



VISION SCREENING OF AT RISK COLLEGE STUDENTS

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Abstract

The New York State Optometric Association Vision Screening Battery (NYOSA) was administered to 30 at risk college freshmen enrolled in a recruitment and retention program in order to determine the incidence of specific visual problems in this population. Fifty-four graduate students served as a control group. A chi-square statistical analysis revealed that the freshmen scored significantly lower on the Tracking, Acuity-Near, and Convergence subtests. A multiple regression statistical analysis revealed that the Tracking and Stereopsis subtests related to students' scores on the Verbal and Mathematics SAT scores. Other significant findings included the 80% failure rate among the at risk freshmen.

Key Words

college freshmen, vision screening, at risk students, New York State Optometric Association (NYOSA) Vision Screening Battery

Millions of adolescents perform poorly on standardized tests that measure proficiency in reading, language arts, mathematics, etc. The Education Commission of the States¹ estimates that 30% of our nation's youths fail to acquire a basic education needed to obtain adequately paying and secure jobs. The number of these at risk students is growing.² A large underclass of poorly educated young people will make it more difficult for the United States to compete in the world market.^{3,4}

Recently, researchers have screened adults and inner city adolescents enrolled in literacy programs and have noted significant failure rates on these visual screenings. Specifically, Johnson and Zaba⁵ found that 74% of adult students enrolled in a literacy program failed a visual screening battery. When Thau⁶ screened a similar population, she noted a 66% failure rate. Suchoff and Mozlin⁷ visually screened an adolescent inner city population and noted a 52% failure rate.

Although the research just reviewed suggested that special populations may have high failure rates on visual screening tests, little is known concerning visual screening of at risk college students. The question of whether college students enrolled in non-credit, developmental courses have significant visual problems needs to be examined. It is particularly important to rule out visual defects among at risk college students who in general have a more difficult time completing college requirements than their majority peers. Therefore, the purpose of this study was to screen at risk freshmen enrolled in a special college recruitment and retention program.

METHODS

Subjects

The at risk students selected for this special program had submitted low SAT scores (average SAT = 775) or had a mediocre high school academic record (high school grade point average = 2.58). All 30 subjects were 17, 18, or 19 years of age, African-American, and had graduated from high school within the last month. They had been identified as at risk by the admissions office of a large eastern state university and had been encouraged to apply to a special summer minority student recruitment and retention program. This six-week residential program provided intensive college preparation and orientation experiences by offering opportunities in developmental course work, tutoring, employment, and student activities.

More specifically, after diagnostic testing and advice from academic counselors, each student enrolled in two of the following developmental courses: mathematics, reading, writing, or problem solving. Other special opportunities included eligibility for tutoring in one more of these academic areas and having on-campus employment in several campus locations. Campus employers expected students to perform their duties and tasks in a responsible manner. This summer work experience encouraged self-discipline, compensated students for revenue lost from summer jobs, and provided students with the opportunity to work in a multicultural environment. Furthermore, peer counselors, working with the students, arranged athletic, cultural, educational, and

social events. Students broadened the scope of their academic and cultural frame of reference. Lastly, during the fall semester, the Multicultural Student Services provided ongoing academic monitoring and tutoring support services. Fifty-four graduate students served as the comparison group. The age range was from 24 to 30 years.

Screening Procedures

One of the researchers, assisted by four professional educators, screened both groups with the New York State Optometric Association Vision Screening Battery (NYSOA).⁸ The NYSOA included the following eight subtests:

1. Tracking: The ability to move the eyes across a sheet of paper
2. Fusion: The ability to use both eyes together at the same time
3. Acuity-Distance: Distance visual acuity at 20 feet
4. Stereopsis: Binocular depth perception
5. Acuity-Near: Near vision acuity for reading distance
6. Convergence: The ability of the eyes to work together as a team
7. Hyperopia: A refractive problem that makes it difficult to focus, especially at near viewing distances
8. Color Vision

The "Copy Forms" subtest was not utilized in the testing.

Statistical Analysis

A chi-square statistical technique determined if significantly more at risk students failed the NYSOA subtests compared with the 54 graduate student controls. A multiple regression statistical technique determined if the subtests of the NYSOA could predict student high school grade point average or success on the SAT's Verbal and Mathematics, or success on locally developed mathematics, reading, and writing placement tests. In statistical terms, failing one or more of the NYSOA subtests, and failing two or more of the NYSOA subtests served as predictors.⁹ High school grades, SAT scores (Total, Verbal, and Mathematics) and the mathematics, reading and writing placement exams served as the criterion variables. Thus, the authors investigated whether college freshmen who failed a visual screening also had low high school grades, low SATs, and/or local placement

examination scores. These comparisons determined if subgroups of at risk freshmen such as those with low SATs also demonstrated particular risk for having visual problems. Thus, it may be important to screen specific subgroups of freshmen.

