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Title

Physiological and Perceptual Responses to Latin Partnered Social Dance

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Abstract

The purpose of this study was to investigate the physiological and perceptual responses to Latin partnered social dance to salsa music when performed as a self-selected activity within an ecologically valid setting. Eighteen non-professional adult Latin dancers undertook a laboratory-based graded exercise test for determination of maximal oxygen uptake and maximal heart rate. The dancers then attended two Latin partnered social dance sessions in established salsa venues in London, UK over a 2 wk period. Physiological data were collected using a wrist-worn ActiGraph wGT3X+ accelerometer with accompanying heart rate monitor. Perceived benefits of dance were assessed via the Exercise Benefits/Barriers Scale, and measurement of state intrinsic motivation during dance was undertaken using the Intrinsic Motivation Inventory. Total step count during 2 h of dance was not different (t_{16} = –.39, p = .71) between females and males (9643 ± 1735 step); however, women expended a significantly lower (t_{16} = –2.57, p < .05) total energy expenditure when compared to men (479 ± 125 versus 651 ± 159 kcal). Dancers of both genders considered interest-enjoyment to be the motivator of primary importance. The highest rated perceived benefit of dance was psychological outlook. Latin partnered social dance to salsa music demands moderate to vigorous physical activity intensity levels, and further, fosters interest, enjoyment, and a positive psychological outlook among novice to advanced adult Latin dancers taking part primarily for leisure purposes. These findings may be of use for those interested in the efficacy of Latin social dancing as an expressive medium for the promotion of community health.

Keywords

Accelerometer; EBBS; IMI; Physical Activity; Salsa

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1. Introduction

Despite recognition that physical activity (PA) enhances health-related quality of life (Anokye, Trueman, Green, Pavey, & Taylor, 2012) and serves as a protective agent against the overall burden of disease (World Health Organization [WHO], 2010), almost half of all adults in high-income countries remain insufficiently physically active (WHO, 2011). The benefits of regular PA are firmly established in terms of a reduced risk for the major non-communicable diseases currently threatening global health (Lee et al., 2012). Additionally, and having also received extensive attention in the literature, PA is considered able to improve mental health and psychological well-being (Garber et al., 2011; WHO, 2005). Exercise has been shown to be therapeutically beneficial for both anxiety and depression (Carek, Laibstain, & Carek, 2011), and positive correlations exist between PA and self-esteem and physical self-perceptions (Opdenacker, Delecluse, & Boen, 2009).

Dance, a creative leisure pursuit when performed frequently enough to accrue a volume that meets the recommended health maintenance guidelines of at least 150 min of moderate intensity PA weekly (WHO, 2010), may prove to be an efficacious activity for community-wide recommendation (Burkhardt & Rhodes, 2012). Latin dance to salsa music has been investigated for its potential to positively affect both physical (Di Blasio, De Sanctis, Gallina, & Ripari, 2009; Emerenziani et al., 2013) and psychosocial health (Birks, 2007). Recently, we undertook an assessment of Latin dance using the objective measurement method of combined accelerometry and heart rate (HR) telemetry (Domene & Easton, 2014). Although the study was laboratory-based, a quantification of the characteristics of Afro-Cuban salsa was established. However, as this dance genre is generally performed in a social context (i.e., with partners and in established salsa venues), additional investigation is warranted as only one previous study (Emerenziani et al., 2013) has attempted to evaluate the physiological demand of Latin partnered social dance within an ecologically valid setting. The aforementioned research estimated energetic cost based on the relationship between HR and oxygen uptake (VO_2) established during a non-dance-specific task. HR recording and the use of non-dance-specific calibration procedures have now been shown to be

techniques that are less accurate for the determination of energy expenditure (EE) in this particular dance genre when compared to the activity-specific method of motion sensing with HR recording (Domene & Easton, 2014).

