Dual-tasking in older women: Physical activity or else?

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The interplay between gender, Physical Activity (PA) and Dual Tasking (DT) in older adults is unclear. This study aimed to address DT based on gender and PA level. One-hundred and twenty older adults (81 women and 39 men) participated. Timed up and go test and spatiotemporal gait measures were collected in single and DT conditions. Participants were grouped according to gender and PA level. Physical activity did not explain gender differences, women were slower and had shorter stride lengths when DT regardless of PA level. Findings indicate the necessity for tailored PA and functional interventions to improve women's performance.

Keywords: Gender; Dual task; Gait; Physical activity

Introduction

Being physically active has been associated with better health in older adults. Physical Activity (PA) has been identified as a key factor in reducing of chronic disease risk, falls, premature mortality, depression and cognitive impairment (I. Lee et al., 2013; Stephen, Hongisto, Solomon, & Lönnroos, 2017; Teychenne, Ball, & Salmon, 2008; Thibaud et al., 2012). Additionally, physically active older adults report higher independence in daily life and better quality of life than those who are less physically active (Svantesson, Jones, Wolbert, & Alricsson, 2015; Tak, Kuiper, Chorus, & Hopman-Rock, 2013). Physical activity recommendations for older adults state that they should achieve at least 600 Metabolic Equivalent (MET) – Minute/week (WHO, 2005, 2010). These recommendations can be achieved by accumulating 150 minutes of moderate or 75 minutes of vigorous PA per week or a combination both (WHO, 2005, 2010). Nevertheless, only 30-60% of adults aged 60 years or older achieve these recommendations (Hallal et al., 2012).

One of the most commonly reported predictors of PA in older adults is gender, with women being less physically active than men (Koeneman, Verheijden, Chinapaw, & Hopman-Rock, 2011). Lower levels of PA present a greater risk for women of poor health implications such as higher incidence of chronic conditions and falls. However, gender disparities in PA in older adults cannot be attributed to one specific factor; with physical, psychological, social, cultural and environmental factors influencing PA behaviour (Suh & Kim, 2018; Van Uffelen, Khan, & Burton, 2017).

Walking is one of the most commonly reported modes of PA (Besser & Dannenberg, 2005). Moreover, it is frequently used to assess physical function of older adults in research and clinical settings. Gait performance has been linked to PA levels, with slower gait speed and spatial-temporal gait measures such as shorter stride length and step time being associated with lower PA levels in older adults (Egerton, Paterson, & Helbostad, 2017). Although walking is a popular form of PA in older adults, it becomes difficult to perform automatically which can contribute to balance deficits and risk of falls in this population (Ciprandi et al., 2017).

Walking is seldomly performed as a single task, we usually engage in mental tasks such as a conversation with others or thinking about shopping lists or perform a motor task such as carrying shopping bags while walking. Being less able to divide attention between tasks during gait has been associated with higher risk of falls in community-dwelling older adults (Muir-Hunter & Wittwer, 2016). Moreover, it is known that women are at higher risk of falling than men in older age (Franse et al., 2017). However, results on gender differences in Dual Task (DT) gait performance in older adults, with a variety of DT combinations and outcome measures, were inconclusive (Bogen, Moe-Nilssen, Ranhoff, & Aaslund, 2018; Hollman, Youdas, & Lanzino, 2011; Wellmon, 2012).

While research has shown that there are gender differences in PA and gait under ST and DT conditions separately, it is not known whether there are differences in DT gait in older women and men with different PA levels. This study aimed to explore PA levels and gait in a random sample of community-dwelling older adults. Particularly, address DT gait based on gender and PA level differences.

Methods

A cross-sectional study design was used following Strengthening the Reporting of Observational Studies (STROBE) guidelines. The national institutional review board at the university hospital approved the study (86/2014/IRBJ). All procedures used in the study were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments.

