

Metabolic Intensity and Stepping Cadence for Middle-Aged and Older Adults During Competitive Mixed-Teams Walking Football

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Abstract

Walking football is a new sport popular with middle-aged and older adults, but relatively little is known about the determinants of metabolic intensity while playing. This study was designed to measure and compare the average metabolic equivalent (MET) – a measure of metabolic intensity – and walking cadence (WC) with established thresholds associated with a moderate intensity. Specifically, it was hypothesized that average intensity would be ≥ 3.0 METs and WC ≥ 100 steps/min during competitive walking football matches. Quantitative observational data were collected during a tournament that included all members of four participating teams (22 women and 20 men) representing Australia, Malaysia, and Singapore – (Mean $\pm$ SD; 51 $\pm$ 11 years old, 27.3 $\pm$ 5.2 kg/m² BMI). Participants wore a neoprene waist pack with an accelerometry-based activity monitor (AM) that collected and summarized accelerometry data every 60 seconds. After the tournament, the data were downloaded to a computer and transformed into average METs and WC for each minute of game play. Mean METs and WC values for all players of each match were compared to their moderate intensity thresholds (i.e., 3.0 METs and 100 steps/min, respectively) using one-sample t-tests and a Bonferroni adjusted alpha of 0.006. Lastly, the linear relationship between METs and WC was evaluated using linear regression. Mean METs for each match (3.2–3.9 METs) either met or exceeded the 3.0 METs threshold ($P < 0.006$) as hypothesized, but mean WC of 44–63 steps/min were all significantly lower than the 100 steps/min threshold. The correlation between METs and WC for all matches was moderately strong ($R = 0.78$; $P < 0.001$). These results support the premise that competitive walking football is played at moderate intensity (or higher) in middle-aged and older adults. The unexpected lower walking cadence values, however, suggest that further research is warranted to understand the determinants of metabolic and cardiovascular intensity when playing this sport.

Keywords: MET, Health, Stride rate, Physical activity, Soccer.

1. Introduction

According to the World Health Organization (WHO), insufficient physical activity causes about 3.2 million global deaths annually (1). Consequently, the WHO suggests that adults should accumulate at least 150 minutes of moderate intensity physical activity (PA) weekly (2). When adults meet or exceed these PA guidelines, especially those adults who were previously sedentary, they are more likely to improve measures of fitness (e.g., cardiorespiratory fitness, muscular fitness, and maintain body weight at a healthy body mass index) and decrease their risk for chronic diseases (e.g., lower rates for all-cause mortality, type 2 diabetes, hypertension, stroke, coronary heart disease, colon and breast cancer, as well as depression) (1,2).

The WHO PA guidelines include activities that are classified as recreational (walking, hiking, bicycling), domestic (house or yard work), occupational, or competitive sports. A common problem for middle-aged and older adults, however, are orthopedic issues (e.g., low back pain, as well as hip and knee joint issues) that can limit their participation in their preferred activities. Football, for instance, is one of the most popular recreational and sporting activities throughout the world and has been shown to improve a broad range of health and fitness components including cardiorespiratory and musculoskeletal health, improved postural balance, as well as a decreased risk for falls and fractures, hypertension, and cardiovascular disease (3,4). Far less is known about *walking* football, however, which is the walking version of regular football and is increasingly popular with middle-aged and older adults who cannot run (or prefer not to run) but still want to practice and play competitive football. Having started in the early 2010s in England, walking football is played with similar rules as regular football except that pitch and goal sizes are smaller and there are very strict rules against body contact, kicking the ball above the head, and running. As

such, the rules of walking football help to keep the ball near the ground to emphasize brisk walking, passing, footwork, and frequent changes of direction, while also providing a safer playing environment (i.e., safer than regular football).