The measurement of stepping cadence during Latin partnered social dance has not previously been attempted, despite step count (SC) being a frequently used metric in the study of PA engagement (Tudor-Locke et al., 2011). The strengths and limitations of objectively measuring SC during ambulatory bipedal locomotor activities, including dance, were recently reviewed by Tudor-Locke and Rowe (2012). A measure of SC during dance would serve not only as an adjunct indicator of PA volume and intensity, but may also be of utility for dance-oriented health promotion strategies. Although certain gait parameters of dance would not necessarily be expected to match those observed when walking or running (Tudor-Locke & Rowe, 2012), the SC metric in a dance context is still meaningful for a comprehensive evaluation of the activity. Furthermore, we have previously demonstrated under laboratory conditions the validity and reliability of the measurement of SC during performance of Latin dance (Domene & Easton, 2014).

From the self-determination perspective (Ryan, Williams, Patrick, & Deci, 2009), the fulfillment of competence, autonomy, and relatedness needs have been theorized to contribute to intrinsic motivation (IM) for PA and its adherence. It is known that PA adherence is increased under enjoyable and socially supportive environments (Wankel, 1993), and as such, it could be argued that Latin dance is likely a holistic activity that has the potential to foster both physical and mental health. At the present time, however, the IM of non-professional adult Latin dancers has not been investigated in a social setting. Pender's model of health promotion (Pender, Murdaugh, & Parsons, 2011) identified factors that affect certain health-related behaviors, such as engagement in PA and exercise. The perceived benefits (PB) of these behaviors are determinants within the model, and thus, an assessment of these measures in the context of Latin partnered social dance may shed some light on why individuals perform this activity during their leisure time. Furthermore, to inform the design of PA interventions utilizing Latin dance, it is necessary, firstly, to

understand the extent to which non-professional adult dancers are driven by the physical and psychosocial aspects of the activity. Currently, the PB of the social engagement of this particular dance genre have not been measured.

The purpose of this study was therefore to investigate the physiological and perceptual responses to Latin partnered social dance to salsa music when performed as a self-selected activity within an ecologically valid setting. We sought to examine, using an observational research design and a previously validated dance-specific technique (Domene & Easton, 2014), gender differences in measures of EE, SC, PA volume, and intensity of Latin partnered social dance, and determine what fraction of the total time was spent engaged in dance. Furthermore, to present a holistic understanding of this particular dance genre, the underlying dimensions of state IM were measured and the PB of dance were determined.

2. Methods

2.1. Participants

Recruitment was undertaken using advertisements directed to Latin dance schools based in London, UK. Eighteen non-professional adult Latin dancers (11 women and seven men, aged 27 to 57 yr) volunteered to participate in this study, which had been approved by the Faculty Ethics Committee at Kingston University and was conducted in accordance with the Declaration of Helsinki of 1964. Descriptive characteristics are presented (Table 1). The dancers gave their informed consent in writing before the commencement of the study and after the experimental procedures, risks, and benefits of participation had been explained. A PA readiness form (Adams, 1999) was completed. Inclusion criteria stated that the dancers must have attended Latin social dance events in established salsa venues in London, UK for at least 2 h/wk in the three months preceding the research period, be of a novice to advanced level of Latin dance and a recreational performer only, and be free from musculoskeletal injury at the time of laboratory testing and data collection.

2.2. Laboratory procedure

The dancers visited the laboratory to perform a graded exercise test for determination of maximal VO_2 and maximal HR. Maximal VO_2 was used for descriptive characterization of the

dancers while maximal HR was necessary to formulate exercise intensity expressed as HR reserve (HRR) during dance. Instructions were given to arrive euhydrated, at least 2 h postprandial, and to avoid strenuous exercise in the 24 h preceding testing. Following 15 min of seated rest, resting HR and blood pressure were measured using an automated monitor (Elite 7300IT, Omron Healthcare Inc, Lake Forest, USA). Stature was determined with a stadiometer (213, Seca Ltd, Birmingham, UK), and body mass and percent body fat were assessed using multifrequency bioelectrical impedance analysis (MC 180MA, Tanita Europe BV, Amsterdam, Netherlands). Capillary blood samples were collected for measurement of glucose and total cholesterol using an automated analyzer (Accutrend GC, Hoffman-La Roche Ltd, Basel, Switzerland). Latin dance experience and frequency were self-reported.

