Podiatry Screening Project for Children in the District of Columbia

JEROME SHAPIRO, D.P.M., and CHU S. RHEE, M.A.

MANY OF THE FOOT disorders in adults begin in childhood. Therefore identification and prompt treatment in that period will prevent, or at least minimize, many foot ailments in the adult. Former Surgeon General William H. Stewart, in a 1966 address before the American Podiatry Association, discussed the importance of preventive measures. "I hope," he said, "you are exploring preventive aspects of ailments afflicting the feet. It seems to me, that as with many other health conditions, prevention should be your ultimate goal" (*1*).

To date, however, there have been few mass screenings of children's feet. The small number on record (*2–5*) differ widely in both their criteria and evaluative approach so that comparisons are difficult. Nevertheless, a substantial reservoir of potentially painful and disabling conditions evidently exists among young children. In a letter to J. S. dated May 9, 1969, John T. Sharp, D.P.M., professor in podiatry, Pennsylvania College of Podiatric Medicine, Philadelphia, related the results of 13 screenings of children's feet conducted in the United States, Great Britain, and Canada, and concluded that nearly one-third of the children screened were in need of care.

Pilot Screening

To evaluate the need for screening young children for foot disorders, in 1967 the District of Columbia Department of Public Health (now the District of Columbia Health Services Administration) initiated a pilot screening among inner city school children aged 5–12 years. The department solicited the cooperation of the District of Columbia Board of Education, which offered two schools for the study. The student bodies of these schools, which were located at opposite sides of the city, were of similar socioeconomic composition. Although the choice of schools was arbitrary, their principals indicated a special interest in the project.

Health department podiatrists were assisted by podiatrists of the Washington metropolitan area (from the Northern Virginia Podiatry Society, the Maryland Podiatry Association, and the District of Columbia Podiatry Society) who served without compensation as examiners for 1 or more days.

The purposes of the screening were the following:

1. Determine the level of foot hygiene among the children
2. Assess the adequacy of footgear (according to fit and type)
3. Identify special kinds of foot disorders
4. Refer children with treatable conditions to the podiatry clinics of the health department
5. Determine the adequacy of the screening procedures.

To prepare the students for the screening, a podiatrist visited each school 1 week before the screening. He showed, and then discussed, a filmstrip entitled "Little Johnny Sore Foot" (*6*). He also explained the importance of healthy feet and the need for proper hygiene

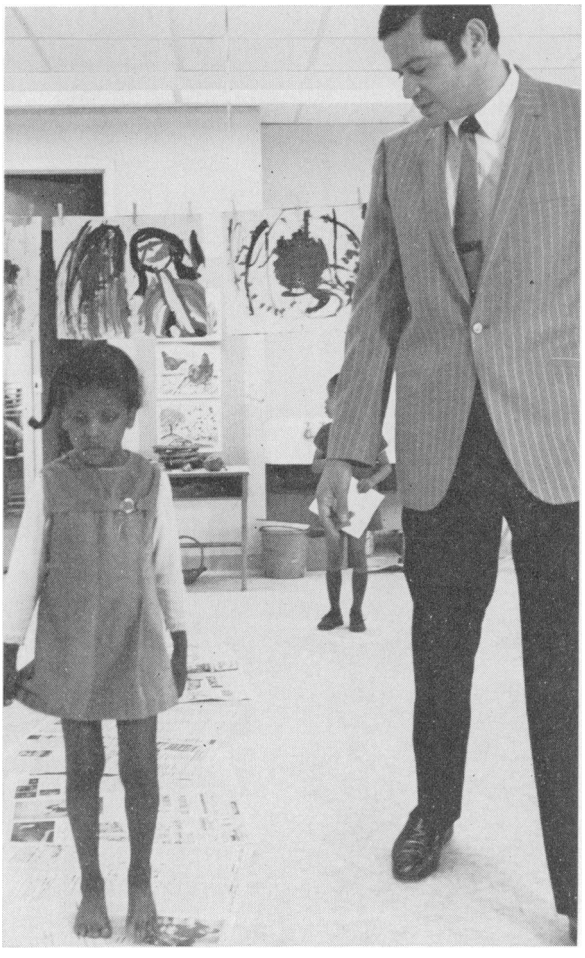
Dr. Shapiro is the supervisory podiatrist and Mr. Rhee is a statistician of the District of Columbia Health Services Administration. Mrs. Maud Hamilton, another statistician in the administration, assisted Mr. Rhee with the tabulations for the study.

and foot care. At the conclusion of his presentation, the podiatrist distributed a printed form for each child to take home. This form, to be signed by a parent or guardian and returned by the child at the time of his screening, explained the program, solicited parental consent (all parents gave it), and requested pertinent comments or questions.