Given the rising popularity of walking football with middle-aged and older adults it is of interest to establish whether playing walking football can help satisfy the WHO guidelines for weekly PA. Specifically, is the metabolic intensity associated with playing walking football high enough to satisfy the “moderate intensity” threshold specified in the WHO PA guidelines? In 2018, Heil et al. (5) used GPS data to compute the average metabolic equivalent (or MET, which is a measure of metabolic intensity) for two successive competitive walking football matches in mostly middle-aged Southeast Asian women. The reported values of 3.2-3.3 METs were statistically equal to the 3.0 MET threshold value commonly associated with an absolute “moderate” intensity (6). In the same article (5) it was also reported that average heart rate values expressed relative to age-predicted maximal heart rate (HR% of 77-80% for one team and 91-95% for the another team) exceeded the HR% threshold value of 64% that is commonly used as a threshold measure of relative “moderate” intensity (6). More recently, Ayabe et al. (7) reported average intensity values of 82% and 8.0 METs for HR% and metabolic equivalents, respectively, for a group of middle-aged and older adults playing a single recreationally competitive match of walking football. Similarly, Reddy et al. (8) reported an average HR% of 76% during walking football match play. Thus, this small collection of studies has consistently reported that measures of both metabolic (5,7) and cardiovascular intensity (5,7,8) for walking football do, in fact, meet or exceed the standard definitions for “moderate” intensity. Regardless, it is not clear why the reports of both metabolic (3.2 to 8.0 METs) and cardiovascular intensity (76% to 95% of HR%) have been so broad, though it is likely related to a combination of factors that include the population tested and the type of walking football match that was monitored (i.e., competition match versus recreational match). Establishing the factors contribution to both metabolic and cardiovascular intensity may be important for understanding the underlying changes associated with long term walking football training (8,9).

Another health outcome of interest related to walking football is the measure of walking cadence (WC) – i.e., a measure of stepping or striding rate (strides/min). Walking cadence is a metric that evolved from the prolific use of pedometers as tools to monitor walking volume over the course of a day (i.e., accumulated steps/day). While the walking volume metric was easy to conceptualize and formulate into a motivational tool (e.g., 10,000 steps/day), walking volume by itself lacks an intensity definition that could relate back to the WHO PA guidelines. Walking cadence (steps/min), in contrast, is a measure of a specific locomotor task that has direct physiological consequences. As such, walking cadence is now considered a reasonable indirect indicator of whole-body ambulatory intensity (10). According to a review by Tudor-Locke et al (10), a cadence of 100 steps/min is considered a clinically relevant threshold commonly associated with a “moderate” intensity for sustained bouts of walking. Despite not measuring walking cadence themselves, Harper et al. (11) suggested that the 100 steps/min threshold value (or an equivalent step volume for a specific amount of time – e.g., 1500 steps for 15 mins, or 3000 steps for 30 mins) could be used as an exercise prescription metric for those using walking football to improve measures of health and fitness. After reviewing the literature, it seems that only Ayabe et al. (7) has reported walking cadence for a walking football match. Using a group of middle-aged and older adults all classified as having “mild metabolic disorders”, Ayabe et al. (7) reported an average WC of 85 steps/min with no statistical comparison to the 100 steps/min threshold. Regardless, the current amount of WC data reported in the literature is very limited and should be expanded upon to better understand this metric as a potential tool for monitoring and evaluating walking football athletes.

Given the broad and relatively limited reports on metabolic intensity and walking cadence associated with walking football, the goal of the current study was to observationally evaluate the relationship between these two factors during walking football competition. As such, the primary goal of this study was to build upon previous research documenting the metabolic intensity during a competitive walking football tournament using mixed teams. It was hypothesized that average metabolic intensity during multiple matches would consistently meet or exceed the established thresholds for improving physical health and disease risk (≥ 3.0 METs). Given the walking nature of this sport, as well as the often-cited threshold of 100 steps/day as that associated with moderate intensity physical activity, this study also sought to characterize

walking cadence during the same competitive walking football matches. It was hypothesized that average walking cadence would meet or exceed 100 steps/min when playing competitive walking football. Finally, knowing that walking cadence is a primary determinant of metabolic intensity, this study also sought to explore the correlational relationship between walking cadence and METs.

