



WALKING FOOTBALL 4 HEALTH (WAF4H) ASIA – A MOVEMENT TO PROMOTE BETTER HEALTH AND WELLBEING THROUGH SPORT

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Abstract

Walking Football for Health (WaF4H) Asia is a new movement that exemplifies what the United Nations refers to as sport for development and peace – i.e., programs that use a common community interest in sporting activities to leverage positive change in non-sport development goals. WaF4H Asia is a communities-crossing-countries health empowerment movement. While WaF4H Asia has general goals of impacting the physical, mental, and social well-being of its participants by playing walking football, there is also a steady emphasis on communication and bonding within families and between community members, as well as inclusivity of all who are willing and able to play. To help evaluate the potential impact that playing walking football may have on the WaF4H Asia goals, a quantitative research team was formed. This paper describes the first three international research projects performed by this team that were focused on evaluating the physiological intensity of match play walking football for middle-aged and older adults. The team took advantage of modern electronic monitoring equipment and convenience sampling to determine measures of metabolic, cardiovascular, and walking intensity for entire teams competing in tournaments across the world (Singapore, London, and Perth). The results from these studies consistently showed that measures of both metabolic and cardiovascular intensity exceeded established thresholds (3.0 METs and 65% HRMAX, respectively) that are equivalent to a moderate physiological intensity. Thus, like many other forms of recreational activity and competitive sports, the intensity of match play walking football is great enough to positively impact measures related to changes in physical, mental, and social well-being in middle-aged and older adults. These quantitative results support the use of walking football by WaF4H Asia to promote development and peace with health and fitness.

Keyword: Exercise, Heart Rate, Metabolic Equivalent, Physical Activity, Walking Cadence Walking football

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1. INTRODUCTION

The 2001 establishment of the United Nations Office on Sport for Development and Peace, as well as the 2003 Magglingen Declaration, are foundational initiatives for sports programs that utilize what is referred to as Sport for Development (S4D) (Schulenkorf and Adair, 2014), or Sport for Development and Peace (SDP) (Svensson and Woods, 2017). These SDP programs are characterized by their unique use of sport as a means “to communicate, implement, and achieve non-sport development goals” (Svensson and Woods, 2017). Specifically, SDP programs use one or more sporting activities to promote positive changes in targeted outcomes that are commonly classified into one or more of

these seven domains: Disability, education, gender, health, livelihoods, peace, and social cohesion (Schulenkorf and Adair, 2014; Svensson and Woods, 2017). Further, while the word “sport” may imply physical activities that are competitive in nature, a more general definition of sport as it applies to SDP programs includes “*all forms of physical activity that contribute to physical fitness, mental well-being and social interaction, such as play, recreation, organized or competitive sport, and indigenous sports and games*” (Svensson and Woods, 2017). This latter definition of sport is more general and allinclusive of non-work forms of human movement that can be used to bring diverse peoples together to promote development goals and peace.

According to a review by Svensson and Woods (2017), football is by far the most common sport on which SDP programs are based. These researchers speculated that it was football’s global popularity, as well as the lack of specific equipment and facilities needed to play the game, that make football easy to implement within SDP programs. However, while football is globally popular across all age groups, playing competitive football is less popular with many middle-aged and older adults because of the need for running and the relatively high risk of injury from body contacts and falling. Walking football, in contrast, is a relatively new version of regular football that requires walking instead of running (i.e., running is actually penalized), the use of smaller pitches and goal sizes, includes fewer players per team, as well as rules that emphasize safety and injury prevention (e.g., no body contact; no kicking the ball above head height). As such, walking football has become increasingly popular globally with middle-aged and older adults who want to play a competitive team-based sport but cannot or do not want to run despite being healthy enough to engage in moderate-to-vigorous intensity exercise. Thus, while regular football may be a better sport when SDP programs target children, teens, and younger healthy adults, walking football may be better when the target population is middle-aged and older adults (Stevens 2018). As such, walking football is often touted as a sport that can impact the physical, mental, and social wellbeing of middle-aged and older adults (Stevens 2018).

Taking advantage of the global rise in walking football’s popularity, the *Walking Football for Health* (WaF4H) Asia Movement was founded in Singapore by Dr Dee Dee A. Salle (Dr Dee Dee Mahmood) (Edith Cowan University, Western Australia) to address the alarming trends in obesity and the lack of sufficient daily physical activity throughout Asia (Ramachandran and Snehathatha, 2010), as well as provide

a means for social interactions amongst communities. The overarching objectives of the Wa4H Asia movement are to use the sport to promote the development of health and functional fitness in the community by combating sedentarism, obesity, and risk for non-communicable diseases, all of which interfere with the productivity and quality of life. To help achieve these objectives, this movement also promotes walking football as a mechanism for communication and social bonding between family and community members. Since the initial launching event in 2017, WaF4H Asia has also strived to emphasize inclusivity regardless of ethnicity, age, gender, religion, language, or physical disability.

