Issues of Elderly Pedestrians

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As people age, walking becomes critically important in maintaining mobility. A standardized questionnaire was used to assess the perceptions of 76 elderly citizens ages 56 and over in Orlando, Florida, regarding adequacy of pedestrian crosswalk displays in terms of time and display visibility, the walking routine of the sample members, and their understanding of the cues provided by the display. The majority of those surveyed indicated that the current configuration of the pedestrian crossing signal provides sufficient time to cross the street. However, many expressed concerns for safety and feelings of anxiety and reported an increase in walking pace when crossing the street. Those surveyed lacked information concerning the significance of the signal phases, the meanings of the cue indicators, and knowledge of proper crossing behavior. A quarter of those surveyed did not understand the meanings of the international icons. More than half avoid crossing the street during peak traffic hours and during low visibility, such as at dusk and at night. About a fourth of those sampled had difficulty seeing the crosswalk display. It is recommended that to improve the safety of the walking pedestrian, information concerning the meanings of display cues be provided.

The U.S. Senate Committee on the Aging projects that 15 percent of the United States population will be 65 or older by 2020 (*1*). In Florida, the elderly make up 21 percent of the population. It is projected that this percentage will increase to 25 percent by 2015. Living and working environments must be designed to meet the needs of the aging population. As people age, walking becomes critically important in maintaining their mobility. Walking is the second most relied upon mode of transportation for the elderly (vehicles being the primary mode). Furthermore, the elderly depend more heavily on walking as a means of mobility as their age increases. Thus, to enhance mobility, it is necessary to consider the physical and sensory limitations of the elderly when designing pedestrian crossings.

Densely populated metropolitan areas with high volumes of pedestrian and automobile traffic present a challenging problem for traffic engineers. Pedestrian crosswalks must be designed to allow pedestrians safe passage at regular intervals while maintaining traffic flow. Current standards in the *Manual on Uniform Traffic Control Devices* (MUTCD) (*2*) recommend that crossing signals be installed at intersections with large volumes of pedestrians, school crossing intersections, intersections where pedestrians cross more than one street such as a wide median divided road, and where vehicular indications are not visible to pedestrians.

Currently, several forms of pedestrian displays are in use. The display format is either text or iconic representation. Text has an advantage in that it can convey precisely the message that is intended. However, text can be problematic when individuals' reading skills, language barriers, or visual decrements are involved. Kline et al. (*3*) found that the visibility distance for viewing traffic signs using icons was nearly twice that of signs using text. The icons were particularly beneficial for viewing signs under reduced visibility conditions (e.g., dusk) and for elderly subjects. However, icons require an additional cognitive process and processing time to interpret the meaning of the symbols. These findings are particularly interesting because the MUTCD (*2*) specifies that either icon or text is acceptable to convey the Walk/Don't Walk message, but contrary to the Kline et al. results, the MUTCD (*2*) requires the icon form of the message to be twice as large as the text form.

Universal icons have been adopted to provide cues to the pedestrian (*2*). To designate Walk, the iconic representation is a "walking man." Three different icons are used to represent Don't Walk: a slash through the figure of a walking person, a raised hand; and an upright man in a standing position. Dewar (*4*) noted that prohibitive signs (a slash through an icon) require longer processing times, possibly because the slash partially obscures legibility of the symbol. Robertson (*5*) investigated which icon was most effective at conveying Don't Walk. The use of a prohibitive slash does not meet effective design principles because it obscures the icon when viewed at a distance. However, the prohibitive form of the icon (i.e., a slash through the figure of a person walking) was chosen over the other two icons by 70 percent of the subjects.

The crosswalk display has three distinct temporal phases. The first phase consists of a period during which the word Walk or the walking man icon is illuminated. The second phase consists of a period during which the words Don't Walk or an upraised hand flashes on and off. The final phase consists of a steady illumination of the Don't Walk or upright hand. The duration of the complete crossing display cycle is dependent on the width of the street and the flow of traffic. The MUTCD standard (*2*) is based on the premise that the flashing Don't Walk phase provides enough time for the average pedestrian to travel from the curb to the center of the farthest lane. The standard for the average walking speed is 4 ft/sec (*2*). Intersections that are frequently used by the handicapped elderly may be set at slower speeds to accommodate their special needs.