3. Method

3.1. Participants

All members of each of the four participating teams read and signed an Informed Consent Document approved by the Montana State University Institutional Review Board (MSU IRB). Prior to the first match, each participant was assessed for demographic measures that included body height and mass (while wearing competition clothing, but without shoes) and current age. Each participant also completed a brief questionnaire to characterize each player's experience with walking football. Data for each team member was included in each match analysis only if the team member participated in at least half of the total time for at least one match.

3.2. Procedures

All measures took place on a single day in December of 2019 at the inaugural *Walking Football4health Communities Games* on the campus of Edith Cowan University in Perth, Australia. There were four participating regional teams: Australia A and B Teams (AUSa and AUSb, respectively); Team Malaysia (MYS); Team Singapore (SNG). While the AUS and SNG teams included both men and women, the MYS team included women only. Six consecutive round robin 7-on-7 competitive matches were played with each planned as two 10-min halves separated by a 3-5 min halftime. Each match was played on the same 15.1 m x 30.4 m pitch located outdoors on a hard-surfaced tennis court. Environmental conditions, as reported by a local weather station, were relatively stable across all matches with clear sunny skies that were cooler and more humid during the first match (20 °C, 55% relative humidity, 27 KPH wind) that progressively became hotter and drier until the last match (26 °C, 30% relative humidity, 24 KPH wind).

After completing the informed consent document, the walking football questionnaire, and the demographic measures, team members participating in the first match were assigned a neoprene waist pack that contained an accelerometry-based activity monitor (AM; Actical Z, Philips Respironics, Inc., Bend, OR USA). The pack was worn such that the AM was located just posterior to the right anterior superior iliac spine (ASIS). The waist belt of the pack was adjustable such that the placement of the AM remained stable and tight against the body while playing football. Worn as such, the AMs were used to record whole-body motion at the hip during each match so that the data could be downloaded and transformed into relevant outcome variables. Each AM was programmed to store two types of data: Summarized accelerations and number of steps with each at 60-sec epoch durations. The waist packs were reassigned to the next two teams at the end of each match and worn in the same manner just described. The AMs were programmed to begin collecting data on the morning before competition began and were not downloaded until several days afterward. In addition to the 6-game round robin competition, data were also collected and summarized for two post-competition "friendlies" (matches 7 and 8) which lasted 10-mins each (no halftime) and involved only women from MYS, SNG, and an AUS combined team (i.e., women from both AUSa and AUSb teams). Thus, a total of eight matches (six 20-min competition matches and two 10-min "friendly" matches) were included in the final analyses.

3.3. Data Processing

The data recorded by the AM's were downloaded to a computer using proprietary software (Actical Z V3.0; Philips Respironics, Inc., Bend, OR USA) and then exported as text files to a spreadsheet program. The text files were then merged into a single spreadsheet file where the data corresponding to each match were extracted for analysis. For each match, the AM accelerometry data were first transformed into units of activity energy expenditure (kcal/kg/min) and then into METs using the "2R" algorithm (12). This AM data also included walking cadence (WC, steps/min) that paralleled each minute of accelerometry. The WC data were derived by a separate algorithm (imbedded within the AM firmware and applied to the accelerometry data prior to download) that has been validated for overground walking in adults (13).



Finally, the MET and WC data for each match were then summarized as Mean $\pm$ SD for the first and second halves of each match, as well as an average for the entire match. The match averages later served as the basis for all subsequent statistical evaluations. These procedures for AM data processing are consistent with those described previously (14,15).

For the purpose of assessing intraclass reliability of the AM-derived outcome variables, 15 of the waist packs were fitted with two AMs adjacent to each other and programmed identically. The second AM in each pack was treated in the same manner described above, though its data was only used for the reliability analyses.

