Young adults are surprisingly bad at walking: Sex differences in the circumstances associated with falls

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INTRODUCTION

Falls are not a trivial problem for young adults [1-3], and fall-related fractures have increased in young adults [3]. However, there are only a few studies of falls in young adults, and most of this information is from medical reports. For example, a higher proportion of fall injuries occur on stairs for young females as compared to males [2], and fall-related fractures in young females (aged 16-19 years) increased 59% from 2000 to 2010 [3]. However, it is still unclear whether young adult females are injured more because they fall more, or if they are more likely to sustain injuries from falls.

The purpose of this abstract is to determine if the frequency and circumstances of falls in young adults are associated with sex.

METHODS

Undergraduate students (N=230, 19.8 ±0.9 years, 74 males) participated in either the fall semester (106 students, 33 males) or the spring semester (124 students, 41 males).

Two surveys were distributed via email:

1. Initial survey (distributed once): Included participant demographics, number of falls in the past year, number of medications, and physical activity level with Leisure-Time Exercise Questionnaire (LTEQ) [4].
2. Daily survey (distributed daily for 16 weeks): Participants were asked if they had slipped, tripped or fallen in the past 24 hours. When participants reported a fall, follow-up questions regarding the circumstances and injuries were asked. If a participant had more than one fall a day, they were asked to report the most serious fall.

A generalized linear mixed model was used (GLIMMIX in SAS 9.3, Cary, NC, USA) to quantify differences between males and females. The odds of falls associated with fall frequency, primary cause, activity, injury, and medications were compared for men versus women. Significance level was set at $p = 0.05$. Insufficient observations were available to compare types of injuries and activity at time of injury, so these comparisons are described without statistics.

RESULTS AND DISCUSSION

1. Response Rate: The average response rate was 91%. The response rate demonstrated a linear decrease of 0.7% per week ($p<0.001$). Ten participants (4%) were excluded from the results because the response rate was less than 35%. The response rate ranged from 46-100% for the analyzed participants.

2. Fall frequency: A total of 260 falls were reported, circumstances were provided for 193 falls, so the following analysis focuses on those reports. One hundred ninety three falls were reported by one hundred six fallers (36 males). 52% of males and 46% of females fell at least once, and are henceforth termed fallers. 28% of males (n=19) and 23% of females (n=34) fell more than once, and are henceforth termed frequent fallers. (Fig. 1). There was not a significant difference in the frequency of falls between males and females (odds ratio (OR) 1.04; confidence interval (CI) 0.70-1.53; p=0.86; Fig. 1). The high fall frequency supports the observation that falls are not a minor issue, even for 20 year-old adults [1-3].

3. Causes of falls: The three main causes of falls for males were slip (40%), trip (32%), and hit/bump

(13%). Similarly, the three main causes of falls for female were slip (33%), trip (32%), and hit/bump (9%). No differences were observed between sexes on the causes of falls. The main causes of falls, slips and trips, are similar to observations for community dwelling older adults [5], highlighting the prevalence of these perturbations across all age groups.

4. Activity at time of fall: The three main activities for males were sports (58%), walking (35%), and transfer (3%). The three main activities for females were walking (48%), sports (40%), and transfer (5%). Males were more likely to fall during sports activities than females (OR 2.29; CI 1.04-5.02; p=0.04); no other differences were observed. For sports activities, it is expected that people will fall due to exposure to environmental and task-related hazards. However, a substantial number of falls occurred during walking, and walking was the main activity for females, which highlights the inherent instability of bipedal locomotion [1].

5. Physical activity (LTEQ score): No differences in physical activity level were observed between male and female fallers (p=0.68).

6. Injuries from falls: Injuries were reported as follows: males, 17% of falls (n=6); females, 37% (n=26). The number of injuries were not significantly different (p=0.12). The types of injury in males were 2 contusions (25% of injuries), 4 abrasions (50%), 2 sprain/strain (25%), and all of the injuries were due to sports-related falls. Females reported 14 contusions (45%), 10 abrasions (32%), 4 sprain/strain (13%), two concussions (6%), and one fracture (3%). The fall-related injuries were due to sports (n=15), walking (n=10), and transfer (n=1).

The number of injuries were not different between males and females, but all injuries sustained by males were sports-related, while 38% of injuries sustained by females were walking-related. Further, the most serious injuries, concussions and fractures, were only observed in females.

7. Prescribed medications: Female fallers took more medications than male fallers (p<0.001). Since this finding was unexpected, we also compared number of medications as a function of sex in the non-faller group; the number of prescribed medications was not significantly different across sex in the non-faller group (p=0.12). While it is well known that prescribed medications increase fall risk in older adults [6], this is the first observation of fall-risk related to medications in young female adults.

This study is limited by the relatively small and homogeneous subject sample.

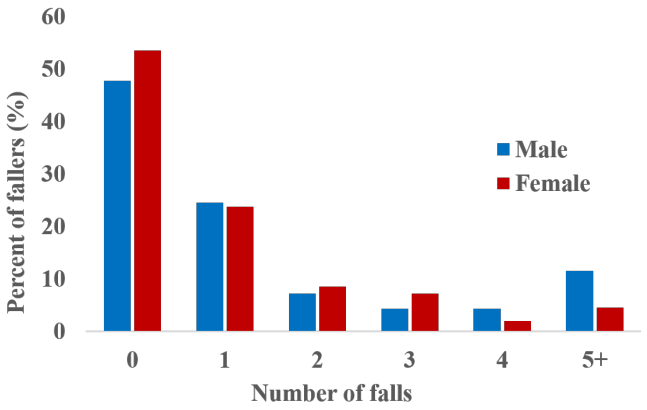

Figure 1: Percentage of participants described as a function of the number of falls; ten subjects with a response rate less than 35% were excluded.

CONCLUSIONS

The high fall rate and number of frequent fallers in 16 weeks reinforces the finding that falls are not a trivial problem for young adults [1-3]. Frequency of falls and fall-related injuries were not different for young adult males and females. While males sustained no injuries during walking, females did, and the types of injuries were more serious in females. Therefore, at 20 years of age, we provide preliminary support that females fall at the same rate as males, but they appear more likely to sustain injuries during less challenging activities and also appear to suffer more serious injuries.

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