Proper street-crossing behavior consists of the following actions: During the onset of a steady Walk signal, the pedestrian is to scan the street for oncoming traffic and proceed to cross the street perpendicular to the face of the Walk signal. It is important to scan for traffic making right turns on red and left turns on green even though the pedestrian has the legal right-of-way. When the flashing Don't Walk signal begins and a pedestrian is in the street, the correct behavior is

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to continue crossing the street. If the pedestrian has not begun to traverse the street, the correct behavior is to push any button to "call" the pedestrian signal and wait until the next Walk cycle. The flashing Don't Walk signal indicates proceed with caution. The steady Don't Walk signal is the equivalent of a red signal indicating danger, and it is not safe to enter the street. If the pedestrian is still in the street, the pedestrian should reach the curb as quickly as possible because approaching motorists will not expect a pedestrian to be in the road.

Color provides a secondary cue to the street-crossing pedestrian. The MUTCD standard (*2*) recommends Portland orange to signify Don't Walk and lunar white to indicate Walk. White may produce the best contrast for viewing but has been shown to be associated with the slowest reaction times (*6*).

FACTORS AFFECTING THE PEDESTRIAN WALKING TASK

Environmental Factors

A variety of environmental factors affect the ability of pedestrians to complete the task of crossing the street safely. Environmental conditions, such as rain, fog, snow, dusk, nighttime, and glare, can limit or restrict the visibility of the crossing display. Similarly, both environmental and man-made sources of illumination may present problems of glare and dark adaptation. Without glare protection devices such as hoods or baffles, it is difficult to distinguish which signal is lit under conditions of direct sunlight. Sources of glare include sunlight, headlights, neon, and street lighting. The elderly may have difficulty seeing unprotected displays because of their decrease in contrast sensitivity and lower tolerance of glare.

Another factor affecting the pedestrian crossing task is the complexity of traffic patterns. Busy intersections, multiple lanes, and vehicles turning right on red or left on green make it difficult for pedestrians and motorists to simultaneously attend to all the possible combinations of traffic patterns. This results in many pedestrians in Florida being struck by vehicles while crossing multilane intersections that allow right turns on red or left turns on green, or both (*7*). Moreover, 70 percent of the elderly pedestrian fatalities occur while crossing with the Walk signal illuminated (*7*).

Street conditions such as curb design and pavement maintenance may also affect the safety of pedestrian crossings. Extremely high curbs and curbs without handicap ramps pose a serious problem for the elderly. Cracks and potholes in the crosswalk pavement can also be dangerous for elderly pedestrians, particularly for those using walking aids.

Physiological Factors of Age

Elderly pedestrians are confronted with progressive sensory and physical debilities that may impede their ability to manage the potential hazards at pedestrian crosswalks. Consider, for example, the sensorimotor requirements needed to skillfully traverse the street on which there is a signalized crosswalk. The components of the pedestrian task are to see and press the button on the pole (if any); read and understand the crosswalk instructions (if any exist); see and comprehend the walk display on the other side of the street when it is displayed; listen to scan for traffic; search for and negotiate potholes, curb erosion, gratings, gutters, and other obstructions in the path; and attend to a myriad of other impinging stimuli. Besides the standard "look left, look right, look left" scan pattern, the pedestrian must look over the shoulder to scan for vehicles turning right on red.

Physiological changes that occur with age include impaired vision and audition as well as postural instability and gait disturbances. The following sections provide a brief review of pertinent literature concerning the deterioration of sensory and physical capabilities that affect elderly pedestrians' ability to safely traverse pedestrian crosswalks.

Vision

There is an accelerated decrement in peripheral vision after the age of 50 (*8*). The loss of peripheral vision increases the elderly pedestrian's chances of not seeing approaching and turning cars from the side. Modern crosswalks typically do not provide a time period in which pedestrians can cross without the threat of simultaneous vehicular turning.

A decline in static acuity, the ability to resolve fine spatial detail in the absence of motion, can affect the elderly pedestrian's ability to read the crossing signal message accurately as well as the crossing instructions on the pole. Decrements in dynamic acuity, the ability to resolve fine spatial detail for objects in motion relative to the observer, can affect the processing of details while the individual is in motion. Sharpe and Sylvester (*9*) demonstrated that older subjects were not able to track accurately objects that moved smoothly across the visual field at a rate of 10 degrees/sec or greater. Rabbit (*10*) found that older subjects were poorer at searching complex patterns. Reduced scanning ability may present problems for elderly pedestrians when scanning the road for traffic and various obstructions while tracking their own movements across the street.

