Assessment of a motor-powered assistive sofa for the elderly

C. HUANG. ***Assessment of a motor-powered assistive sofa for the elderly.*** *Gerontechnology 2014; 13(2):208;* doi:10.4017/gt.2014.13.02.280.00 **Purpose** Sit-to-stand and stand-to-sit (STS) have been considered to be two of the most challenging movements for the elderly[1]. Many fall accidents happened during STS maneuvers of the elderly[2]. Therefore, it is very important to design a chair with elderly people in mind. Among the wide variety of chairs currently on the market, the sofa chair is the most popular one in our living rooms. However, the low height of its seat may cause difficulty for elderly people. Therefore, a need exists to redesign the sofa chair for elderly people. A motor-powered assistive sofa chair design is therefore proposed (*Figure 1*). The seat lifts up at the push of a button on the back of the sofa chair and lowers down automatically when the user sits on the seat. When the user wants to stand up, he/she can push a button of the right side arm of the sofa and the motorized seat can lift the user up toward a standing position. After a 30 seconds vacancy, the seat will automatically lower itself back to its original position. This study aims to assess the usability of this design. **Method** User testing was conducted to assess the sofa using a prototype of the proposed sofa chair design that had been made for the test. The test was carried out in Da-long Nursing Home at Taipei. Twenty healthy older adults, 8 males and 12 females, between the ages of 65 and 94 (mean 80.5; Barthel Index over 90,) were recruited. The sofa chair was assessed in two modes: assistive-off mode and assistive-on. First, subjects were asked to sit down and stand up three times on the sofa chair with the assistive mode off with a one-minute break in-between attempts. After five minutes of rest, the test was repeated with the assistive mode on. Videos of the right-side view were taken during the test. A semi-structured followed-up interview was conducted to understand the subjective satisfaction of subjects. The video was reviewed to measure the maximum leaning trunk angles[3] by AutoCAD. Microsoft Excel was used to analyze the data. **Results & Discussion** *Table 1* shows that average leaning angles are significantly smaller for both sit-down and stand-up positions when the assistive mode of the sofa is 'on' ($p<0.05$). This means that the subjects may exert less effort with use of the assistive sofa, especially in the stand-up position. This also conforms to the subjective satisfaction rates in the follow-up interviews, which are 70% and 90% for sit-down and stand-up, respectively. We conclude that the proposed assistive sofa design is helpful for elderly people.

Table 1. Leaning trunk angles (degrees) for sit down and stand-up with and without assistance; n=60;=t-test; confidence limit 0.05*

Action	Assistive mode	Mean	SD	p*
Sit-down	Off	48.8	6.85	0.018
	On	45.5	7.00	
Stand-up	Off	43.5	4.12	0.00
	On	37.3	7.53	

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Figure 1. Prototype of the assistive sofa during assessment