On the day of the screening, the school auditorium was divided into six stations, each staffed by a podiatrist, a recorder, and two students (assigned to help the younger children take off and put on their shoes). Each station was prepared to handle 80 to 100 children on each of 2 days. The children entered the auditorium by classes and then formed small groups opposite each examining station, at the far ends of the room. As a child was summoned, he walked about 30 feet to the station, thereby permitting the podiatrist to observe his gait.

After collecting the child's permission slip, the podiatrist noted parental questions and comments, and during the examination he dictated an appropriate response to the recorder. He in-

Podiatrist checking a child's foot for skin and nail abnormalities



Podiatrist observing child's gait

spected the child's footgear and then asked the child to sit down and remove his shoes and socks. While the child was seated, the podiatrist checked toenails and skin. Then, after asking the child to stand, he noted any postural abnormalities in the feet.

As the examiner reported his observations, the recorder completed the examination record. At the end of the screening, the recorder gave each child a printed form to take home. This form notified the parents whether or not further treatment was necessary and listed the addresses and telephone numbers of the two podiatry clinics of the District of Columbia Department of Public Health. Those children requiring further examination or treatment were encouraged to visit a clinic, their family physician, or a podiatrist.

Results. The results of the pilot screening were significant. Among the 1,062 children examined, there were 284 postural and orthopedic abnormalities of the foot, 59 abnormalities of the nails (ingrown or inverted nails, fungal or other infections, and so forth), 197 disorders of the skin (corns, calluses, warts, athlete's foot, and other dermatoses), and 65 deviations in gait (marked in-toe or out-toe). Of these 1,062 children, 217, or approximately 20 percent, required further examination, further treatment, or both.

Not all abnormal conditions require treatment. Among postural abnormalities, for example, a recognizable degree of flat feet may not require treatment. Referral for treatment was suggested only in cases of flat feet accompanied by pain or fatigue in the foot or leg, by abnormal wear on one part of the shoes, by an awkward gait, by calluses or corns, or by a short heel cord.

Unless detected and treated, flat feet may develop unnoticed until the adult bone and ligamentous structure is established and treatment is no longer effective. Thus, an adult afflicted with this condition might have distorted feet, an altered general body posture, be unable to wear standard shoes or to walk distances, and suffer from periodic pain. Seventy-eight of the children screened required treatment for pathological flat feet.

In addition to pathological conditions, the examiners found 320 children who were wearing inadequate footgear. Most shoes in this category were too short. Also, 322 children evidenced extremely poor foot hygiene (dry skin, dirt, debris under the nail, maceration between the toes, and excessive scaling). These observations point up the need for teaching parents, teachers, and the children themselves about foot care.

According to the podiatrists who participated in the pilot study, the foot bones of many children with orthopedic disorders had already developed beyond the point of maximum response to treatment. For this reason, the podiatrists recommended that screening be extended to the preschool population.

General Screening

During 1967, the District of Columbia Department of Public Health renewed its cooperative ties with the board of education and made plans to extend foot-health screening in 1968

to the pupils of nine elementary schools. The screening was extended in 1969 to 41 additional schools but was limited to kindergarten pupils and preschool children. Once again podiatrists from the health department were assisted by podiatrists of the Washington metropolitan area who volunteered their services.

Soon after the screening dates were set, a health department official met with each school principal to discuss arrangements for space, personnel, and supplies. The principals solicited parents, teacher-aides, and other school employees to act as recorders and assistants for routing and escorting the children to the examining room and conducting them through the screening.