3.4. Statistical Analyses

Mean values for each subject who participated in at least half of one competition match (i.e., either the first or second half, or the entire match), or an entire friendly match, were computed and summarized for each AM outcome variable (METs, WC). For those players who wore one of the waist packs with two AMs, intraclass reliability was computed for each outcome variable across all the matches using a two-factor repeated measures ANOVA. One-sample t-tests were used to compare each mean MET value for each match to the 3.0 MET threshold using a Bonferroni corrected alpha of 0.006 (0.05 overall alpha for 8 tests). Similarly, one-sample t-tests were used to compare each mean SR value for each match to the 100 steps/min threshold using a Bonferroni corrected alpha of 0.006 (0.05 overall alpha for 8 tests). Finally, linear regression was used to evaluate the strength of the expected linear relationship between WC and METs across all matches, as well as for each match individually (Bonferroni corrected alpha of 0.006). All statistical analyses were performed with Statistix 10 software (Analytical Software, Tallahassee, FL USA).

4. Results

While most of the players were decidedly middle-aged and older adults (39 of 43 players, or 91%, were ≥ 40 years old), there were two relatively young players on the AUS A and B teams (19 and 24 years old). Across all teams, 11 were classified as obese ($\text{BMI} \geq 30$), 19 as overweight ($25 \leq \text{BMI} < 30$), while the remaining 12 were classified as having a normal weight ($18.5 \leq \text{BMI} < 25$). Two other players who were less than 18 years of age were not included within any analysis for this study. The AUS and MYS teams self-reported having played walking football for less than two years (0.8-1.3 years and 1.7 years, respectively; Table 1), while the most experienced team from SNG had been playing an average of only 2.2 years (Table 1). When asked how many days/week that they typically practiced walking football during the previous 3 months, 95% self-reported 1-2 days/week while only 5% reported 3 days/week. Finally, when asked about the typical weekly duration of walking football practices, most self-reported 1-3 hrs/week (68%), while remaining players reported either 4-6 hrs/week (22%) or < 1 hr/week (10%). The intraclass correlations (ICC) for reliability between outcomes computed from the waist packs with two AMs were both moderate in magnitude (15): 0.66 (95% CI: 0.51-0.78) for METs and 0.65 (0.50-0.77) for WC. Mean MET and WC values for each team and match are provided in Table 2 for descriptive purposes. Mean MET values for each match (after averaging across both teams) were significantly greater than the 3.0 MET threshold value (3.4-3.9 METs; $P < 0.006$) except for match 2 which was statistically equal to 3.0 (3.2 METs; $P = 0.100$). Interestingly, mean WC values were statistically lower than the 100 steps/min threshold (48-62 steps/min; $P < 0.001$) for all eight matches.

Table 1. Summary of demographic measures (Mean $\pm$ SD) for each of four walking football teams. Also shown is the self-reported walking football experience (WFE).

Team	Gender	Sample Size	Age (years)	Body Height (m)	Body Mass (kg)	BMI (kg/m^2)	WFE (years)
AUSa	Women	n=5	51 $\pm$ 5	1.59 $\pm$ 0.04	71.6 $\pm$ 12.2	28.4 $\pm$ 5.4	1.0 $\pm$ 0.7
	Men	n=6	50 $\pm$ 16	1.70 $\pm$ 0.09	74.1 $\pm$ 9.0	25.8 $\pm$ 2.3	1.3 $\pm$ 1.0
AUSb	Women	n=5	49 $\pm$ 6	1.61 $\pm$ 0.06	82.8 $\pm$ 17.5	31.7 $\pm$ 5.3	0.8 $\pm$ 0.3
	Men	n=7	46 $\pm$ 11	1.72 $\pm$ 0.05	82.1 $\pm$ 13.1	27.7 $\pm$ 3.4	0.8 $\pm$ 0.3
MYS	Women	n=8	57 $\pm$ 8	1.61 $\pm$ 0.05	67.5 $\pm$ 10.3	26.0 $\pm$ 4.2	1.7 $\pm$ 0.5
SNG	Women	n=6	47 $\pm$ 10	1.54 $\pm$ 0.08	70.0 $\pm$ 19.0	29.6 $\pm$ 7.5	2.3 $\pm$ 1.0
	Men	n=6	56 $\pm$ 11	1.63 $\pm$ 0.09	63.2 $\pm$ 17.9	23.4 $\pm$ 4.9	2.1 $\pm$ 0.8

Abbreviations: BMI is Body Mass Index = [(body mass, kg) / (body height, m)²]; AUSa – Australian Team A; AUSb – Australian Team B; MYS – Malaysian Team; SNG – Singaporean Team.

