
Financial problems	1
The problem was not important	2
The recommendation was unclear	3
Total	6

When the parents of the children who failed the vision screening were asked to assign a numerical value to the importance of the failure (1 indicating no importance and 5 being very important), 90% of the parents questioned stated the failure to be very important. Only 7% perceived the failure as being of some importance and 3% considered the failure as being of no importance at all. Additionally, no significant differences in the parental perceptions of the failures noted between the parents of the first graders and the parents of the fourth graders were noted. (See Table 9).

A determination of whether the presence of health insurance coverage for vision care had any effect on follow-up compliance was the aim of one of the questions in this study. It was hypothesized that the presence of this vision care contingency plan might encourage a parent's willingness to comply with a follow-up recommendation. In this study, 75% of the sample did not have vision care insurance coverage, yet 91% of the sample sought follow-up care. This information makes it easy to conclude that the presence or absence of insurance has little effect on follow-up compliance within the confines of this study. (See Table 10).

Another aim of this study was to determine if parent notification and education regarding the significance of the vision screening failure was adequate. When examining the first and fourth grade populations together, 55% of the parents received the results hand-delivered by the child while 43% were

Table 9 - Perceived Importance of Failure

	1st graders		4th graders		Total	
	%	No.	%	No.	%	No.
1	3.5	(1)	2.5	(1)	3	(2)
3	6.5	(2)	8.0	(3)	7	(5)
5	90	(28)	89.5	(34)	90	(62)

1=no importance
3=of some importance
5=very important

Table 10 - Presence of Family Health Insurance

Do you have an insurance plan with vision care coverage?

	1st graders		4th graders		Total	
	%	No.	%	No.	%	No.
Yes	29	(9)	24	(9)	26	(18)
No	71	(22)	76	(29)	74	(51)

notified of the results through the mail. In only 1 instance was the information delivered by the child's teacher. (See Table 11). The most important fact was that in this sample, 100% notification was achieved. When the parent's were questioned regarding their satisfaction with the amount of information received concerning the reason for their child's vision screening failure, the answer was decidedly mixed. No real differences existed between the parents of first and fourth graders with 51% of the total parents questioned responding that they would like more information on the reason for the vision screening failure, while the remaining 49% were satisfied with the facts they received. (See Table 12).

Relevant demographic data was sought from each family which identified the highest level of education completed by the parents present in the household, the occupation of the primary wage earner in the family, and the approximate family income from all sources. It was suspected that the outcome of a referral for recommendation made in a vision screening may depend on social class information. These relationships would only be possible to establish if a sufficient diversity in the sample population existed. Out of the sample population examined in this study this variance did not exist. To illustrate this lack of diversity, by examining the distribution in family income levels we see that 87% of the sample population earns between \$15,000 and \$34,999 showing that a vast majority of the sample is clustered in the mid

Table 11 - How Were the Results Received

	1st graders		4th graders		Total	
	%	No.	%	No.	%	No.
Child	55	(17)	55	(21)	55	(38)
Mailed	42	(13)	45	(17)	43	(30)
Teacher	3	(1)	0	(0)	2	(1)

Table 12 - Parental Perceptions of Information Received
from the Screening

Would you have liked to receive more information
about the screening results?

	1st graders		4th graders		Total	
	%	No.	%	No.	%	No.
Yes	52	(16)	50	(19)	51	(35)
No	48	(15)	50	(19)	49	(34)

income range. (See Table 13). Additionally, 93% of the families contacted reported that highest level of education was either high school or some college. Of the sample, 54% showed completion of high school as the highest level achieved and 39% indicating completing some college as the highest level of education obtained. (See Table 14). When we go on to examine the occupation distribution among the sample group in the study, we find that the majority of the families report that the primary wage earners are engaged in jobs that could be considered "blue-collar" occupations. For example, out of the total sample, 13% are working in service jobs, 26% are employed in precision production, craft, and repair occupations, and 30% are termed operators, fabricators or laborers for a total of 69% of the study population. (See Table 15). More specific information regarding the details of what occupations are included under which categories are included in Appendix 4. Based on these three pieces of demographic information, conclusions cannot be drawn regarding socioeconomic influences on the rate of follow-up care after a vision screening due to the lack of diversity of responses in the sample examined.

Table 13 - Income of Parents

What was your approximate family income, from all sources before taxes in 1985?