Participants

Participants were recruited between 2014 and 2016 from local community centres, shopping malls, personal contact and outpatient waiting rooms at a local hospital. Adults aged 60 years or older, who can walk 10 meters with or without a walking aid (except walking frames) and were able to understand simple instructions were included in the study. Participants were excluded if they had any health conditions that affect their ability to walk 10 meters and unwillingness to participate.

All participants provided written informed consent prior to participation in the study. Data collection took place at a research lab or at the participants' home and lasted approximately one hour.

Measurements

Demographic characteristics and health status

Demographic characteristics included age, education level, weight and height. Educational level was classified into 5 categories: none, primary, secondary, undergraduate and postgraduate. Health status information was obtained using a self-report questionnaire (Greig et al., 1994). The information from the questionnaire were further processed into number of chronic conditions, number of medications and number of falls in the previous year. Fear of falling was assessed using a simple question "are you afraid of losing balance or falling?" translated into Arabic.

Health-related quality of life was assessed using the Arabic version of the RAND-36 item health survey (Sabbah, Drouby, Sabbah, Retel-Rude, & Mercier, 2003), global cognitive function was assessed using the Arabic version of the Mini-Mental State Examination (MMSE) (Al-Rajeh, Ogunniyi, Awada, Daif, & Zaidan, 1999). The executive clock test was used to measure (CLOX) executive function(Royall, Mulroy, Chiodo, & Polk, 1999).

Physical activity

Self-reported physical activity was obtained using the Arabic version of the Global Physical Activity Questionnaire (GPAQ) (WHO, 2005). This questionnaire has been recommended by the World Health Organization and has been validated in older adults (Bull, Maslin, & Armstrong, 2009). Data from the questionnaire were further processed to obtain Metabolic Equivalent per week (MET-min/week). Participants were categorized as achieving physical activity guidelines if they reported ≥ 600 MET-min/week and not achieving guidelines if they reported < 600 MET-min/week (WHO, 2005). To compare gender differences, participants were further categorized into four groups; women achieving (WA), women not achieving (WN), men achieving (MA) and men not achieving (MN).

Gait

Gait performance was assessed using a 10-meter walk test at the participants preferred speed. Participants performed the test under single task (ST) and DT motor (DTM) and cognitive (DTC) conditions. The DTM was walking while carrying a cup of water and DTC was walking while subtracting 3's from a random 3-digit number. No instructions were given on task prioritization. However, participants were told to try not to spill the water during the dual motor task. Time needed to perform the tests was measured in seconds. Spatial and temporal gait parameters were measured during the 10-meter walk tests using an Inertial Measurement Unit (IMU) comprising a triaxial accelerometer, gyroscope, and magnetometer (MTx, Xsens, AN Enschede, the Netherlands) that was attached over the skin of the fourth lumbar vertebra (Esser, Dawes, Collett, & Howells, 2009). This corresponds to the participants centre of mass during walking (Kerrigan, Viramontes, Corcoran, & LaRaia, 1995).

Functional balance was assessed using the Timed Up and Go test (TUG), where participants were asked to stand up from a chair, walk 3 meters, turn, walk back and sit down again at their preferred speed (Podsiadlo & Richardson, 1991) under ST and similar DT conditions as above; TUG-M and TUG-C. Each walking and TUG task was repeated twice in a pseudo-random order and for further statistical analysis the average of the two trials was considered.

Data processing and statistical analysis

Processing of the output from the IMU was performed using a customized program written in LabVIEW 15.0f (National Instruments, Austin, TX, USA) (Esser et al., 2009). Spatial and temporal gait parameters were then estimated according to the inverted pendulum gait model (González, Alvarez, López, & Alvarez, 2007; Zijlstra, 2004). The spatiotemporal measures included in the analysis were velocity, stride length, cadence and double support ratio. Stride length was normalized by dividing it by leg length, velocity was normalized using equation 1 and cadence using equation 2 (Pinzone, Schwartz, & Baker, 2016).