In the first nine schools, the routine closely followed the logistics of the pilot program. Entire classes came to a single large room where there were multiple screening stations. The inevitable delays in the examination process, however, often inconvenienced students and teachers, who stood idly by awaiting their turns. Also, the school auditorium, library, or whatever room was being used was not available for school purposes while the screening was in progress. To minimize these disruptions, the podiatrists agreed to visit individual classrooms and perform the examinations there. Under this simplified arrangement, which was used during the 1969 screening, the podiatrist and the school nurse were able to conduct the examinations themselves without recruiting additional personnel.

Table 2. Normal and abnormal conditions found, by sex of child

Conditions	Boys	Girls	Both sexes
Gait:			
Normal	3,780	3,859	7,639
Abnormal	684	672	1,356
Shoes:			
Normal	3,503	3,236	6,739
Abnormal	961	1,295	2,256
Skin:			
Normal	3,687	3,907	7,594
Abnormal	777	624	1,401
Nails:			
Normal	4,285	4,345	8,630
Abnormal	179	186	365
Postural and orthopedic disorders:			
Normal	2,776	2,856	5,632
Abnormal	1,688	1,675	3,363

During the years 1967–69, a total of 8,995 children were screened under the program, 5,181 of whom were under the age of 6 years. Of the total children whose race was known, about 99 percent were nonwhite. The ratio of males to females was almost one to one (table 1).

Results. As shown in table 2, abnormal foot posture, orthopedic disorders of the feet, or both, were found in 3,363 children (37 percent of the total number screened). Unsatisfactory shoes were second in the order of frequency. About 16 percent of the children (1,401) had one or more types of skin abnormalities of the feet. Examiners found gait deviations in 1,356 children (15 percent of the total) and nail abnormalities in 365 (4 percent).

Table 1. Elementary and preschool children in District of Columbia podiatry screening project, 1968–69, by race, sex, and age

Race and sex	Age (years)						
	All ages	Under 5	5–6	7–8	9–10	11 and over	Not stated
All races	8,995	1,033	4,148	1,366	943	1,124	381
Boys	4,464	498	2,056	689	442	574	205
Girls	4,531	535	2,092	677	501	550	176
White race	92	11	29	26	18	6	2
Boys	49	6	19	13	9	0	2
Girls	43	5	10	13	9	6	0
Nonwhite race	7,511	826	3,403	1,207	847	1,010	218
Boys	3,684	404	1,681	601	393	498	107
Girls	3,827	422	1,722	606	454	512	111
Race not stated	1,392	196	716	133	78	108	161
Boys	731	88	356	75	40	76	96
Girls	661	108	360	58	38	32	65

For each of the five variables measured, no significant difference was found in the proportion of abnormal conditions in boys and girls except that a significantly higher proportion of girls were wearing unsatisfactory footgear.

Of the 3,363 children with postural abnormalities such as flat feet, hammertoes, an extremely high arch, and other orthopedic conditions, flat feet were most frequent (2,632 cases). More than half (1,399) of the children with flat feet required no treatment, 654 (25 percent) were referred for treatment, and the remaining 579 were referred or asked to return for further examination (table 3).

There is a close correlation between gait deviations, such as toeing out and awkwardness, with postural abnormalities of the foot. Of the children with postural abnormalities, 998 (30 percent) had a gait deviation, while only 358 (6 percent) of those without postural abnormalities had them. Among children with flat feet, those who required treatment had the highest percentage of gait deviation (table 3).

While approximately one-fifth of the children without orthopedic disorders were wearing unsatisfactory footgear, nearly one-third of the children with orthopedic disorders such as hammertoes, bunions, and metatarsus adductus had unsatisfactory footgear (table 3).

Bearing out the observations of the examining podiatrists, the statistics reveal an inverse relationship between age group and the rate of referral for treatment. The younger the age group, the higher was the referral rate. This

Table 3. Postural and orthopedic disorders in relation to gait and condition of shoes

Disorder	Total children	Gait		Shoes	
		Normal	Abnormal [1]	Satisfactory	Unsatisfactory [1]
Total children	8, 995	7, 639	1, 356	6, 739	2, 256
Normal posture	5, 632	5, 274	358	4, 357	1, 275
Abnormal posture	3, 363	2, 365	998	2, 382	981
Flat foot	2, 632	1, 816	816	1, 883	749
Needs no treatment	1, 399	1, 193	206	1, 034	365
Needs treatment	654	293	361	445	209
Needs further examination	579	330	249	404	175
Other orthopedic disorders	1, 108	808	300	755	353
Hammertoe	218	183	35	141	77
Hallux valgus	178	138	40	113	65
Metatarsus adductus	376	225	151	242	134
Pes cavus	91	68	23	66	25
Other	245	194	51	193	52

[1] Some children had more than 1 postural abnormality of the foot so that the total number of abnormal conditions is slightly more than the total number of children abnormal for foot posture.

