

Artifical lens (mapina)
He never took a lens

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Myopia at West Point: Past and Present

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In a paper presented in 1813 to the Royal Society of London, the Honorable James Ware¹ described his observations about myopia. Most notably, he found, "While the officers of the Queen's Guard frequently were nearsighted, among the 10,000 footguards in their command, not even a half-dozen were known to be nearsighted." In today's volunteer Army, one out of every three enlisted men and women and two out of every three West Point graduates wear spectacles or contact lenses for the correction of myopia.

The subject of vision standards for entrance to the US Military Academy (USMA) has been and remains a controversial subject. Since 1912, these standards have been changed or amended six times, to reflect the problem of visual acuity degradation among the cadets. Since 1960, when the vision standards were last changed, new candidates have received admission to USMA within the refractive limitations of ± 5.50 diopters and with waivers permitted up to -6.50 diopters (e.g., 20/800 Snellen visual acuity). Statistical records² show that, since 1964, over 50 per cent of each entering class are admitted to USMA wearing spectacles, and that approximately 65 per cent of each graduating class depart USMA wearing spectacle or contact lenses for the correction of myopia.

The Class of 1974 has proven to be no exception; 554 cadets (67 per cent) of a class of █ graduated wearing spectacles or contact lenses. By comparing the refractive error (spherical equivalent) of each cadet as it was recorded in his 201 File, both for his entrance physical examination (1970) and his commissioning examination (1974), visual acuity degradation can be demonstrated empirically. At the completion of four years in an academic environment, there were fewer hyperopic and many more myopic cadets in the Class of 1974 (Table I).

Historical

In an appendix to James Ware's paper, Sir Charles Blagden³ gave the following comments in 1813:

Mr. Ware attributes the nearsightedness among the officers in the Queen's Guard to the perusal of books and other forms of study, since all of them were educated and were able to read while none of the men in the company were educated to the extent of being able to read. . . Mr. Ware states in his Paper that nearsightedness comes on most frequently at an early age; that it is

more common in the higher than in the lower ranks of life; and that, particularly at the Universities and various Colleges, a large portion of the students made use of concave glasses. All this is exactly true, and to be accounted for by one single circumstance; namely, the habit of looking at near objects.

Among the earliest investigations into myopia in America was a study conducted a century ago by an ophthalmologist, Haskit Derby⁴, "Influence on the Refractions of Four Years of College Life—1873-1879." His study related the high proportion of myopic patients among the students and faculty at Harvard.

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Looking back into the history of USMA, the earliest study on the subject of vision was conducted in 1879 to determine the "effects of gas light on visual acuity." It was concluded that the fumes emitted from the burning gas could be a cause of conjunctivitis but was not the cause of refractive changes. Better ventilation in the cadet library was recommended. Additional studies were initiated with each introduction of a "more modern" light source (electric bulb in 1909, indirect lighting in 1918, and fluorescent fixtures in 1945-1946). Each separate study reinforced the same conclusion that lighting *per se* was not a factor responsible for visual acuity degradation.

In 1890, the first spectacles were prescribed for cadets at the US Military Academy by a visiting civilian ophthalmologist. In preceding years, spectacles had to be prescribed by civilian specialists in New York City. By 1900, it was noted that 20 per cent of the cadets and officers required glasses. When a study revealed in 1912 that 20 per cent of the entire Corps of Cadets required spectacles, the Post Surgeon, LTC Frank Keefer, MC, requested the consulting services of MAJ Wadhams, MC, in 1913. The recommendations of USMA's first military ophthalmologist were: "(1) that present lighting sources were fine; (2) five per cent of the cadets had progressive myopia due to close work; and (3) in the future, only cadets with normal vision be accepted to USMA." In 1916, his suggestion of changing the entrance visual requirements from 20/30 to 20/20 became law. However, it was not until 1935, that these requirements were implemented, at the request of the Superintendent MG William D. Connor, to fill his personal preference for a non-be-spectacled Corps of Cadets.