To help support and validate the efforts of the WaF4H Asia movement, a quantitative research team was formed around Founder Dr Dee Dee Salle with Dr Dan Heil (Montana State University, USA) and Dr Robert Newton (Edith Cowan University, Western Australia), Perth, AUS). While one team goal is to document how walking football participation can positively impact the physical, mental, and social wellbeing of middle-aged and older adults, our initial projects have been more focused. Specifically, we wanted to document that active participation in walking football was metabolically and cardiovascularly intense enough to elicit positive changes in health and fitness outcomes. For instance, the World Health Organization (WHO) suggests that adults should accumulate at least 150

minutes/week of moderate intensity physical activity to maintain and/or improve measures of health and fitness, as well as decrease one's risk for many chronic diseases (World Health Organization, 2020). As such, we wanted to know if playing walking football occurred at or above a moderate intensity because then, if true, we might also expect the subsequent benefits of improved fitness (e.g., body weight maintenance, improved cardiovascular and muscular fitness) and decreased chronic disease risk (e.g., lower rates of all-cause morbidity, stroke, hypertension, coronary artery disease, type 2 diabetes, some forms of cancer, and depression) with long-term program adherence (World Health Organization, 2020).

Thus, the common goal amongst these initial quantitative projects were to determine the physiological intensity at which walking football was commonly played during competitive match play. Physiological intensity, in turn, was determined by measuring metabolic intensity, cardiovascular intensity, or walking cadence intensity. Measures of these physiological intensity markers could then be compared to established thresholds that correspond to a moderate intensity. For instance, the thresholds for metabolic and cardiovascular activity that correspond to a moderate intensity are ≥ 3.0 metabolic equivalents (i.e., ≥ 3.0 METs) (Haskell et al., 2007) and $\geq 65\%$ of maximal heart rate (i.e., $\geq 65\%$ %HRMAX) (American College of Sports Medicine, 1998). Similarly, walking cadence (WC, steps/min) has also been used as an indirect indicator of walking intensity with a threshold of 100 steps/min corresponding to a moderate intensity for steady-state walking activities (Tudor-Locke et al., 2018). It was hypothesized that each of these measures of physiological intensity would meet or exceed the established thresholds for a moderate intensity when playing competitive walking football.

2. METHODS

To address our hypotheses, we chose to observationally monitor participants who were already training as teams that were committed to competing in specific walking football tournaments. This convenience sampling approach was a necessary characteristic of these projects because a common strategy amongst the projects was to monitor entire teams during competitive match play. While very brief summaries of each project's methodology will be provided below, much greater detail can be found elsewhere (Heil et al., 2018; Heil et al., 2021; Salle et al., 2019). Prior to participation, each participant read and signed an Informed Consent document specific to each project that was approved by the Montana State University (Bozeman, MT USA) Institutional Review Board (IRB).

Participants

Given our interest in determining the physiological intensity of walking football during match play competition, as well as the desire to monitor participants while playing during the same match, our common strategy was to identify teams (through their coaches) competing in tournaments that were willing to participate. However, while competing in the tournament was a prerequisite for participating in each research project, volunteering as a research participant was not a requirement for participating in any of the tournaments. As such, this convenience sampling approach led to the monitoring of entire teams while they participated in tournaments in Singapore (November 2017), London (June 2019), and Perth (December 2019). Project 1 involved the monitoring of two women's teams from Singapore and Malaysia across two matches as part of the 2017 *Walking Football Healthy Asia* program in Singapore (Heil et al., 2018). This tournament, in fact, was the official launching of the WaF4H Asia Movement. Project 2 monitored a single men's team from Singapore across seven successive matches in one day during the 2019 *Walking Football Federation World Cup* in London, Walking Football 4 Health (WAF4H) Asia – A Movement to Promote Better Health and Wellbeing

England (Salle et al., 2019). Lastly, Project 3 monitored mixed-gender teams from Australia, Malaysia, and Singapore in eight successive matches during one day for the inaugural *Walking Football4Health International Communities Games* in Perth, Australia (Heil et al., 2021).