Equation 1

$$Normalized\ velocity = velocity/\sqrt{leg\ length * acceleraion\ due\ to\ gravity}$$

Equation 2

$$Normalized\ cadence = cadence * \sqrt{leg\ length/acceleraion\ due\ to\ gravity}$$

Statistical analysis was performed using IBM SPSS Statistics (version 25 IBM SPSS, Inc, Armonk, NY, USA). Demographic and health data were compared between the groups using Chi-square test and one-way independent analysis of variance (ANOVA) for count and continuous variables, respectively. Gait and balance data were analysed by conducting a repeated measures ANOVA with task (3 levels) as the independent variable for each parameter separately, and participants' group (gender and PA level) as the between-subject factor. For all statistical tests, alpha level was set at .05 a priori. To account for unequal sample sizes in the groups and unequal variance, the Tamhane T2 test was used for post-hoc analysis (Shingala & Rajyaguru, 2015).

Results

A total of 120 older adults were included in the study. Based on the cut-off of ≥ 600 MET-min/week point for PA (WHO, 2005), participants were divided into four groups (WA = 31, WN = 50, MA = 29 and MN = 10). Demographic and health data are presented in table 1. The unequal group sizes and relatively small number of men in the

MN group is a limitation to the study and needs to be considered when reading the results below. Post-hoc analysis showed that there was a statistically significant difference between the groups in age (MA older than WA and WN, $P = 0.009$ and 0.005 respectively), BMI (MA lower than WN, $P = 0.01$ and WA lower than WN, $P = 0.02$), leg length (MH longer than FL, $P < 0.001$), total MET-min/week (MA higher than MN and WN, $P < 0.001$ and WA higher than MN and WN, $P = 0.003$ and 0.002 respectively), MMSE (MA higher than WN, $P = 0.008$) and all subscales of the RAND 36-item Health survey except the social functioning subscale. Physical functioning (MA higher than WN, $P<0.001$ and WA higher than WN, $P = 0.03$), Role functioning/physical (MA higher than WN, $P = 0.019$; MN higher than WN, $P = 0.01$ and WA higher than WN, $P = 0.045$), Role functioning/emotional (MN higher than WN, $P<0.001$), energy/fatigue (MA higher than WN, $P<0.001$ and WA higher than WN, $P = 0.03$), emotional well-being (MA higher than WN, $P = 0.009$), pain (MA higher than WN, $P = 0.013$ and MN higher than WN, $P = 0.003$), general health (WA higher than WN, $P = 0.03$). Number of chronic conditions was significantly higher in the WN group compared to the MA group ($P<0.001$). Men had higher educational levels than women with most men in the MA and MN groups having either undergraduate or postgraduate degrees.

Differences between groups on 10-meter walk test and TUG test under different task conditions are presented in table 2. There was a significant effect of task on 10-meter walk test ($F(2,103) = 22.27$, $P < 0.001$, partial $\eta2 = 0.18$) and TUG ($F(2,112) = 24.96$, $P<0.001$, partial $\eta2 = 0.18$). The addition of motor and cognitive tasks to the 10-meter walk test and the TUG slowed down participants and this effect was most prominent when the cognitive task was added as can be seen in table 2. Pairwise comparisons for the 10-meter walk test showed that there was a significant difference between ST vs. DT-C and DT-M vs. DT-C ($P < 0.001$). For the TUG test, there was a significant difference between all tasks (TUG vs. TUG-M ($P < 0.001$), TUG vs. TUG-C ($P < 0.001$), and TUG-M vs. TUG-C ($P = 0.015$)). There was no significant interaction between group and task. There was a significant main effect of group on 10-meter walk test ($F (3, 103) = 5.42$, $P = 0.002$, partial $\eta 2 = 0.14$) and TUG ($F (3,112) = 4.45$, $P = 0.005$, partial $\eta 2 = 0.11$). Post-hoc analysis showed that there was a significant group difference in 10-meter walk test between the MA and both the WA and WN groups ($P<0.001$ and $P = 0.002$ respectively). For the TUG test multiple comparisons showed a significant group difference between MA and WN groups ($P = 0.001$).