	1st graders		4th graders		Total	
	%	No.	%	No.	%	No.
under \$5,000	0	(0)	0	(0)	0	(0)
\$5,000-\$9,999	3	(1)	0	(0)	2	(1)
\$10,000-\$14,999	10	(3)	5	(2)	6	(5)
\$15,000-\$19,999	13	(4)	29	(11)	22	(15)
\$20,000-\$24,999	32	(10)	34	(13)	33	(23)
\$25,000-\$34,999	36	(11)	29	(11)	32	(22)
\$35,000-\$49,999	3	(1)	0	(0)	2	(1)
over \$50,000	0	(0)	0	(0)	0	(0)
Won't disclose	3	(1)	3	(1)	3	(2)

Table 14 - Level of Education of Parents

Of those parents in the household, what is the highest level of education completed?

	1st graders		4th graders		Total	
	%	No.	%	No.	%	No.
Some high school	0	(0)	0	(0)	0	(0)
Completed high school	52	(16)	55	(21)	54	(37)
Some college	35	(11)	42	(16)	39	(27)
Completed college	10	(3)	0	(0)	4	(3)
Graduate work	3	(1)	3	(1)	3	(2)

Table 15 - Occupation of Parents

What is the occupation of the primary wage earner in the family?

	1st graders		4th graders		Total	
	%	No.	%	No.	%	No.
Managerial and professional	3	(1)	3	(1)	3	(2)
Technical, sales and administrative support	26	(8)	21	(8)	23	(16)
Service occupations	10	(3)	16	(6)	13	(9)
Farming, forestry and fishing	6	(2)	0	(0)	3	(2)
Precision production, craft and repair	26	(8)	26	(10)	26	(18)
Operators, fabricators and laborers	26	(8)	34	(13)	30	(21)
Experienced unemployed	3	(1)	0	(0)	2	(1)

DISCUSSION

This study presents an analysis of general compliance with recommendations made for follow-up care following the failure of a child in a Modified Clinical Technique Vision Screening. Although the results of other inquiries into compliance in other aspects of health screenings have generally run low, this study shows an atypically high compliance rate of 91%. The reason for this inflated compliance rate is not entirely clear. Speculatively, it could be attributed to the fact that all the respondents in this study were residents of the Forest Grove School District. The presence of the Pacific University Optometry Clinic within the community may have elevated general public awareness regarding vision care to an artificially high level in this community compared to the population at large.

One other cause for this uncharacteristically high compliance rate may be that parents perceive vision problems to be of tremendous concern in their child's well-being and academic progression. Support for this theory is partially provided by 90% of the parents in this sample indicating that a failure in the vision screening was perceived as very important to them. Additional corroboration of this theory is seen in the one study that shows compliance of follow - up care in children who failed a health screening for visual reasons to be at 92%.¹² The study by Gabrielson, et al., went on to show that compliance for failures in the health screening for reasons of dental or psychological problems were not nearly as

high. It was his conclusion that differences in social significance are placed on different health problems. Gabrielson indicates that the value placed on these problems may be related to the rate of follow-up care after a screening. It may well be that visual problems are regarded with significantly more concern than other health problems. These factors may play a role in this study as well.

One final proposal for the high compliance rate may be due to a type of self-selection process. Although a total of 108 children failed the screening, this sample only includes 64% of the total that failed. A total of 39 families could not be reached because they had moved from the area or were not found at home after repeated attempts. The Forest Grove School District has a distinct segment of school age children that are from families of migrant farm workers or single parent households. These two segments could exhibit the very characteristics that put them at risk for low compliance. Cauffman, et al., has shown that the following factors can be significant in decreasing the likelihood of a child receiving attention after health care screening recommendations are made: families with low incomes, parents with a high school education or less, parents with Spanish surnames, parents employed in blue collar occupations, mothers that were 35 years old or less, members of families with working mothers and if they had a short length of residence in the area.¹⁰ If we are to assume

that some of the families that could not be contacted are at risk for non-compliance and fall into some of the aforementioned categories, then the compliance rate found could be artificially high.

Upon examining the specific reasons why children failed the vision screening, it was noted that of all the reasons for failure, the only two areas that showed a weak clinical significance between first and fourth graders was refractive status and refractive status and two-eyed coordination. It was the fourth graders who showed the higher failure rate. In a very similar vein, Peters, et al., in the Orinda Vision Study, found increasing age associated with an increase in the incidence of mean refractive error.² That study showed large shifts toward more myopia by those already myopic and a shift of some normals to myopia. Unfortunately, in this study no distinction was made between myopia, hyperopia, astigmatism, or anisometropia so no direct comparisons can be made. It can only be speculated that the population in this study may be showing similar tendencies.

It is interesting to note that 49% of the families contacted utilized the optometric clinic at Pacific University for follow-up care. Once again, this may be due to the public awareness within the Forest Grove community of the services available at the university. It may also be supposed that a

large number of the children who were screened had never received a vision evaluation previous to the time of the screening. It may have been a logical step for some families to bring the child to the Pacific University Clinic for follow-up evaluation since the Pacific College of Optometry provided the initial vision screening information and recommendations. If we then combine the 32% of the families that sought further evaluation from private optometrists and the 6% that saw optometrists through a HMO, a total of 87% of the children were seen by an optometrist.