Summaries of our participant demographics are provided in Table 1 with reference to the participants' gender, their biological age at the time of each project, as well as their body mass index (BMI). In general, these participants in Table 1 are best described as middle-aged (35-64 years old) and older adults (≥ 65 years old) who are mostly classified as either "overweight" (25.0-29.9 kg/m²) or "obese" (≥ 30 kg/m²) (World Health Organization, 2004). The self-reported range of prior football playing experience was quite broad as well with participants across all projects self-reporting as little as one month of training prior to playing in a tournament to those who had 10+ years of competitive football experience as younger and/or middle-aged adults.

Table 1. Participant demographics for walking football teams participating in WF4Health research projects.

Study Reference	Team	Team Sample Sizes & Age (years)	BMI	
& Location Nationalities Gender (kg/m ²)	Project 1	Malaysia	8 women	37.0 \pm 6.0 32.9 \pm 5.7
Heil, Newton, & Salle (2018): Singapore (SGP)	Singapore	14 women	42.0 \pm 11.0	29.2 \pm 7.0
Project 2 (2019):	Singapore	9 men	58.6 \pm 5.4 26.6 \pm 5.4	Salle, Newton, & Heil London (GBR)
Project 3	Australia	5 women	50 \pm 5	30.2 \pm 5.3
Heil, Newton, & Salle (2021): Perth (AUS)	Malaysia	8 women	57 \pm 57	26.0 \pm 4.2
	Singapore	6 women	47 \pm 10	29.6 \pm 7.5

	<u>6 men</u>	<u>56±11</u>	<u>23.4±4.9</u>
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Instruments

Each project relied upon one or more wearable electronic devices for either direct or indirect monitoring of metabolic, cardiovascular, or walking intensity while playing walking football. To estimate metabolic intensity, Project 1 used a small commercially available global positioning satellite (GPS) monitor worn within a waist pack by each participant which provided the raw data for later conversion to walking speed and METs using a custom algorithm. Projects 2 and 3, however, used commercially available accelerometry-based activity monitors (AMs) to collect summarized body movement data that was later converted to METs using previously published algorithms. Using a separate proprietary algorithm, the AMs also provided a measure of walking cadence (WC, steps/min) that was reported for Project 3. Lastly, Project 1 also had participants wearing telemetry-based heart rate monitors (chest strap transmitter + wristwatch receiver) to directly monitor cardiovascular intensity during the walking football matches.

Procedures

The procedures for collecting data were similar for each of the three Projects. After securing the signed Informed Consent documents, measures of body height and weight were determined directly by either the coaching or research staff prior to each tournament. Researchers then met with the participating teams just prior to the start of each tournament to distribute and set up the wearable monitoring devices. The GPS and AM monitors were worn within a tight-fitting neoprene waist pack so that the monitors were always kept tight against the body. The heart rate monitors used in Project 1 were set up and tested using standard procedures for telemetry-based heart rate monitoring. All wearable monitors were initiated to start data collection just prior to the first match for each tournament and recorded continuously until shortly after the last match ended.

Data Analyses

Shortly after each tournament ended, the raw data from each electronic monitoring device was downloaded to a computer for processing and summarization. In general, each monitor's data from each match and each participant were first extracted from the raw data string. These data were then processed in a manner that was specific to each monitoring device with the common goal of creating an average measure that was representative of each participant's playing time. These measures included metabolic intensity (METs for all Projects), cardiovascular intensity (Project 1), or walking intensity (WC for Project 3). Summaries of these measures for each tournament were then compared directly to clinically relevant thresholds: METs ≥ 3.0 for metabolic intensity; %HRMAX $\geq 65\%$ for cardiovascular intensity; WC ≥ 100 steps/min for walking intensity. Finally, for the purpose of this manuscript, sample size weighted averages were computed for each outcome measure of interest (i.e., METs, %HRMAX, WC).

3. RESULT

Table 2 provides a summary of the physiological intensity outcomes from each of the three walking football Projects. Within each Project, the average measures of metabolic intensity were statistically greater than or equal to the 3.0 MET threshold with a range with a range of 3.3 to 4.1 METs. The average cardiovascular intensity of 86.8% of %HR_{MAX} for Project 1 easily exceeded the threshold of 65% of %HR_{MAX}. Lastly, walking cadence, the measure of walking intensity, averaged 54 steps/min and was statistically lower than the threshold of 100 steps/min.

Table 2. Summary of results from three projects evaluating measures of metabolic (METs), cardiovascular (%HR_{MAX}), and walking intensity. The bolded average values are sample-size weighted averages for each outcome measure. Note that while measures of metabolic (Projects 1-3) and cardiovascular (Project 1) intensity exceeded clinically relevant thresholds, the measure of walking intensity (Project 3) did not exceed the threshold.