The effect of task and group on spatial and temporal gait measures during 10-meter walk test are displayed in table 3. There was a significant effect of task on gait velocity ($F (2,103) = 36.4$, $P < 0.001$, partial $\eta 2 = 0.26$). The addition of another task slowed down participants, with the greatest effect being evident with the addition of the cognitive task. Pairwise comparisons showed that there was a significant difference between the ST and DT-C conditions ($P < 0.001$) and the DT-M and DT-C conditions ($P < 0.001$). There was no significant interaction between group and task. There was a main effect of group on gait velocity ($F (3, 103) = 4.87$, $P = 0.003$, partial $\eta 2 = 0.12$). Post-hoc analysis showed that there was a significant difference in velocity between the MA and both WA and WN groups ($P = 0.003$ and 0.002 respectively).

There was a significant effect of task on stride length ($F (2, 94) = 18.2$, $P < 0.001$, partial $\eta 2 = 0.16$). The addition of another task caused a decrease in stride length, with the greatest effect being evident with the addition of the motor task. Pairwise comparisons showed that there was a significant difference between all tasks (ST vs. DT-M, $P < 0.001$; ST vs. DT-C, $P = 0.009$ and DT-M vs. DT-C, $P = 0.027$). There was no significant interaction between group and task. There was a significant main effect of group on stride length ($F(3, 94) = 13.39$, $P < 0.001$, partial $\eta 2 = 0.3$). Post-hoc analysis showed that there was a significant difference between MA and MN ($P = 0.049$), MA and WA ($P < 0.001$) and MA and WN ($P < 0.001$).

Task had a significant effect on cadence ($F(2, 94) = 17.7$, $P < 0.001$, partial $\eta 2 = 0.16$). The addition of another task caused a decrease in cadence, with the greatest effect being evident with the addition of the cognitive task. Pairwise comparisons showed that there was a significant difference between the ST and DT-C conditions ($P < 0.001$) and the DT-M and DT-C conditions ($P < 0.001$). There was no significant interaction between group and task and no main effect of group on cadence. The results for the double support ratio showed no significant effect for task, group or interaction between task and group.

Discussion

This is the first study to investigate the interplay between gender, PA and DT gait performance. The findings suggest that women, regardless of PA level, experience greater deterioration under DT conditions in functional measures like the 10-meter walk and TUG tests in terms of time required for performance and gait measures such as velocity and stride length. These findings are considered of importance planning DT and PA interventions that aim to increase PA levels and promote function in older women.

The results showed that women, regardless of achieving PA guidelines or not, required longer time to perform the 10-meter and TUG tests and had slower gait velocity than men who achieved the guidelines in both ST and DT conditions. Moreover, there were no statistically significant differences between men of different PA levels. These findings indicate that gender affects DT performance despite PA levels. However, stride length, which reduced in all groups most in the DT motor conditions, was significantly shorter in women regardless of their PA levels and men who did not achieve the guidelines compared to men who did. This shows that PA might affect DT performance in men but not in women. The variation in results between the different gait parameters could be due to the higher sensitivity of stride length to dual tasking, this is supported by it being an independent predictor for cognitive decline in older age (Taniguchi, Yoshida, Fujiwara, Motohashi, & Shinkai, 2012). These findings support the use of stride length as an intervention target when working with older adults.

Dual tasking is an integral part of our daily life, with the ability to divide attention between different tasks being key for successful achievement of activities such as walking (Muir-Hunter & Wittwer, 2016). It is well established that aging reduces the ability to perform DT gait and balance activities, which can be explained by age-related changes in executive function and motor performance (Beurskens & Bock, 2012). The role of gender in DT gait and functional balance such as the TUG test has been described in the literature. These studies suggested either no effect of gender on DT performance (Almajid & Keshner, 2019; Bogen et al., 2018; Chen & Tang, 2016; Wellmon, 2012), women having poorer performance (Hall, Echt, Wolf, & Rogers, 2011), or men having poorer performance (Hollman et al., 2011). These conflicting results could be explained by the variety of DT combinations and gait and balance outcomes explored in these studies and lack of standardization (Al-Yahya et al., 2011).