The graded exercise test was conducted on a treadmill (Venus, H/P/Cosmos Sports & Medical GmbH, Nussdorf, Germany) using the Bruce protocol (Bruce, Kusumi, & Hosmer, 1973) and was terminated when volitional exhaustion was reached. HR was measured via radio telemetry (RS400, Polar Electro Oy, Kempele, Finland) and breath-by-breath pulmonary gas exchange data were collected using an indirect calorimeter (Oxycon Pro, Viasys Healthcare GmbH, Hoechberg, Germany). Maximal VO_2 was calculated by averaging the VO_2 data during the final 30 s of the test. A maximal effort was deemed to have been given if at least two of the following criteria were satisfied upon test termination: a plateau in VO_2 of < 150.0 mL/min; a respiratory exchange ratio of > 1.10, and a HR response within 10 beat/min of age-predicted maximal HR. All dancers met at least two of the criteria. Maximal HR was taken as the highest HR attained during the treadmill test.

2.3. Instruments

The dancers were familiarized with the instruments and instructed on their proper usage. A triaxial accelerometer (wGT3X+ 2.0, ActiGraph LLC, Pensacola, USA) worn on the right wrist (Domene & Easton, 2014) was initialized using the manufacturer's software (Actilife 6.2, ActiGraph LLC, Pensacola, USA) for data recording on the vertical, anteroposterior, and mediolateral axes at a sampling frequency of 100 Hz and a dynamic range of ± 6 *g*.

Additionally, the manufacturer's accompanying chest strap monitor, worn at the level of the xiphoid process of the sternum, was utilized for recording of HR. The monitor permits measurement of HR and telemetry of data via the ANT+ protocol to the accelerometer for recording. Downloading of the HR and vector magnitude (VM) acceleration data was undertaken using the manufacturer's software with 1 s epochs selected and the low frequency extension enabled. The equipment allows continuous recording of both body acceleration and HR response, and is lightweight, small, and unobtrusive during dance performance. Furthermore, the equipment neither restricts body movement nor impedes the ability to dance normally.

Measurement of Latin dance state IM was undertaken using the four dimension Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1989). The questionnaire is scored on a Likert-type scale from one (strongly disagree) to seven (strongly agree) and has been shown to have adequate internal consistency with Cronbach coefficient alphas of 0.80, 0.87, 0.84, and 0.68 for the dimensions of interest-enjoyment, perceived competence, effort-importance, and tension-pressure, respectively. The first three of these dimensions have been theorized to positively indicate IM, while, conversely, tension-pressure has been theorized to be a negative indicator of IM. The wording of the instrument was slightly altered to reflect the activity of dance.

PB of Latin dance were measured via the Exercise Benefits/Barriers Scale (EBBS; Sechrist, Walker, & Pender, 1987). The questionnaire uses a four response Likert-type scoring system ranging from one (strongly disagree) to four (strongly agree). Only the perceived benefit items of the instrument were scored; barrier questions were ignored. PB are comprised of the following five factors: life enhancement; physical performance; psychological outlook (a state of improved mental health and well-being, experiencing a sense of enjoyment or accomplishment, or being relaxed and without feelings of stress or tension); social interaction; and preventative health. Internal consistency has been reported to be good, with a Cronbach coefficient alpha of 0.95 for the benefits component of the scale. Instructions were given to answer the questions in the context of the specific activity

being researched (i.e., dance). The dancers completed the EBBS on a single occasion (the day of their laboratory visit) in order to capture general ideas relating to the PB of dance.

2.4. Latin dance sessions

The dancers attended two Latin partnered social dance sessions in established salsa venues in London, UK over a 2 wk period. Each session was 2 h in length, and a recovery period of at least 48 h was taken between sessions. Instructions were given to perform euhydrated, at least 2 h postprandial, and to avoid strenuous exercise in the 24 h preceding dancing. The salsa venues and session start times were self-selected by the dancers and were chosen to be representative of where and when they normally took part in the activity. Both sessions were performed at the same time of day (± 1 h). The dancers were instructed that only time spent in social dance would be eligible for analysis; participation in instructor-led group classes of Latin dance (which commonly precedes social dance time in many salsa venues) would have been unsuitable for this study as the performance of dance under these conditions is not entirely self-selected. Additionally, the dancers were given specific instructions to treat the sessions as normal social dance events and to not alter their behavior in any way due to attachment of the accelerometer and HR monitor. The dancers completed the IMI immediately following each session in order to capture their state IM for dance.