As an interesting aside, 10% of the families contacted were unable to identify exactly what type of eye care practitioner they consulted. In all of these cases, the parent was unable to make the distinction even after a description by the interviewer outlining some possible differences was provided. It was surprising to discover the percentage of people in this sample who were unaware of the possible differences that existed in the type of eye care professional they ultimately chose for evaluation and treatment.

When follow-up examinations were performed on the children who failed the screening, a total of 86% were confirmed to have clinically significant vision anomalies. However, a difference was noted between the number of clinically confirmed visual anomalies in the first and fourth grade. A 94% confirmation was found in the fourth graders while a decreased rate of 76%

confirmation was found in the first graders. The question then becomes to what are these differences attributable? One factor that may be at play is simply the age of the child being evaluated. From both a visual screening and eye care practitioner point of view it might be speculated that the added maturity of a fourth grader could add to the reliability of findings. Second, the personal and arbitrary criteria for passage or failure of a visual evaluation developed by a eye care professional may not be in total agreement with the criteria established for the Modified Clinical Technique. In addition, it might be suggested that a generalized, more stringent optometric criteria is taken with fourth graders due to their increased academic rigors and the perceived possible increased academic impact a visual problem would have in the classroom. Third, the specific testing method or even comprehensiveness of the testing battery utilized to evaluate specific aspects of the visual system may vary between eye care practitioners and lead to varied results.

When evaluating the treatment patterns seen, we find that the writing of a spectacle prescription was by far the most prevalent therapy prescribed. Vision therapy was suggested in only 6% of the cases evaluated in combination with glasses. It is important to remember that based upon each eye care practitioner's philosophical approach, the prevalence of certain therapy regimes may be somewhat skewed in comparison to

the general eye care community. It was also noted that eye care practitioners had a greater tendency to monitor visual problems in first graders than in fourth graders. Once again, this may indicate that the eye care practitioner perceives the potential impact of visual problems on fourth graders to be of greater consequence.

One of the hypotheses that was being tested in this study was if the parent's perception of the importance of the vision screening failure would impact on the degree of follow-up care. Since 91% of the parents took their child for follow-up care and 90% of the parents classified the failure in the vision screening as being very important, it would appear that parental perceptions of the importance of the problem directly impacts on the compliance of follow-up care. Upon further examination of the parent's who did not seek follow-up care, 4 out of 6 of the parents did not perceive the failure as very important. Only one family that was non-compliant in follow-up regarded the failure as very important but claimed financial hardship as the reason there was no follow-up. Therefore, within the confines of this study, it appears that parental perceptions of the importance of follow-up care is a key factor in influencing compliance.

This study also examined the efficacy of the delivery of the vision screening results and the parental satisfaction with the information shared. Although both hand delivered and

mailed results were equally effective, the amount of information disbursed was not as successful. A full 51% of the total sample of parents would have preferred more information about the screening. If compliance is truly dependent on parental perceptions of the importance of a problem, then the more public education regarding the impact of the visual problem detected the higher the theoretical compliance rate. Even in this highly compliant sample, more information was requested by a large portion of the respondents. A lack of information and education regarding vision screening results in a less vision care sensitized population, could easily degrade the compliance on follow-up care.

Finally, demographic information was sought to try to determine if social class information would have a significant bearing on compliance with recommendations. However, on examination of the sample population it must be recognized that limitations of diversity of the population make it impossible to disclose evidence that the level of education of the parents, occupation of the primary wage earner and the approximate family income has any correlation with compliance.

In summary, this study was designed to examine a series of issues surrounding the compliance of parents to recommendations made following a child's failure at a Modified Clinical Technique vision screening. The limited scope and size of the population sample in this study can only point to general

trends regarding those issues. Compliance and a realistic perception of the importance of a problem detected seemed to be directly related. It would seem that public education and awareness of the factors involved in vision screening and the potential impact of vision anomalies on a child's life would be the key to promoting a level of compliance in accord with that noted in this study. It could be expected that the results of this approach, when applied to a larger more heterogeneous sample, would yield clues to the modification and improvement of referral and compliance guidelines in vision screening.

