

CHAPTER 1

INTRODUCTION

Falls are a major health problem among older adults (1). Approximately 35% of people over 65 years of age experience falls at least once a year. It has been suggested that the falling rate increases among those over the age of 75 and 10%-25% of hospital admissions of older adults are the results of falls (2, 3). Falls often lead to devastating consequences such as injuries, reduced levels of physical activity, fear of falling, decreased quality of life, and death in older adults (4-8).

Many falls in older adults have been reported to occur when they walk and simultaneously perform a secondary task (1, 9). A number of recent studies have demonstrated that the concurrent attentionally-demanding cognitive task has a deleterious effect on gait and increases risk of fall in elderly population (4, 7, 10-12). Gait changes were found when older adults walked and simultaneously performed a cognitive task (i.e. dual-task condition) compared to walking without any secondary tasks (i.e. single-task condition) (13-15). For example, older adults decreased their gait speed during walking while performing the visual-spatial task compared to walking without any secondary tasks (1). They also increased their gait variability (i.e. swing time variability) during walking while performing the serial 7 subtraction task compared with walking alone (15). Furthermore, it was shown that increased gait variability was associated with an increased risk of falls in older adults (15, 16). Thus, this may suggest the influence of concurrent cognitive task on gait and risk of falls in the elderly population.

The factors that contribute to the dual-task related gait changes have not been clearly elucidated in older adults, although dual-task decrements during gait have been evident (1, 15). Beauchet et al. (17) examined the association between dual-task related gait changes and intrinsic risk factors for falls (i.e. mobility, cognitive function, number of drugs taken per day, and vision) among transitional frail older adults. The results showed the association between dual-task gait decrement (i.e. increased walking time and number of steps) and mobility impairment and polymedication. Hausdorff et al. (18) also examined the factors that might contribute to dual-task decrements during walking among healthy older adults. This included mobility performance, cognitive function, emotional well-being, and usual walking performance. The findings revealed that there was a small, but significant association between the dual-task deficiency and usual walking performance as well as cognitive function. Hausdorff et al. (18) suggested that no single factor could be used to explain these dual-task decrements among healthy older adults.

There is yet no comprehensive research investigating the contributing factors to the dual-task related gait changes in a more heterogeneous cohort. Thus, further investigation of such factors that contribute to the dual-task decrement in community-dwelling older adults is needed. In addition, the ability to allocate attention can also be another factor which significantly contributes to the dual-task decrement during gait in older adults, but was not included in the previous studies examining the contributing factors. Siu et al. (19) examined the attentional mechanisms that might contribute to dual-task related gait changes in older adults with and without balance impairment. The results showed that the older adults with balance impairment decreased their ability to allocate attention between the two tasks compared with

healthy older adults. The authors concluded that the ability to allocate attention is one of the several factors that may contribute to the dual-task deficits in older adults with balance impairment. Thus, this factor should also be taken into account when investigating the factors that contribute to the dual-task decrement during walking in the older population.

To be successful in managing the elderly, it is essential to have better knowledge of the contributing factors to the dual-task decrements. Thus, this study aimed to determine the factors that could possibly contribute to the dual-task decrement during walking in older adults. The study would stand to enhance the understanding of factors that contribute most to the dual-task decrement in the elderly and importantly may provide useful information and guidance in development of prevention and management of fall in the older population.

Aims and hypotheses of the study

1.1 Aims of the study

To determine the factors that contribute to the dual-task decrements during walking in elders

1.2 Hypotheses

1) Among elders, the cognitive function (i.e. executive function and ability to allocate attention), balance and mobility performance, affect and emotional well-being will be associated with the dual-task related gait changes.

2) Among all contributing factors, the ability to allocate attention and the balance and mobility performance will have the greatest effect on the dual-task decrements in elders.