2.5. Data analysis

Calculations of EE, SC, HR, HRR, maximal HRR, VM acceleration, PA volume, and time spent dancing were undertaken using the mean of the data collected during the two dance sessions. Mean values were used to minimize intraindividual variability. Time spent dancing was established by summing the VM acceleration data that corresponded to a PA intensity other than sedentary using dance-specific wrist location cut-points (Domene & Easton, 2014). EE and SC during dance were computed using previously validated methods (Domene & Easton, 2014). Laboratory-measured resting and maximal HR were used to formulate HRR and maximal HRR via the Karvonen method (Karvonen, Kentala, & Mustala, 1957). PA volume was calculated from time spent dancing, metabolic equivalents (MET)

during dance (where 1 MET = 1 kcal/kg/h), and Latin dance frequency. Moderate and vigorous PA intensities were defined as 3.00 to 5.99 and ≥ 6.00 MET, respectively (Garber et al., 2011). IM ratings were averaged between the sessions before analysis.

All statistical analyses were conducted using Statistical Package for the Social Sciences (SPSS 19.0, IBM Corp, Armonk, USA). Independent *t*-tests were used to evaluate the descriptive characteristics and ascertain differences between female and male dancers. Differences between genders in EE, SC, HRR, maximal HRR, PA volume, and time spent dancing were also determined using independent *t*-tests. Reliability of HR and VM acceleration between dance sessions was established using dependent *t*-tests. A two-way (gender x indicator) mixed analysis of variance with repeated measures on the second factor was used to explore IMI ratings. Analysis of EBBS ratings was undertaken in a similar fashion to that of IM, except the within-subject factor was changed to perceived benefit. Positive indicators of IM were further examined using repeated measures analysis of variance for each gender. Alpha was set at 0.05 and Bonferroni corrections were made for pairwise comparisons. Centrality and spread are presented as mean ± standard deviation with 95% confidence intervals (CI) reported where appropriate. Non-normally distributed data were assessed using non-parametric methods (i.e., Mann-Whitney tests).

3. Results

3.1. Physiological responses to Latin dance

Results of the Latin partnered social dance physiological assessment are presented (Table 2). In summary, during the 2 h session, no difference (t_{16} = –.29, p = .77) was observed between genders for the total amount of time spent dancing, which was 80 ± 12 min. Total SC during dance was not different (t_{16} = –.39, p = .71) between female and male dancers; however, women expended a significantly lower (t_{16} = –2.57, p < .05) total EE from dance, by an average of 172 [95% CI 30 – 314] kcal, when compared to men. No difference (t_{16} = –.19, p = .85) was revealed between genders in accrued PA volume from dance.

When the dance session was examined for moderate intensity PA engagement, women spent a significantly greater (t_{16} = 2.26, p < .05) amount of time dancing when compared to

men (45 ± 6 versus 37 ± 9 min). The average difference was 6.6 [95% CI 0.4 – 12.7] % of the total session time, or 8 [95% CI 0 – 15] min. Female dancers were found to have a significantly lower (U = 7.00, p < .01) EE, by an average of 0.34 [95% CI 0.16 – 0.51] kcal/kg/h, when compared to male dancers. Female dancers also demonstrated a significantly lower (U = .00, p < .001) SC when compared to their male counterparts. The average difference was 3 [95% CI 1 – 4] step/min. No differences in HRR (t_{16} = .80, p = .44) or maximal HRR (t_{16} = .95, p = .36) were found between genders.

When examining the dance session for engagement in vigorous intensity PA, no differences were observed between female and male dancers in measures of time spent dancing (t_{16} = –1.25, p = .23), which was 37 ± 16 min, EE (t_{16} = –.66, p = .52), SC (U = 34.00, p = .68), HRR (t_{16} = .25, p = .80), or maximal HRR (t_{16} = .90, p = .38).

3.2. Reliability of Latin dance sessions

Results of the VM acceleration reliability analysis indicated no difference (t_{17} = –.46, p = .65) between dance sessions (204 ± 37 and 208 ± 37 count/s for sessions 1 and 2, respectively). Furthermore, results of the HR reliability analysis also indicated no difference (t_{17} = .20, p = .84) between dance sessions (121 ± 17 and 120 ± 15 beat/min for sessions 1 and 2, respectively).