Appendix 1

Vision Screening Program - Criteria for Referral as established by the Modified Clinical Technique

- A. Visual Acuity (Near or Far)
- 1. Pre-schoolers.....20/40 or poorer, either eye
 - 1. Pre-schoolers.....20/40 or poorer, either eye
 - 2. Others.....20/30 or poorer, either eye
- B. Refractive Error
- 1. Hyperopia
 - a. Pre-schoolers.....+2.00 D or more
 - b. Others.....+1.50 D or more
 - 2. Myopia.....-0.75 D or more with acuity loss
 - 3. Astigmatism.....+1.00 D or more
 - 4. Anisometropia.....+1.00 D or more
- C. Two Eyed Coordination
- 1. At Distance (20 feet)
 - a. Tropia.....any tropia
 - b. Esophoria.....5^ or more
 - c. Exophoria.....5^ or more
 - d. Hyperphoria.....2^ or more
 - 2. At Near (16 inches)
 - a. Tropia.....any tropia
 - b. Esophoria.....5^ or more
 - c. Exophoria.....10^ or more
 - d. Hyperphoria.....2^ or more
- D. Ocular Health.....any verified pathology or medical anomaly of eye and/or adnexa

*Categories A, B, and C are tested with habitual corrective lenses in place.

Appendix 2
Questionnaire

Child's Name _____ Telephone _____
Date of Screening _____ School _____
Grade _____ Reason for Failure _____

1. Did you take your child for further evaluation?

yes no

If the answer to question #1 is yes, then answer the following questions:

2. What kind health care practitioner did you take them to?

OD ophthalmologist MD/DO other _____

3. What was their name?

4. What were the results of the examination?

positive diagnosis negative diagnosis don't know

5. What kind of treatment was undertaken at that time?

Rx VT Developmental LV Monitor Refer Other

If the answer to question #1 was no, then answer the following question:

1. Was there any one specific reason why you didn't follow-up on the recommendation made at the vision screening?

Dr. too far away Financial Problem not imp.

Recommendation unclear Other _____

Appendix 3

Optometrists Seen for Follow-Up

	1st grade	4th grade	Total
Pacific Univ.	10	21	31
Kautz	7	3	10
Lind	2	1	3
Richardson	2	0	2
Pollock	1	1	2
Stratton	1	1	2
Miller	0	1	1

Appendix 4

Employment Categories¹³

- I. Managerial and professional
 - A. Executive, administrative, managerial¹
 - 1. Administrators and officials²
 - 2. Managers: financial
 - a. Personnel and labor relations
 - b. Marketing, advertising, and public relations
 - c. Medicine and health
 - d. Properties and real estate
 - e. Managers and administrators, not elsewhere classified
 - 3. Management related occupations
 - a. Accountants and auditors
 - B. Professional speciality¹
 - 1. Architects
 - 2. Engineers
 - 3. Mathematical and computer scientists
 - a. Computer systems analysts
 - 4. Natural scientists¹
 - 5. Health diagnosing¹
 - a. Physicians
 - 6. Teachers, post secondary
 - 7. Teachers, exc. post secondary
 - 8. Social scientists and social planners
 - 9. Lawyers
- II. Technical, sales, and administrative support
 - A. Technicians and related support¹
 - 1. Health technologists and technicians
 - 2. Engineering and related technologists and technicians
 - 3. Science technicians
 - 4. Computer programmers
 - B. Sales¹
 - 1. Supervisors and proprietors³
 - 2. Sales representatives
 - 3. Sales workers, retail, and personal services
 - C. Administrative support¹
 - 1. Supervisors
 - 2. Computer equipment operators¹
 - 3. Adjusters and investigators¹
 - a. Insurance adjustors, examiners, and investigators
 - b. Investigators and adjustors, exc. insurance

- III. Service occupations
 - A. Private household
 - B. Protective service
 - C. Service, exc. protective and household
 - 1. Food preparation¹
 - a. Bartenders
 - b. Cooks, exc. short order
 - 2. Health services
 - 3. Cleaning and building, exc. private household
 - 4. Personal service
- IV. Farming, forestry, and fishing¹
 - A. Farm operators and managers
 - B. Farm occupations, exc. managerial
- V. Precision production, craft, and repair
 - A. Mechanics and repairers
 - B. Construction, trades
 - C. Extractive
 - D. Precision production
 - 1. Woodworking
- VI. Operators, fabricators, and laborers
 - A. Machine operators, assemblers, and inspectors
 - 1. Machine operators and tenders, exc. precision¹
 - a. Printing machine operators
 - b. Textile, apparel, and furnishings
 - B. Transportation and material moving¹
 - 1. Motor vehicle operators¹
 - a. Truckdrivers, heavy and light trucks
 - b. Bus drivers
 - c. Taxicab drivers and chauffeurs
 - C. Handlers, equipment cleaners, helpers and laborers
- VII. Experienced unemployed⁵

1 Includes occupations not shown separately

2 In public administration protective services and related fields

3 Salaried and self-employed

4 Includes finance and business

5 Unemployed persons who have worked anytime in the past

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