Lack of consensus on the effect of gender on DT performance in older adults shows the complexity of interaction between these variables and the possibility of mediating factors such as PA. Low levels of PA have been associated with poorer gait performance (Egerton et al., 2017). Moreover, gender is one of the strongest predictors of PA in later life with women being less physically active (Koeneman et al., 2011;

McKee, Kearney, & Kenny, 2015). Therefore, performance on DT tests in men and women might be affected by different PA levels. However, a previous study that compared TUG DT performance in frail and non-frail older adults, who were significantly different in PA levels found no differences (Giusti Rossi et al., 2018).

In the current study, demographic and health data show that there were significant differences between the groups in age, global cognitive function, education, health-related quality of life and number of chronic conditions. This might suggest that the relationship between gender, PA and DT performance might not be simply explained by the interplay between these three factors. Interestingly, men achieving PA guidelines had significantly better DT performance than women, despite being older in age. Women who did not achieve PA guidelines of at least 600 MET-min/week had poorer health-related quality of life on almost all subscales of the RAND-36 item health survey than men who achieved the guidelines. Moreover, they had lower scores on the physical functioning, role physical functioning, energy/fatigue and general health subscales than women who achieved the guidelines. They also had lower scores than men who did not achieve the guidelines on the role physical functioning, role emotional functioning and pain subscales. All these findings suggest that women have poorer perception of health than men(Van den Bergh, Witthöft, Petersen, & Brown, 2017) and that PA can affect women’s perception of health-related quality of life to a greater extent than men. This is supported by women’s perception of health-related quality of life being only positively influenced by higher intensity PA levels (Morimoto et al., 2006).

The World Health Organization (WHO) emphasizes that PA recommendations for older adults are applicable to both men and women (WHO, 2010). The above mentioned differences between women and men could indicate that women might naturally become less active than men in older age and by that have greater deterioration in gait (Y.-S. Lee, 2005). Moreover, older women and men might engage different modes of PA, which could contribute to differences in DT gait abilities. Women perform more in household and garden physical activities, whereas men are involved in outdoor, leisure time and transportation related physical activities (Notthoff, Reisch, & Gerstorf, 2017). Additionally, when it comes to walking, women engage in shorter walking durations and distances than men (Y.-S. Lee, 2005). This could suggest that women experience greater deficits in DT gait performance than men due to the nature of PA they perform in addition to the intensity. The results from the current study encourage researchers to develop PA measures that capture the differences between men and women in modes of PA in addition to intensity.

Healthcare professionals that work with older adults should consider designing PA and functional training interventions for older women that focus on activities involving social interaction to improve DT performance. The results showed that despite women having lower PA levels than men and poorer DT performance, they did not report significantly different on the social functioning subscale of the RAND-36 item health survey. Previous research has shown that women are more likely to engage in activities that involve social elements and involve spending time with others (Van Uffelen et al., 2017). Additionally, professionals should focus on educational interventions to promote PA and exercise instructors or therapists should provide supervised exercise sessions to improve performance in women with lower educational levels (Shaw & Spokane, 2008; Van Uffelen et al., 2017).

This study has some limitations. Participants were recruited irrespective of their PA levels to evaluate how physically active they are and then they were allocated to groups based on gender and PA levels which led to inequal group sizes and relatively small number of men in the MN group. However, the distribution seems to be compatible with gender and PA distribution in the older population (United Nations, 2015; WHO, 2018). Future studies should include larger samples and purposeful recruitment of older adults according to PA levels should be conducted to advance current findings. The PA measure used in the study is self-report and not specific for older adults which could have led to over or underestimation of results. Nevertheless, this measure has been recommended by the WHO and has been validated for older adults(Bull et al., 2009). Lastly, there were differences between the groups in age, education, cognition and chronic conditions which could have affected the results. However, the aim was to explore the gender-PA-DT relationship regardless of other factors to provide insight into performance as it would be evaluated by clinicians and therapists.