3.3. Latin dance state IM

Ratings for the underlying dimensions of IM for Latin partnered social dance are presented (Table 3). Significant main effects of indicator ($F_{1,16}$ = 156.54, p < .001) and gender ($F_{1,16}$ = 6.71, p < .05) were revealed, with positive indicators rated higher than negative by an average of 2.40 [95% CI 2.00 – 2.81], and overall ratings of male dancers scoring higher than those of female dancers by an average of 0.95 [95% CI 0.17 – 1.72]. No interaction ($F_{1,16}$ = 3.65, p = .07) was observed between the independent variables. Assessment of the individual dimensions positively indicating IM resulted in a significant main effect for both women ($F_{2,20}$ = 3.56, p < .05) and men ($F_{2,12}$ = 4.28, p < .05). Dancers of both genders considered interest-enjoyment to be the motivator of primary importance. Post hoc analyses revealed that interest-enjoyment was significantly higher (p < .05) than effort-

importance by an average of 0.99 [95% CI 0.08 – 1.90] for female dancers. For male dancers, interest-enjoyment was significantly higher ($p < .05$) than perceived competence by an average of 1.00 [95% CI 0.24 – 1.76]. No other differences were found between the individual dimensions.

3.4. Latin dance PB

Perceptions of the benefits of Latin partnered social dance are presented (Table 4). Significant main effects of benefit ($F_{4,64} = 13.47$, $p < .001$) and gender ($F_{1,16} = 216.93$, $p < .001$) were revealed; however, no interaction effect ($F_{4,64} = 1.04$, $p = .39$) was present. Both females and males considered psychological outlook to be the dance-related benefit of greatest importance. Post hoc tests indicated that psychological outlook was significantly higher ($p < .001$) than life enhancement by an average of 0.66 [95% CI 0.38 – 0.93], physical performance by an average of 0.61 [95% CI 0.25 – 0.97], and preventative health by an average of 0.79 [95% CI 0.36 – 1.22]. Furthermore, social interaction was found to be significantly higher ($p < .05$) than life enhancement by an average of 0.45 [95% CI 0.06 – 0.84] and preventative health by an average of 0.58 [95% CI 0.05 – 1.11]. No other differences were observed between the PB. It was revealed that women demonstrated significantly higher ($p < .001$) perceptions of the benefits of dance, by an average of 0.29 [95% CI 0.09 – 0.66], when compared to men.

4. Discussion

The purpose of this investigation was to evaluate the physiological and perceptual responses to Latin partnered social dance. The principal findings were that, Latin dance to salsa music demands moderate to vigorous PA intensity levels when engaged in as a self-selected activity within an ecologically valid setting, and further, fosters interest, enjoyment, and a positive psychological outlook among novice to advanced adult Latin dancers taking part primarily for leisure purposes.

As expected, male dancers displayed higher maximal VO_2, body mass, and lower body fat, when compared to female dancers. Laboratory-measured maximal VO_2, an indicator of cardiorespiratory fitness, was found to be of average level for both the female and male non-

professional adult Latin dancers in the present study in comparison with normative data (Thompson, Gordon, & Pescatello, 2010). Despite having only average fitness levels, the dancers in this investigation fared better in all four of the metabolic risk factors for non-communicable disease (body mass index, systolic blood pressure, glucose, and total cholesterol) than the 2011 UK population figures reported by the WHO (WHO, 2011). This, of course, cannot be attributed solely to participation in dance as the design of our study was observational in nature; however, sufficient physical activity (WHO, 2010) has consistently been shown to be negatively correlated with the development of obesity, hypertension, glucose intolerance, and dyslipidemia in otherwise healthy adults (Garber et al., 2011).

The dancers in the current work accrued a total dance-related PA volume of 20.7 MET h/wk. Leisure activities of moderate to vigorous intensity have been shown to be substantially beneficial for adults in terms of decreased mortality risk and improved life expectancy (Moore et al., 2012). In a pooled prospective cohort analysis of 650,000+ women and men aged 21 to 90 yr, Moore et al. (2012) demonstrated that individuals taking part in 15.0 to 22.4 MET h/wk of moderate to vigorous intensity leisure PA increased life expectancy by 4.2 [95% CI 4.0 – 4.5] yr. The accrued PA volume from Latin dance observed in this investigation, even after exclusion of non-dancing time, was more than double the WHO-recommended level for adults aged 18 to 64 yr (Moore et al., 2012; WHO, 2010). These findings are especially intriguing considering that data were collected within an ecologically valid setting with results indicating that dancers who took part in this activity did so for reasons other than for physical health gains.

