Elbow and knee aging simulators on young subjects

C. HUANG. ***The effects of elbow and knee aging simulators on young subjects.*** *Gerontechnology 2014; 13(2):209;* doi:10.4017/gt.2014.13.02.295.00 **Purpose** In order to stimulate ideas for products or services in gerontechnology, ageing simulators are often used to allow industrial design students to experience elderly people's difficulties in their daily life. However, how effectively do these simulators work? Could they truly reflect the elderly people's physical condition? This study aims to evaluate an existing aging simulator on knees and elbows to determine its effects on young subjects. A comparison can be made and published that explores the range of motion on elbows and knees for the elderly. **Method** An existing elbow and knee aging simulator was chosen for assessment (*Figure 1*). Within-subjects experimental design was adopted for the test. Thirty graduate students, 15 males and 15 females, with a mean age of 23.5 years (SD=1.4) were recruited to test the product. First, subjects were asked to walk 50 m on a terrazzo floor at their normal pace without wearing the simulator. Their paces and time elapsed were recorded. Range of motion of their elbows and knees were also measured. After a 5 min break, the test was repeated with the subjects wearing the simulator and the same measurements were taken. A comparison was made to determine the effects of the simulator. **Results & Discussion** Subjects wearing the simulators were observed to walk with shorter paces and at significantly slower speeds than when walking without wearing the simulators (p<0.001). *Table 1* shows the flexion angles of elbows and knees on both sides changed dramatically when the test subjects were wearing the simulators (p<0.001). The flexion angles of the elbows and knees of subjects without simulators are similar to young people but are very different from older adults[1,2] when wearing the simulators. However, in follow-up interviews most subjects responded that they did not expect that it would be so difficult to move their arms and legs. A synthesis of the above results and medical expert's opinions conclude that this elbow and knees aging simulator may not be able to truly reflect the physical conditions of elderly people but may be able to simulate symptoms of some illnesses, e.g., bone fracture, trauma and arthritis. Therefore, we believe the effects of the simulator may not be accurate and may be exaggerated but the simulators provide a means that can be used to arouse people's sympathies related to the physical conditions of elderly people, which is of importance for inspiring product/service ideas in gerontechnology.

*Table 1. Comparison of flexion angle of wearing and not-wearing simulator on elbow and knee; n=30; *=p<0.001*

Joint	Side	Simulator	Mean	SD	t
Elbow	Right	no	140.45	4.33	77.03*
		yes	46.35	6.52	
	Left	no	142.03	4.42	69.41*
		yes	47.42	6.97	
Knee	Right	no	131.37	5.12	40.14*
		yes	41.03	11.61	
	Left	no	131.45	5.10	41.67*
		yes	42.93	10.88	

Figure 1. Elbow and knee aging simulator worn by a subject

References

1. Walker JM, Sue D, Miles-Elkousy N, Ford G, Trevelyan H. Physical Therapy 1984;64(6):919-923
2. Roach KE, Miles TP. Physical Therapy 1991;71(9):656-665

Keywords: communication & governance, aging simulators, knee, elbow, range of motion

Address: National Taipei University of Technology, Taipei, Taiwan
E: chiwu@ntut.edu.tw