There was a moderately strong linear relationship between WC and METs across all matches ($R = 0.78$, $SEE = \pm 0.14$ METs; $P < 0.001$). However, when the same relationship was evaluated for each match (Table 3), there were several notable observations. Specifically, as the competitive matches progressed from first (#1) to last (#6) the regression coefficient tended to decrease after the second match. Further, the slope of the regression line also decreased, and the amount of error around predicting METs from WC increased dramatically (i.e., SEE increased). In fact, the relationship between WC and METs was so relatively poor for match 6 that it was non-significant ($P = 0.02$). To explore this observation further, Figure 1 was created to directly compare the relationship between WC and METs between match 2 (with the highest correlation) and match 6 (lowest correlation).

5. Discussion and Conclusion

The primary goals of this study were to compare measures of metabolic intensity (METs) and walking cadence (WC) to threshold equivalents for moderate intensity, as well as explore the correlational relationship between METs and WC during a mixed-teams international walking football tournament. As hypothesized, mean METs for both teams during 8 successive matches met or exceeded the 3.0 MET threshold for a moderate intensity (3.2-3.9 METs; Table 2). These results are very consistent with a previous study that reported 3.2-3.3 METs averages for two successive walking football matches with Southeast Asian women (5). Despite the collective similarity of these results, both studies report MET values that are 2-2.5 times lower than the 8.0 MET average reported by Ayabe et al. (7). While all three studies were unique with regard to the populations studied and the formats of walking football competition, the single biggest difference was how METs were determined for each study. Both the current study and that by Heil et al. (5) used wearable electronic monitoring devices (accelerometry-based activity monitors or portable GPS monitors, respectively) to predict METs, an approach that has been found to underpredict actual energy expenditure for multidirectional running and sprinting tasks (17). In contrast, Ayabe et al. (7) predicted an average MET from each participant's average heart rate (HR) during game play using a HR-METs equation that was derived from a graded submaximal step test. However, it is not clear whether METs were originally measured or predicted from the step test since there is no description of using indirect calorimetry. Further, Ayabe et al. (7) also stated that the 8.0 MET estimate corresponded to 80% of the participants average maximal oxygen uptake (VO_{2MAX}) of 37 ml/kg/min. However, this average VO_{2MAX} value would be classified as "fair" to "excellent" for healthy men and "excellent" to "superior" for healthy women (6), all of which seems somewhat high for this population of middle-aged and older adults with "mild metabolic disorders". Collectively, this analysis suggests that future research should continue to focus on characterizing the metabolic intensity of walking football to better understand the full range of metabolic demands on middle-aged and older adults.



Table 2. Average MET and walking cadence (WC) values for each team of each of eight walking football matches, as well as average MET and WC values for the teams combined. The first six matches were regular competition matches while the last two were unscheduled “friendly” matches. All values expressed as Mean±SD (95% CI).

Match Team1/Team2	Team 1		Team 2		Combined Values for Both Teams	
	METs	WC	METs	WC	† METs	‡WC
Match 1 MYS/AUSa	3.6±0.5 (n=11)	58±20	3.1±0.4 (n=8)	45±19	3.6±0.5 (3.2-3.6)	52±20 (45-61)
Match 2 SNG/AUSb	3.3±0.7 (n=10)	51±23	3.2±0.6 (n=9)	49±24	* 3.2±0.7 (3.0-3.5)	51±26 (41-61)
Match 3 AUSa/SNG	3.2±0.4 (n=9)	50±15	3.6±0.6 (n=7)	58±24	3.4±0.6 (3.2-3.7)	55±21 (46-64)
Match 4 AUSb/MYS	3.3±0.7 (n=9)	50±22	3.5±0.6 (n=7)	48±22	3.4±0.6 (3.2-3.7)	49±22 (40-58)
Match 5 AUSa/AUSb	3.3±0.6 (n=12)	47.1±16	3.8±0.4 (n=9)	62±19	3.5±0.6 (3.2-3.7)	52±18 (44-60)
Match 6 MYS/SNG	3.9±0.6 (n=7)	66±28	3.7±0.4 (n=7)	67±28	3.8±0.5 (3.6-4.0)	66±27 (55-79)
Match 7 SNG/MYS	3.8±0.4 (n=7)	63±22	4.1±0.4 (n=7)	63±19	3.9±0.4 (3.7-4.1)	63±20 (53-72)
Match 8 AUS/SNG	3.3±0.4 (n=7)	44±21	4.0±0.3 (n=7)	51±11	3.7±0.5 (3.5-4.0)	48±16 (42-55)