The street-crossing task requires a number of changes in accommodation (e.g., a shift in focus from the curb to the crossing signal). Accommodation is the ability of the eye to focus an image on the retina. The process of accommodation provides depth cues that decline significantly with age (*11*). The decline in depth perception may affect the elderly pedestrian's ability to judge oncoming traffic, the height of curbs, or obstructions in the road. The loss of accommodation can result in blurred vision and disorientation, which may increase the likelihood of falling.

Wolf (*12*) found that the elderly are more sensitive to glare and require higher illumination to identify targets even in the absence of glare. The headlights of oncoming traffic present a major problem because they require more time to recover from the effects of glare (*13,14*). Dark adaptation affects the pedestrian crossing task during dusk and nighttime illumination and presents a potential problem when traversing from a well-lit area to conditions of lower illumination.

Audition

Elderly individuals experience progressive hearing loss with age (*15*), and a decrement in hearing presents obvious problems for the pedestrian. Sounds created by automobiles, trucks, and motorcycles provide aural information regarding oncoming traffic. The elderly pedestrian afflicted with hearing loss may have to rely on visual cues to detect approaching vehicles. Because the noise source is projected from behind the head, pedestrians have greater difficulty perceiving oncoming traffic when their backs are turned away from the traffic.

Cognition

The most prevalent observed change due to age is the slowing of behavior, including simple sensory and motor processes, reaction time, and complex cognitive processes (*16*). The changes in intellectual ability, reasoning, word fluency, verbal comprehension, and educational aptitude are usually minimal up to age 60 (unless there is a specific physiological cause). Slowed cognitive responses, plus not unreasonable increased concern for safety, affect the elderly pedestrian's ability to effectively respond to oncoming cars or unexpected events in the environment. In the absence of walking ramps, the elderly may hesitate to step off the curb. Given circumstances requiring decision making under stress, slowed reaction time and cautiousness may render even a correct action ineffective.

Gait

Drills (*17*) and Molen (*18*) reported a decline in walking velocity, step length, and step rate as age increases. Elderly females were found to walk at a slower pace with a higher cadence and shorter step length than elderly males. It is difficult to determine, however, whether the shortened stride and slower velocity is due to physiological changes alone or to past experiences and fears of falling (*19*). Nonetheless, a shortened stride length may affect their ability to clear street gutters or obstructions. If road surfaces are uneven or their visibility is impaired, the elderly are more cautious in their walking habits (*19*).

The elderly tend to experience a decrease in postural stability because of the systematic degeneration of vestibular, somatosensory, and neural pathways for motor control (*20*). As many as one-half of all persons 65 or older experience a fall each year. Uneven street surfaces may contribute to postural instability, which may increase the probability of falling.

Finally, and perhaps most important, because elderly persons walk more slowly than the general population, they may not have sufficient time to cross the street. A study conducted by Lundgren-Linquist et al. (*21*) compared the walking velocity of 79-year-old pedestrians with the walking standard for crosswalks in Sweden (1.4 m/sec). The subject pool included 112 women and 93 men; walking aids were used by 27 and 25 percent, respectively. The results indicated that none of the subjects could cross the street at the specified rate when using their preferred rate of walking. When instructed to walk at their maximum speed, only 32 percent of the women and 72 percent of males could achieve the 1.4 m/sec standard. The authors concluded that the timing of lights at intersections in Sweden did not meet the functional capacity of older citizens, and therefore the Swedish standard for crosswalk design may be less than optimal.

Crosswalk design parameters that accommodate the sensory and mobility capabilities of the elderly will result in increased performance, reliability, and safety for all. Reduced mobility and the use of walking aids such as a cane or walker may further slow the rate of movement in elderly persons. Impaired balance might also reduce their ability to maneuver over curbs, which might also then increase the time needed to cross the street.

The current study was designed to assess elderly pedestrians' perceptions regarding the following issues: the adequacy of pedestrian crosswalks, knowledge of the display cues, and correct pedestrian crosswalk behavior.