The fraction of the total time spent engaged in dance was quantified via motion sensing technique. This measurement is of particular importance as Latin partnered dance is essentially a self-selected activity with performance involving a certain degree of improvisation when undertaken socially. It was found that one third of social dance time was spent not dancing; however, the remainder of the time yielded slightly less than 10,000 step taken by both female and male dancers. This number of steps has been suggested to be a reasonable target for healthy adults seeking to meet recommended guidelines for daily PA

involvement for the maintenance of health (Tudor-Locke et al., 2011). This study is also the first to report measurement of stepping cadence during Latin partnered social dance, which ranged from 114 to 131 step/min, a value well above the intensity of 100 to 110 step/min demonstrated to be the equivalent of moderate intensity walking (Marshall et al., 2009). Accelerometer-determined steps have been shown to be negatively associated with cardiovascular disease risk, whereby each 1000 step increment in daily SC resulted in a reduced odds of metabolic syndrome development of 10 to 13% for both women and men (Sisson et al., 2010).

Although a target EE of ~1000 kcal/wk from PA is recommended for the general adult population, recent evidence suggests that a reduced risk of cardiovascular disease and premature mortality actually begins at an EE of ~500 kcal/wk (Garber et al., 2011). This value is similar to the total EE observed in the present study following 2 h of social dance time. Interestingly, relative EE during dance ranged from 4.91 to 7.35 kcal/kg/h, which is higher than the results reported by Emerenziani et al. (2013; 3.90 to 5.50 MET; where 1 MET = 1 kcal/kg/h). This apparent discrepancy is likely due to the different techniques used for EE determination. The aforementioned project was conducted using HR recording and a non-dance-specific calibration procedure. In contrast, EE in this study was derived using a previously validated dance-specific combined accelerometry and HR technique that has been shown to predict EE during dance more accurately than the use of HR alone (Domene & Easton, 2014).

In a cohort of adults of approximately the same age as the dancers in this study, Hanrahan, Pedro, and Cerin (2009) examined IMI responses to instructor-led group classes of Latin dance. All three of the positive indicators of IM were rated similarly as those reported in this study, suggesting that novice to advanced dancers engaging in Latin dance primarily for leisure purposes are equally intrinsically motivated during both class time and social dance time. Whether this remains the same when physically inactive and inexperienced individuals take up dance for health-related purposes is yet to be investigated. Tension-pressure was also rated similarly between the two studies for male dancers. Female

dancers, however, in the present investigation had a considerably lower tension-pressure rating when compared to the results of Hanrahan et al. (2009). This is likely a result of autonomy during instructor-led group classes, in comparison with social dancing, being lower due to the nature of the teaching/learning environment. The current work demonstrates the contribution that interest and enjoyment make to IM for PA. The importance of IM in terms of PA adherence, and in turn its PB, is well established in the literature (Wankel, 1993).

In a study comprising 200 physically inactive women (Lovell, El Ansari, & Parker, 2010), it was shown that the PB of traditional exercise, measured via the EBBS, were rated lower than the benefit scores reported in the present investigation for female dancers. This suggests that women who take part in Latin dance perceive greater benefits from engagement in this activity than physically inactive women do from traditional exercise, a result possibly due to the social nature of this dance genre. Additionally, it was reported that physically inactive mothers rated the EBBS factors of life enhancement and social interaction as highest and lowest, respectively, during a 12 wk exercise intervention (Ransdell et al., 2004). These results are in contrast to the findings presented here. The authors of the aforementioned research suggested that the most beneficial aspects of exercise were improved alertness, fatigue, and sleep. The women in this investigation, however, considered there to be a substantial psychosocial component involved in the performance of Latin dance. This psychosocial benefit likely plays an important contributing role in why individuals choose to pursue this particular dance genre.