Abbreviations: MET = metabolic equivalent; WC = walking cadence (strides/min); MYS = Malaysian Team; SNG = Singaporean Team; AUSa = Australian A Team; AUSb = Australian B Team; AUS = Australian team made up of both Team A and B women members.

* Game 2 mean MET value was equal to, but not greater than, 3.0 MET threshold.

† All mean MET values significantly > 3.0 MET threshold ($P > 0.10$) except for that of Game 2.

‡ All mean WC values significantly < 100 steps/min threshold ($P < 0.001$).

Table 3. Summary of linear regression analyses using walking cadence (WC) to predict metabolic equivalent (MET) for each of six competitive walking football matches. Variables shown are the regression coefficient for the line-of-best fit, the 95% confidence interval for that coefficient, the slope of the regression line, the standard error of estimate (SEE), as well as the P-value for the regression line.

Competition Match	R (95% CI)	Slope	SEE	P-Value
1	0.81 (0.56 – 0.92)	0.0203	±0.10 METs	< 0.001
2	0.94 (0.84 – 0.97)	0.0259	±0.06 METs	< 0.001
3	0.84 (0.66 – 0.93)	0.0242	±0.11 METs	< 0.001
4	0.82 (0.58 – 0.93)	0.0248	±0.15 METs	< 0.001
5	0.80 (0.49 – 0.93)	0.0222	±0.17 METs	< 0.001
6	0.63 (0.12 – 0.88)	0.0125	±0.20 METs	0.020