METHOD

A standardized questionnaire was developed to assess the crossing behavior of the elderly and affective components related to the adequacy of pedestrian crosswalk displays. The questionnaire consisted of 25 questions that addressed walking routine; compliance and avoidance behaviors; and perceptions concerning the adequacy of automated street crossings in terms of time, display visibility, and knowledge of display cues. The following demographic data were collected: gender, age, the use of walking aids and corrective lenses, and physical and visual impairments.

Seventy-six senior citizens from various churches and retirement homes in the downtown area of Orlando, Florida, volunteered to participate in the survey. The sample consisted of 19 males and 57 females aged 56 years or older (total n = 76). Sixty-eight percent of those surveyed were older than 75, 9 percent were between 56 and 65, and 20 percent were between 66 and 75. Two of the subjects did not provide their age. Corrective lenses were worn by 86 percent of the sample, and 28 percent reported having cataracts. One-third of those surveyed reported physical impairments that affect their walking ability, and a similar one-third reported using a walking aid, the most common being a cane. However, most indicated that they were physically capable of crossing the street, with only 19 percent indicating that they required assistance when crossing the street. Four respondents (5 percent) reported that they had been hit by a vehicle, and 14 (18 percent) had seen someone hit by a car.

RESULTS

The results were divided into seven categories: intersection behavior, adequacy of the automated street crossing displays, display visibility, affective perception, avoidance behavior, knowledge of display icons, and the comprehensibility of written instructions.

Intersection Behavior

Six questions addressed pedestrian intersection-crossing behavior. These items were basically concerned with which fac-

tors elderly pedestrians take into account when crossing the street and whether their crossing behavior conforms to safety regulations and guidelines. Crossing the street at nondesignated areas does not appear to be a problem. A majority (86 percent) indicated that they frequently or always cross only at designated crosswalks; 57 percent indicated that they frequently or always press the button on the crosswalk pole to change the crossing signal.

When asked which cues they use to cross the street, 91 percent responded that they frequently or always use the steady Walk symbol, 72 percent use the red traffic light, and 69 percent use the flow of traffic to indicate that it is safe to cross the street. In addition, 97 percent of the respondents indicated that they frequently or always wait for the traffic light to turn red before crossing the street.

Adequacy of Automated Street Crossing

The survey data indicated that 55 percent of the elderly frequently or always hurry across the street. The majority (87 percent) reported that they increase their pace even more when the flashing Don't Walk signal is displayed.

Affective Behavior

Although they increase their pace when crossing the street, a majority (77 percent) indicated that they have enough time to cross the street and that the time allotted was adequate for safe crossing. However, crossing a busy intersection produces anxiety for 62 percent of those surveyed, and 45 percent reported that they frequently or always worry about getting across the street before the signal changes.

The fear of crossing appears to be widespread among the elderly. Of particular concern is the law that permits vehicles to turn right on a red light after stopping. Nearly three-quarters of respondents reported anxiety about cars turning right on red while they were attempting to cross. This worry is well founded in that accident data show that most pedestrian accidents in Florida occur at an intersection while vehicles are making right turns on red (*7*).

Display Visibility

As discussed earlier, visual performance declines with age. Most design guidelines take this into account by requiring optimal illumination levels, contrast ratios, and oversized lettering. The design specifications used on crosswalk displays appear to be sufficient for most users. However, almost 25 percent of our sample reported difficulty seeing the crosswalk signal from the opposite side of the street.

Avoidance Behavior

The respondents were asked about their walking behavior during peak traffic hours, at night, and at dusk. More than half of the elderly (57 percent) reported that they avoid crossing the street at peak traffic hours. In addition, 51 percent avoid crossing the street at dusk, and 58 percent avoid crossing the street at night.

Knowledge of Display

Only 31 percent of the respondents knew that a flashing Don't Walk signal meant proceed with caution. The majority (64 percent) thought the flashing signal meant danger. There appears to be some confusion concerning proper crossing behavior. About one-third of the respondents indicated that they would return to the sidewalk when the signal begins to flash. Although a flashing Walk is not used in the geographic area in which the data were collected, a majority of the sample (75 percent) thought this display meant caution. A flashing Walk cue used to warn the pedestrian to be aware of turning vehicles but is no longer in the MUTCD (*2*) precisely because so few pedestrians, of all ages, understood the intended meaning.