The earliest statistical review on the visual problems of the cadets was the study by MAJ Bowen, MC. The infor-

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TABLE I

USMA REFRACTION CHANGES IN FOUR YEARS

Diopters	+3.00	+2.00	+1.00	Plano	-1.00	-2.00	-3.00	-4.00	-5.00	-6.00	-7.00	-8.00	-9.00
1970	1		42	423	142	106	48	43	16	3	4		
1974		1	30	354	148	121	83	51	23	12	3	1	1

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mation he obtained from the 201 Files of the USMA graduates, Classes 1922-1926, was used to confirm the continuation of the vision standard requirement of unaided 20/20 for entrance, with waivers to 20/40. An investigation in 1940 by the USMA Surgeon, LTC Carbonell, MC, revealed that, even with the adherence to the 20/20 visual acuity entrance requirement set forth in 1935, 10 per cent of the cadets were myopic at the end of their first semester; 18 per cent were myopic at the end of the first year; 25 per cent at the end of their third year, and 29 per cent at the time of their graduation.

In 1941, the vision standards for entrance were changed from 20/20 to refractive limitations of +2.00 diopters and -0.75 diopters (with waivers permitted to -1.25 diopters). In this same year, the study of the USMA Surgeon, COL Royal Reynolds, MC, indicated that the chief causes of visual acuity degradation were myopia, myopic astigmatism, and compound myopic astigmatism. He concluded that 70 per cent of the cadets showed a progression in myopia. Under his supervision, MAJ Reid, MC, an ophthalmologist, and SGT Leibesman, USMA's first optometrist, recorded visual acuity statistics (1942-1946). From these data, they concluded that "the amount of close work, 'bracing', tension, **little time for relaxation**,^x and state of health are factors having direct influence on vision." In July 1946, the War Department "approved the establishment of a research project on the visual acuity of the cadets (2c priority)"; however, in a directive from SGO, 26 September 1946, "A thorough review has been made on the subject covered by the research program previously carried out by MAJ F. R. Reid, MC, at West Point. A decision has been made to discontinue the project, as more accurate information can be obtained from other sources."

The subject of progressive myopia among the cadets remained dormant and no further investigations were made at USMA for ten years. Renewed interest in the subject of myopia was generated by the study of MAJ McKinney, MC, on the Cadet Class of 1956. In his unpublished report, "A Study of Refractive Trends at West Point", MAJ McKinney concluded: "(1) pseudo-myopia during periods of stress associated with studying may result in blurred vision in cadets with little hyperopic reserve; (2) the average increase in myopia was -1.37 diopters (the range being -1.12 diopters through -1.62 diopters); (3) 39 per cent of the graduating cadets of 1956 had less than 20/20 vision at graduation; and (4) recommendation that the vision standards remain unchanged—that hyperopia over +2.00 diopters and myopia over -1.50 diopters should be cause for entrance disqualification.

In 1960, the entrance vision standards were again changed to refractive limitations of ± 5.50 diopters. With these new and relaxed vision standards was ushered in the

era of increasing contact lens use by the cadets. Although official policy neither encourages nor discourages the use of contact lenses, cadets are expected to refrain from wearing spectacles during parades, and selected cadets are fitted with contact lenses at government expense for participation in Corps Squad (Varsity) contact sports.

In 1966, a study in the prevention of myopia was initiated by CPT Montgomery, MC, to investigate the possible usefulness of a short acting muscle-relaxing eye-drop, tropicamide (Mydracyl 1.0 per cent); however, technical difficulties with the drug precluded completion of the study. In 1969, under the direction of MAJ Manson, MC, in conjunction with a concurrent optometric study by MAJ Ditmars, MSC, (the determination of the preventative effects of reading glasses and/or bifocals on myopia) the Mydracyl study was resumed. All the myopic cadets (Class 1972) were randomly assigned to three distinct groups: (1) those who would each night insert into each eye one drop of Mydracyl at bed time; (2) those who would be prescribed reading glasses or bifocals for prolonged study periods; and (3) those which would comprise the Control Group. Once again, however, technical difficulties with the drug curtailed the entire study.

Presently, there is no myopia study being conducted at West Point. This may be due in part to short tours of duty at USMA, (24 months), shortages among Medical Department optometric and ophthalmologic personnel, and greatly increased demands for vision care by dependents and retired personnel in the Greater New York City area. Still, the facilities at USMA remain the ideal for an in-depth study of myopia progression, control and/or prevention through the controlled environment and regimentation of cadet life.

Summary

After a century of investigation, it has been established that the cadets of the United States Military Academy become progressively myopic (or less hyperopic) during their four years of education. Still to be accomplished, however, is an in-depth study of myopia progression and prevention among these USMA Cadets.

References

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^x Definition of spasm of accommodation (Paradee, p. 88)

Early to rise and early to bed makes a man healthy and wealthy and dead.

James Thurber