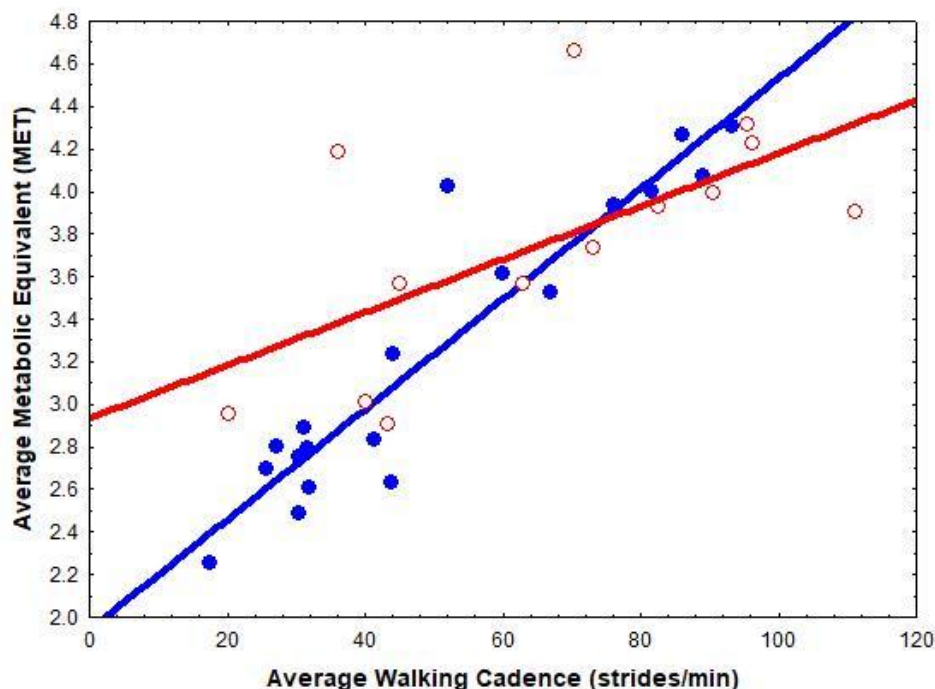


Figure 1. A visual comparison of linear regressions for walking cadence (WC) to metabolic equivalent (METs) for two walking football matches. The lines shown are those for the second match (Blue line and solid dots; $R = 0.94$, $SEE = \pm 0.06$ METs) and the sixth match (Red line and open dots; $R = 0.63$, $SEE = \pm 0.20$ METs) to illustrate the change in the observed relationship between WC and METs as the matches progressed in the tournament – i.e., decreased slope and increased SEE.

The current study also hypothesized that average walking cadence would be ≥ 100 steps/min, but the WC values averaged only 44-63 steps/min and were all significantly lower than 100 steps/min (Table 2). Given the previous report of competitive walking football meeting the moderate intensity threshold (5), it seemed reasonable to speculate that average walking cadence during a competitive match would also meet or exceed the WC value associated with a moderate intensity. However, the WC values across all 8 matches averaged only 54 steps/min which is also much lower than the 85 steps/min reported by Ayabe et al. (7). There are several contributing factors that could explain these unexpectedly low WC values. First, the 100 steps/min threshold is based upon straight line steady-state walking whereas playing walking football is known to involve frequent accelerations and decelerations associated with changing directions and ball handling. Second, the energy cost for both multidirectional running/sprinting (17) and walking with directional changes (18) are known to be significantly higher than for straight line locomotion movement. Thus, a higher metabolic intensity for a given walking cadence during competitive walking football should have been expected. These observations, however, do not explain the lower WC values of this study versus that reported by Ayabe et al. (7). While both studies used similar sized playing pitches, as well as playing on hard surfaces (rather than grass or Astroturf), the current study used teams that were training to compete in walking football whereas Ayabe's participants were described as playing for the first time. As such, it is reasonable to speculate that Ayabe's participants were less skilled and likely did more ball chasing and less effective ball passing than the current study participants. Regardless, given the discrepancy between these two studies it is reasonable to suggest that future research continue to focus on characterizing walking cadence during competitive walking football.

Finally, this study also sought to explore the correlational relationship between METs and WC since changes in walking cadence should be a prime driver of changes in metabolic intensity (10). While there was a moderately strong correlational relationship between METs and WC across all matches ($R = 0.78$; $P < 0.001$), the strength of this relationship progressively decreased from a high of 0.94 ($P < 0.001$) for match #2 to a low of 0.63 for match #6 ($P = 0.02$) (Table 3). It seems likely that this observation was the result of cumulative

fatigue for the following reasons: 1) Most of the players self-reported relatively low training experience (less than 1 year for most; Table 1) and training volume (1-3 hrs/week for most); 2) None of the teams were accustomed to playing three competitive matches within a 3-hour time period on the same morning; 3) 30 of the 42 players were classified as either overweight ($n=19$) or obese ($n=11$); 4) All matches were played on an outdoor pitch that became progressively hotter as the tournament progressed (20°C to 26°C between first and last match). Collectively, this analysis suggests that while there is a moderate or strong correlational relationship between metabolic intensity and walking cadence, the strength of this relationship may depend upon the training background of the participants, as well as the influence of factors that contribute to player fatigue.

In conclusion, this study found that the metabolic intensity of walking football averaged 3.2-3.9 METs and walking cadence averaged 44-63 steps/min, the former of which was hypothesized but the latter was not. This study also found a moderately strong linear relationship between METs and walking cadence ($R=0.78$; $P<0.001$) across all matches, but the strength of this relationship seemed to decrease as the competitive matches progressed and this may have been due to player fatigue. However, these data seemed to contradict much higher reported values for both metabolic intensity and walking cadence (7), so further research is warranted to better understand the physiological demands of competitive walking football, as well as the possible health and fitness benefits to be expected from playing walking football.

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