Conclusion

This study showed that women, regardless of PA level, have poorer DT performance on gait and functional balance measures than men who achieve PA guidelines. The gender-PA-DT relationship seems to be complicated and could be affected by background variables such as education, quality of life and cognition. Women in later life need tailored interventions to promote PA and improve functional performance that account for education level, cognitive function and self-perceived health-related quality of life. Moreover, gender-specific physical activity measures should be developed to ensure PA measurement that reflects the diversity in PA modes and context.

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Table 1. Demographic and health status data

	WA N = 31 (Mean ± SD)	WN N = 50 (Mean ± SD)	MA N = 29 (Mean ± SD)	MN N = 10 (Mean ± SD)	One-way ANOVA	
					F statistics	Significance
Age (years)	65.53 ± 5.4	65.58 ± 3.97	70.45 ± 6.56	70.1 ± 5.86	7.83	< 0.001
BMI (kg/m^2)	28.36 ± 5.34	32.36 ± 5.94	28.8 ± 3.62	28.36 ± 4.2	5.19	0.002
Leg length (m)	0.84 ± 0.06	0.83 ± 0.05	0.87 ± 0.04	0.87 ± 0.04	4.96	0.003
Total MET-min/week	1969.03 ± 2525.69	165.68 ± 144.09	3078.62 ± 2340.87	214.8 ± 139.66	20.29	< 0.001
Number of medications	2.32 ± 1.49	2.86 ± 1.57	2.48 ± 2.29	2.1 ± 1.6	0.92	0.43
Number of falls	0.45 ± 0.66	0.52 ± 0.84	0.38 ± 0.62	0.4 ± 0.52	0.26	0.86
MMSE	26.26 ± 3.77	25.68 ± 3.15	27.55 ± 1.86	27.8 ± 1.93	3.12	0.03
CLOX1	9.76 ± 3.56	10.29 ± 2.73	11.07 ± 2.73	11.22 ± 1.97	1.23	0.3
CLOX2	11.93 ± 3.1	12.56 ± 2.34	13.24 ± 1.12	13.11 ± 0.78	1.78	0.15

RAND-36						
Physical functioning	68.55 ± 19.97	55.4 ± 19.92	71.79 ± 12.78	60 ± 15.99	6.13	0.001
Role functioning/physical	66.94 ± 41.02	41.5 ± 39.32	70.45 ± 40.29	85 ± 31.62	5.94	0.001
Role functioning/emotional	77.42 ± 37.9	64.67 ± 44.37	86.91 ± 29.17	96.67 ± 10.54	3.3	0.02
Energy/fatigue	69.03 ± 19.43	54.9 ± 23.71	74.82 ± 14.24	72 ± 17.19	7.11	<0.001
Emotional well-being	77.16 ± 19.49	67.02 ± 23.25	82.86 ± 18.31	82.8 ± 15.67	4.38	0.006
Social functioning	82.66 ± 26.55	74.75 ± 31.39	88.84 ± 17.13	91.25 ± 15.65	2.3	0.08
Pain	68.31 ± 24.81	55.65 ± 28.06	76.52 ± 27.37	80 ± 14.62	5.12	0.002
General health	68.39 ± 18.37	56.3 ± 16.65	66.79 ± 19.64	53.5 ± 14.15	4.53	0.005
Number of chronic conditions	2.32 ± 1.54	3.2 ± 1.4	1.9 ± 1.18	2.2 ± 1.23	6.61	<0.001
	N (%)	**N (%)**	**N (%)**	**N (%)**	**Chi-square**	**Significance**
Level of education						
None	7 (25)	3 (6.3)	0 (0)	0 (0)	46.61	<0.001
Primary	4 (14.3)	18 (37.5)	2 (7.4)	0 (0)		
Secondary	5 (17.9)	13 (27.1)	8 (29.6)	3 (33.3)		