The respondents were asked to identify the meaning of three icons that represent Don't Walk: the upright hand, walking man with a slash, and upright man. Seventeen percent did not know the meaning of the prohibitive icon (walking man with slash). Although the upright hand is currently used in the Orlando area, 36 percent could not correctly identify its meaning. A majority of the respondents (69 percent) thought the upright man indicated that it was safe to walk, and 15 percent thought it meant caution. The respondents were asked their signal cue preference (text or icon). The majority (65 percent) preferred text.

Comprehensibility of Instructions

The respondents were asked about the comprehensibility of crosswalk instructions. A majority (62) indicated that the instructions were easy to understand. However, 28 percent indicated they have never read the instructions, and 10 percent indicated that the instructions did not make sense.

DISCUSSION OF RESULTS

On the basis of the survey results, pedestrian crossing signals are perceived to provide sufficient time for the elderly to cross. However, the elderly expressed concerns for safety and feelings of anxiety and tend to increase their walking pace while crossing the street. Their concern for safety and the increase in stride and walking pace may result in a higher probability of falling.

The concern for safety may be related to a general lack of understanding concerning the significance of the signal phases, the meanings of the cue indicators, and knowledge of proper crossing behavior. Individuals in the current sample were unfamiliar with the meaning of the various icons used in signal displays and the significance of the flashing cues and operating characteristics of the displays. Many returned to the sidewalk when the signal began to flash instead of continuing across the street. It is important to provide information concerning the operation and function of the crosswalk displays. The misinterpretation of signal cues may be contributing to the

occurrence of traffic accidents involving the elderly and fatalities. Although the meanings of traffic icons are taught in public schools, many of the elderly have not received training in this area. The use of universal icons is relatively new in the United States and may account for the preference for textual displays among the elderly. If the meaning of a pictorial representation is not obvious, it may result in confusion, error, and, in this case, possibly death. The lack of understanding makes it dangerous for the elderly to cross the street. It cannot be assumed that the international icons are understood without additional information.

The elderly avoid crossing the street during peak traffic hours and during low visibility, such as at dusk and at night. This avoidance behavior may be related to the concern for safety and the perceived danger in crossing the street in high traffic volume. The visual decrement that many elderly experience contributes to avoidance behavior under low visibility conditions. About one-fourth of those sampled had difficulty seeing the crosswalk display.

A large percentage of the respondents tend to rely on multiple cues when crossing the street: the red traffic light, the steady Walk signal, and the flow of traffic. Although it is important to attend to the various cues provided, there are some risks involved in attending to the red traffic light or the flow of traffic alone. The vehicles may be legally traveling through an intersection during the first few seconds of the red display and may not have time to stop if a pedestrian has begun to cross the street. Since the elderly pedestrian's reaction time is slower than that of the younger pedestrian, the elderly pedestrian is less able to respond to traffic turning right on red or left on green. Whereas using the flow of traffic as a cue is not an unsafe behavior, it can create unnecessary risks if the pedestrian waits at the curb for an oncoming vehicle to come to a stop, wasting valuable Walk time.

CONCLUSIONS

The following are offered as suggestions to improve the pedestrian crosswalks:

- Post pedestrian signal display explanations at crosswalks and push button operating instructions at pedestrian-activated crosswalks.
- Post potential road hazard signs (i.e., cars turning right on red) on pavement to alert pedestrians.
- Provide general information concerning walking safety. Suggested methods include distributing instruction card or pamphlet to describe safe crosswalk behavior to the general population, not just motorists or the elderly, and providing seminars to target population on how to reduce the risks of walking.
- Control traffic patterns involving a left turn on green by using green arrow for permissible turns where there are significant numbers of elderly, children, handicapped, or other target pedestrian groups. The green arrow cannot be displayed during the pedestrian Walk phase.
- Provide warning cues to motorists at intersections where pedestrian crossings are the unexpected.

Further research is needed to assess the impact of different types of cues for pedestrian crossings. For example, auditory cues as secondary warning indicators of traffic flow and countdown cues to indicate the amount of remaining time to safely cross the street might provide valuable aids to the elderly pedestrian and the physically impaired. The visibility of text and icon displays should be reevaluated under conditions of dusk, night, and glare. Because of the number of fatalities involving vehicles turning right on red, additional research is needed to investigate the feasibility of mitigating this option, especially in areas with a high concentration of pedestrians.