Study	Team Nationalities	METs (dimensionless)	%HR _{MAX} (%)	Walking Cadence (steps/min)
Heil, Newton, & Salle (2018)	Malaysia	3.4 METs	86.1%	
	Singapore	3.2 METs	87.4%	
		Average = 3.3 METs	Average = 86.8%	
Salle, Newton, & Heil (2019)	Singapore	3.9-4.4 METs Average = 4.1 METs		
Heil, Newton, & Salle (2021)	Australia	3.3 METs		50
	Malaysia	3.8 METs		59
	Singapore	3.6 METs		57
		Average = 3.5 METs		Average = 54 steps/min

4. DISCUSSION

Walking Football for Health (WaF4H) Asia is a new movement that exemplifies what the United Nations refers to as sport for development and peace – i.e., programs that use a common community interest in sporting activities to leverage positive change in non-sport development goals. As such, the WaF4H Asia research team has engaged in a series of research projects focused on documenting the physiological intensity of match play walking football. In doing so, the WaF4H Asia research team has established the physiological basis (or limitation) to changes that may be observed with longitudinal or clinical trial types of research. In short, if the physiological intensity of walking football is not sustained above established clinically relevant thresholds, then the likelihood of observing practically and statistically significant changes in other markers of physical, mental, and social well-being are less likely.

However, as shown in Table 2, all three Projects reported metabolic intensity outcomes that exceeded the 3.0 MET threshold, while Project 1 also reported that cardiovascular intensity for both women's teams easily exceeded the 65% of HR_{MAX} threshold. What is especially striking about these results is the consistency of the findings when evaluated across three very different Projects. First, there was diversity in gender across the Projects: Project 1 focused on women's teams, and Project 2 focused on a men's team, while Project 3 focused on mixed-gender teams. Secondly, outcomes for Project 1 were averaged across two matches, while outcomes for Projects 2 and 3 were averaged across seven and eight successive matches, respectively. Third, matches for Projects 1 and 2 were on grass pitches while

Project 3 matches used an astro pitch surface (i.e., fast rolling surface). Finally, these three Projects were performed around the world (Singapore, London and Perth). Despite all the differences between these Projects, measures of both metabolic and cardiovascular intensity consistently exceeded the established thresholds. Thus, match play walking football in middle-aged and older adults can be considered as occurring at or above a moderate intensity.

We should note that Project 3 found that walking intensity, as determined by average walking cadence, was significantly lower than the established threshold of 100 steps/min (Table 2). We believe, however, that this result does not contradict the results for metabolic and cardiovascular intensities. Specifically, the 100 steps/min threshold was established for straight steady-state walking whereas walking football (like regular football) involves lots of directional changes, ball handling, as well as accelerations and decelerations. Thus, we should expect a higher metabolic and cardiovascular intensity than straight walking for a given walking cadence threshold. A reasonable extension of this finding is to suggest that a different walking intensity threshold needs to be established that is specific to match play walking football. This, in fact, will be the topic of a future walking football research project.

Future research

These walking football research projects have achieved a two-prong approach, namely as physical activity for the community to combat sedentarism, as well as walking football as a competitive sport. Currently, WaF4H Asia has spread its influence in Asia, Australia and London and also to South Africa, with its communities-crossingcountries health empowerment movement, now even encompassing three-generationfamilies playing together. Thus, it is imperative that the researchers also act as facilitators to support these collaborative projects in

order to be able to fully understand the nuances of the context and/or the environment, so future research can be designed to include other community demographics such as children, youth, adult, those with medical conditions, as well as the disabled. For the future, interdisciplinary research teams can be formed from several research fields, namely sociology, psychology, and education, to have the most precise and complex understanding of walking football as a community sport for development and peace.

5. CONCLUSION

The Walking Football for Health (WaF4H) Asia Movement exemplifies the use of sport for development and peace. While WaF4H Asia has general goals of impacting the physical, mental, and social well-being of middle-aged and older adults by playing walking football, the initial work of a quantitative research team evaluated the physiological intensity of match play walking football. In doing so, the research team sought to determine the suitability of walking football to meaningfully impact the general goals of WaF4H Asia. Over the course of three years and three different projects, walking football tournament teams were tracked with electronic monitoring devices while competing around the world (Singapore, London, and Perth). Using measures of both metabolic and cardiovascular intensity, the data from these projects demonstrated that walking football consistently meets and exceeds a moderate level of physiological intensity. Thus, like many other forms of recreational activity and competitive sports, the intensity of match play walking football is great enough to positively impact measures related to changes in physical, mental, and social well-being in middle-aged and older adults. These quantitative results support the use of walking football by WaF4H Asia to promote development and peace with health and fitness.

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