Undergraduate	12 (42.9)	13 (27.1)	12 (44.4)	2 (22.2)		
Postgraduate	0 (0)	1 (2.1)	5 (18.5)	4 (44.4)		
Fear of falling	15 (35.7)	17 (40.5)	8 (19)	2 (4.8)	4.11	0.25

WA = women achieving; WN = women not achieving; MA= men achieving; MN = men not achieving

SD = Standard Deviation; N = Number

BMI = Body Mass Index; MMSE = Mini Mental State Examination; CLOX = executive clock test; MET = Metabolic Equivalent

Table 2. 10-meter walk and TUG tests

	10-meter (seconds) Mean ± SD			**P for ANOVA results**		
	ST	DT-M	DT-C	Task	Group	Interaction
WA	11.31 ± 2.39	11.83 ± 2.6	14.16 ± 5.58	<0.001	0.002	0.24
WN	11.59 ± 2.89	11.84 ± 2.8	13.73 ± 4.12			
MA	9.14 ± 1.48	9.64 ± 1.77	10.53 ± 3.55			
MN	10.85 ± 2.95	11.1 ± 3.52	11.77 ± 3.14			
	TUG (seconds) Mean ± SD			**P for ANOVA results**		
	TUG	TUG-M	TUG-C	Task	Group	Interaction
WA	11.83 ± 3.09	13.64 ± 3.02	16.72 ± 8.31	<0.001	0.005	0.16
WN	12.96 ± 3.58	15.35 ± 4.35	18.79 ± 8.55			
MA	10.46 ± 2.57	12.8 ± 3.33	13.13 ± 3.73			
MN	12.41 ± 2.77	14.68 ± 4.82	15.52 ± 4.63			

WA = women achieving; WN = women not achieving; MA= men achieving; MN = men not achieving

ST = Single Task; DT-M = Dual Task Motor; DT-C = Dual Task Cognitive

TUG = Timed Up and Go test, TUG-M = TUG with Motor dual task; TUG-C = TUG with Cognitive dual task

SD = Standard Deviation

Table 3. Normalized gait measures during 10-meter walk test

	WA Mean ± SD			**WN Mean ± SD**			**MA Mean ± SD**			**MN Mean ± SD**			**P for ANOVA results**		
	ST	DT-M	DT-C	ST	DT-M	DT-C	ST	DT-M	DT-C	ST	DT-M	DT-C	Task	Group	Interaction
Velocity	0.32 ± 0.07	0.31 ± 0.06	0.27 ± 0.08	0.32 ± 0.08	0.31 ± 0.07	0.28 ± 0.08	0.38 ± 0.06	0.37 ± 0.06	0.34 ± 0.07	0.34 ± 0.09	0.34 ± 0.11	0.31 ± 0.08	<0.001	0.003	0.74
Stride length	1.54 ± 0.11	1.47 ± 0.11	1.48 ± 0.12	1.52 ± 0.1	1.47 ± 0.11	1.51± 0.13	1.7 ± 0.14	1.62 ± 0.12	1.67 ± 0.13	1.57 ± 0.18	1.49 ± 0.11	1.51 ± 0.08	<0.001	<0.001	0.41
Cadence	32.51 ± 3.51	32.05 ± 3.35	30.26 ± 4.86	32.08 ± 4.76	31.25 ± 3.67	30.42 ± 5.83	31.85 ± 1.79	31.71 ± 2.32	28.98 ± 3.42	32.45 ± 3.03	31.87 ± 2.21	28.61 ± 3.9	<0.001	0.89	0.45

Double support ratio (%)	32.12 ± 6.93	33.95 ± 7.46	35.57 ± 9.05	33.31 ± 8.34	31.69 ± 7.89	33.36 ± 7.89	29.64 ± 6.12	29.19± 5.19	30.8 ± 6.41	27.08 ± 7.19	29.93 ± 8.12	29.68 ± 8.47	0.21	0.08	0.29

WA = women achieving; WN = women not achieving; MA= men achieving; MN = men not achieving

SD = Standard Deviation

ST = Single Task; DT-M = Dual Task Motor; DT-C = Dual Task Cognitive