Basic issues concerning elderly pedestrian behavior need to be researched. For example, how often do they walk, when, under what conditions, do they walk alone or with others, and what crossing strategies do they use to traverse intersections? By understanding the perceptions and issues of the elderly pedestrian, safety issues for all pedestrians can be addressed.

REFERENCES

1. *Technology and Aging in America.* OTA-BA-264. Office of Technology Assessment, U.S. Congress, 1985.
2. *Manual on Uniform Traffic Control Devices for Streets and Highways.* FHWA-SA-89-006. FHWA, U.S. Department of Transportation, 1988.
3. T. J. B. Kline, L. M. Ghali, D. W. Kline, and S. Brown. Visibility Distance of Highway Signs among Young, Middle Aged, and Older Observers: Icons Are Better than Text. *Human Factors*, Vol. 32, No. 5, 1990, pp. 609–620.
4. R. E. Dewar. The Slash Obscures the Symbol on Prohibitive Traffic Signs. *Human Factors*, Vol. 18, 1976, pp. 253–258.
5. H. D. Robertson. Pedestrian Preferences for Symbolic Signal Displays. *Traffic Engineering*, Vol. 47, No. 6, 1977, pp. 38–42.
6. R. F. Reynolds, R. M. White, Jr., and R. I. Hilgendorf. Detection and Recognition of Colored Signal Lights. *Human Factors*, Vol. 14, No. 3, 1972, pp. 227–236.
7. D. Burden. *The Older Pedestrian: Special Problems and Needs* (unpublished data). Florida Department of Transportation, Tallahassee, 1991.
8. A. Burg. Lateral Visual Field as Related to Age and Sex. *Journal of Applied Psychology*, Vol. 52, 1968, pp. 10–15.
9. J. A. Sharpe and T. O. Sylvester. Effects of Aging on Horizontal Smooth Pursuit. *Investigative Opthalmology and Visual Science*, Vol. 17, 1978, pp. 465–468.
10. P. M. A. Rabbit. An Age/Decrement in the Ability To Ignore Irrelevant Information. *Journal of Gerontology*, Vol. 20, 1965, pp. 233–238.
11. C. S. Hoffman, A. C. Price, E. S. Garrett, and W. Rothstein. Effect of Age and Brain Damage on Depth Perception. *Perceptual and Motor Skills*, Vol. 9, 1959, pp. 283–286.
12. E. Wolf. Glare and Age. *Archives of Opthalmology*, Vol. 60, 1960, pp. 502–514.
13. N. H. Pulling, E. Wolf, S. P. Sturgis, D. R. Vaillancourt, and J. J. Dollinger. Headlight Glare Resistance and Driver Age. *Human Factors*, Vol. 22, No. 1, 1980, pp. 103–112.
14. A. Burg. Light Sensitivity as Related to Age and Sex. *Perceptual and Motor Skills*, Vol. 24, 1967, pp. 1279–1288.
15. E. B. Goldstein. *Sensation and Perception.* Wadsworth Publishing Co., Belmont, Calif.
16. T. A. Salthouse. Speed of Behavior and Its Implications for Cognition. In *Handbook of the Psychology of Aging* (J. E. Birren and K. W. Schaie, eds.), Van Nostrand Reinhold, New York, 1985, pp. 400–426.
17. R. Drills. The Influence of Aging on the Kinematics of Gait. In *Geriatric Amputee.* Publication 919, National Academy of Sciences, National Research Council, 1961.

18. H. H. Molen. *Problems on the Evaluation of Gait.* Ph.D. dissertation. The Institute of Biomechanics and Experimental Rehabilitation, Free University, Amsterdam, the Netherlands, 1973.
19. R. Craik. Changes in Locomotion in the Aging Adult. In *Development of Posture and Gait Across the Life Span* (M. Woollacott and A. Shumway-Cook, eds.), University of South Carolina Press, Columbia, 1989, pp. 176–201.
20. F. B. Horak, C. L. Shupert, and A. Mirka. Components of Postural Dyscontrol in the Elderly: A Review. *Neurobiology of Aging*, Vol. 10, 1989, pp. 727–738.
21. B. Lundgren-Linquist, A. Aniansson, and A. Rundgren. Functional Studied in 79-Year-Olds. III. Walking Performance and Climbing Ability. *Scandinavian Journal of Rehabilitation Medicine*, Vol. 15, pp. 125–131.

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