Table 4. Final disposition of children screened, by age and podiatrist's recommendations

Age (years)	Total	Recommendation		
		No treatment	Refer for treatment [1]	Refer for further study [1]
All ages	8, 995	7, 160	997	838
Under 5	1, 033	758	148	127
5–6	4, 148	3, 335	446	367
7–8	1, 366	1, 111	135	120
9–10	943	757	87	99
11 and over	1, 124	898	136	90
Not stated	381	301	45	35

[1] 409 of the children referred had visited the podiatry clinics of the health department as of July 15, 1970.

higher rate of referral does not mean, however, that members of the younger group had more foot problems. It means that the examiners had determined that these patients, with their immature foot structure, would respond better to treatment, thus making referral more worthwhile (table 4).

Conclusion

Whether or not the results of our screening program correctly reflect the foot ailments among the nation's children remains to be determined by future studies.

If, however, mass screening does no more than identify young children with pathological flat feet while this condition is still in the formative stages when it can be treated successfully, the casefinding is of great value. In addition to the long-range benefit of preventing adult foot ills, treatment of minor foot abnormalities early in life means more comfort for these youngsters during the active years of childhood. Also, as an additional benefit, mass screenings draw the attention of the community, parents, teachers, and the children themselves to the importance of foot health. Screening young children for foot disorders is thus good preventive podiatry.

Summary

In 1967, the District of Columbia Department of Public Health (now the District of Columbia Health Services Administration), in cooperation with the District of Columbia Board of Education and podiatrists from the metropolitan area, instituted a pilot foot screening project at two elementary schools, which reached 1,062 children. This screening revealed a great enough proportion of children with previously undetected foot disorders (20 percent) to warrant continuation and expansion of the program. The screening was therefore extended in 1968 to the entire school population of nine elementary schools. Since many foot conditions, when discovered in older children, are not readily amenable to treatment, the screening during 1969 was limited to the preschool and kindergarten children of 41 elementary schools. Although the criteria for evaluation remained the same during the pilot and the general screening, a simplified and improved method of screening was used in 1969.

During the years 1968–69, a total of 8,995 children were screened. More than half were under age 6, almost all were nonwhite, and the sexes were nearly equal in number. Postural and orthopedic disorders were the abnormalities most frequently encountered; almost 37 percent of the children had such a disorder, which most frequently was flat feet. Sixteen percent of the children had some skin abnormality (corns, calluses, warts, athlete's foot, and so forth). Gait deviations were noted in 15 percent, nail abnormalities in 4 percent.

Of the 8,995 pupils screened, 997 were referred for treatment and 838 for further study. Four hundred and nine of the children referred for treatment or study had come to the podiatry clinics of the health department for examination by July 15, 1970. Because of the results of the screening and the response to referral recommendations, the screening program will continue.

REFERENCES

(1) Stewart, W. H.: Address before the Region III annual meeting of the American Podiatry Association, Atlantic City, N.J., April 30, 1966.

(2) Shands, A. R., Jr.: Disorders of the foot in childhood. Virginia Med Monthly 91: 138, April 1964.

(3) Greenberg, F., et al.: A report of foot examinations of school children. J Amer Podiat Assoc 53: 508–509, October 1959.

(4) Bier, E. H.: One thousand and ninety-seven children given foot examination. J Amer College Foot Orthoped 8: 25–36, January 1964.

(5) Charlesworth, F.: A survey of school children's feet. Chiropodist 7: 261, September 1952.

(6) Little Johnny Sore Foot. Film strip, 35 mm., 10 min., 1960. Available on loan, free, from Audiovisual Section, American Podiatry Association, 20 Chevy Chase Circle, NW., Washington, D.C. 20015.

Tearsheet Requests

Dr. Jerome Shapiro, 5406 Connecticut Avenue, NW., Washington, D.C. 20015