Results

Table 1
The Percentage of Failure of At Risk College Freshmen vs. Graduate Students on the NYSOA Subtests

Subtest	At Risk	Graduate
	Freshmen	Students
Tracking	17 ^a	0
Fusion	50	44
Acuity-Distance	3	13 ^b
Stereopsis	33	20
Acuity-Near	7 ^b	0
Convergence	30 ^a	6
Hyperopia	0	0
Color Vision	0	2
Failed at least one subtest	80	59
Failed at least two subtests	43 ^b	26

^a indicates $p < .01$ and ^b indicates $p < .05$

Table 1 shows the failure of at risk college freshmen compared with graduate students on the NYSOA subtests. As can be seen, 17% of the freshmen failed the Tracking subtest, while all graduate students passed. In addition, a greater percentage of freshmen than graduate students failed the Fusion, Stereopsis, Acuity-Near, and Convergence subtests. Furthermore, 80% of the freshmen failed at least one subtest with 43% failing at least two subtests. On the other hand, a greater percentage of graduate students than freshmen failed the Acuity-Distance and Color Vision subtests.

A chi-square analysis determined the statistical significance of failure rates of the two groups (freshmen vs. graduate students) on the NYSOA subtests. It indicated that the greater failure rate of the freshmen was at the .01 level of significance for the Tracking and Convergence subtests and at the .05 level for Acuity-Near. The greater percentage of freshmen failing two or more subtests was at the .05 level.

The greater failure rate of the graduate students on the Acuity-Distance subtest was significant at the .05 level. (The pre-

dictors that reached statistical significance are indicated in Table 1.)

The Tracking and Stereopsis subtests of the NYSOA screening battery were the only two subtests that reached statistical significance with the multiple regression test. Of the 40 comparisons, two demonstrated a positive correlation: (1) students with high Tracking scores tended to have higher SAT math scores, (2) students with high Stereopsis scores tended to have higher SAT verbal scores. Both of these statistical findings were at the .05 level of significance.

Discussion

The most significant finding of this study was the 80% failure rate of at risk freshmen enrolled in a special recruitment and retention program. With four of five freshmen failing one or more visual subtests, it is extremely important that college counselors work with developmental education instructors and optometrists to identify and then provide appropriate care for student visual problems which might hinder academic performance.

Through developing strong auditory skills that enabled them to gain sufficient academic information, these college freshmen may have been relatively successful in high school. Pre-college auditory learners may become quite proficient at listening to verbal presentations and giving this information back to the teacher. In this way, strong auditory learners may be able to compensate successfully for particular visual defects. Unfortunately for auditory learners, however, the SAT is primarily a visual processing test with no spoken cues being allowed by the test taker or tester. Thus, the possible interference of a significant number of undetected visual problems among the freshmen may have accounted for their low SAT scores. Moreover, at the college level, with significant emphasis being placed upon vision and the demand for higher standards, visual deficiencies often lead to academic failure.

The most important screening factors included tests that detect visual problems at the reading distance (13 to 16 inches). Tracking, the ability of the eyes to move across a printed page, is a near vision screening skill that is an important part of the reading process.¹⁰ Students unable to track may have difficulty with college reading assignments. Thus, the current

findings indicating that 17% of the freshmen failed Tracking, while all of the graduate students passed, lends credence to an earlier study by Johnson and Zaba,⁵ which found significant differences between literate and illiterate populations on Tracking. The results of the current study, therefore, add additional evidence concerning the importance of vision in the learning process.

The inadequate performance of the freshmen subjects on Stereopsis, Acuity-Near, and Convergence subtests of the NYSOA⁸ substantiates again the importance of screening for these particular visual skills, which may be related to learning activities when material is presented on a visual basis. The fact that the at risk freshmen had submitted low SAT scores or had a mediocre high school record and yet had been admitted to a special minority student recruitment and retention program might indicate their ability to use the auditory process in the pre-college years to gain academic information as a learning tool.

The distant visual acuity (Acuity-Distance) failure rate was low for the freshmen. In fact, the freshmen did significantly better than the graduate students. The greater failure rate among the graduate students compared to the freshmen could be expected, based on theories about nearpoint stress,¹¹ i.e., the graduate students have had at least four additional years of college with sustained reading and computer activities, both of which can contribute to nearpoint stress and a subsequent reduction in distance visual acuity.

Of the 40 regression comparisons only Tracking and SAT math scores; Stereopsis and SAT verbal scores were statistically significant. Whether or not these findings are statistical artifacts or indeed important predictors needs further study.

Educators should continue to work closely with vision care professionals to help meet the needs of at risk college students. In addition, through such mutual cooperation, future researchers will be able to lend further insight into the visual processing of information and thereby meet the challenge of educating academically ill-prepared college students.

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