Although our work indicates that Latin dance to salsa music is a holistic pursuit with the potential to positively affect both physical and mental health, there are certain limitations that must be recognized. Firstly, our observational research design did not use a reference or control condition; secondly, the dancers who volunteered for this study were already familiar with the activity; and thirdly, we did not ask the dancers to self-report lifestyle factors such as engagement in other forms of PA. Accordingly, these findings should be interpreted

cautiously if attempting to make inferences to physically inactive individuals with no previous experience in dance.

5. Conclusions

Adults seeking to become more physically active could select this particular genre of dance to take part in as engagement over two sessions weekly would mean meeting the PA guidelines for physical and psychosocial health maintenance (Garber et al., 2011; WHO, 2005; WHO, 2010). Moreover, our findings indicate that Latin dance fosters a positive psychological outlook alongside feelings of interest and enjoyment. Those interested in the efficacy of Latin social dancing as an expressive medium for the promotion of community health may find these results intriguing. The application of combined HR and movement registration to evaluate physiological load during dance is a new technique that shows promise not only for the purposes of health promotion through dance, but also potentially in other dance genres and contexts as well.

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Table 1
Descriptive characteristics of non-professional Latin dancers from London, UK.

	Total	Women (*n* = 11)	Men (*n* = 7)
Age (yr)	40 ± 9	42 ± 11	37 ± 4
Body mass (kg)	66.7 ± 9.8*	62.0 ± 7.5	74.2 ± 8.6
Body fat (%)	22.5 ± 7.3**	26.7 ± 4.8	15.9 ± 5.6
Body mass index (kg/m^2)	23.6 ± 2.6	23.4 ± 2.8	24.0 ± 2.3
Maximal oxygen uptake (mL/kg/min)	36.7 ± 8.5**	32.0 ± 7.1	44.0 ± 3.7
Maximal oxygen uptake (percentile)	50 ± 20	45 ± 25	55 ± 20
Systolic blood pressure (mmHg)	120 ± 10	119 ± 11	120 ± 8
Glucose (mmol/L)	4.9 ± 0.7	4.8 ± 0.6	5.1 ± 1.0
Total cholesterol (mmol/L)	5.0 ± 0.8	5.2 ± 0.9	4.7 ± 0.6
Latin dance experience (yr)	6 ± 5	6 ± 6	5 ± 5
Latin dance frequency (h/wk)	5 ± 3	5 ± 3	5 ± 2

Note: data are presented as mean ± standard deviation; * and ** indicate significant differences between genders at the $p < .01$ and $p < .001$ levels, respectively.

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Table 2
Physiological responses to Latin partnered social dance.

	Total	Women (*n* = 11)	Men (*n* = 7)
Two hour Latin dance session			
Time spent dancing (%)	66.3 ± 10.2	65.7 ± 11.2	67.2 ± 9.2
EE (kcal)	546 ± 160*	479 ± 125	651 ± 159
SC (step)	9643 ± 1735	9514 ± 1741	9846 ± 1844
PA volume (MET h/wk)	20.7 ± 11.5	20.2 ± 11.7	21.3 ± 12.2
Moderate intensity PA engagement			
Time spent dancing (%)	35.1 ± 6.7*	37.6 ± 5.0	31.1 ± 7.4
EE (kcal/kg/h or MET)	5.05 ± 0.23**	4.91 ± 0.17	5.25 ± 0.16
SC (step/min)	115 ± 2***	114 ± 2	117 ± 0
HRR (%)	42.7 ± 9.5	45.0 ± 8.8	41.2 ± 10.1
Maximal HRR (%)	80.9 ± 12.6	83.2 ± 11.2	77.4 ± 14.7
Vigorous intensity PA engagement			
Time spent dancing (%)	31.1 ± 13.2	28.0 ± 12.5	35.9 ± 13.8
EE (kcal/kg/h or MET)	7.30 ± 0.27	7.27 ± 0.27	7.35 ± 0.29
SC (step/min)	130 ± 3	130 ± 3	131 ± 1
HRR (%)	55.5 ± 11.2	56.0 ± 11.2	54.6 ± 12.0
Maximal HRR (%)	81.5 ± 13.1	83.7 ± 11.2	78.0 ± 16.0

Note: data are presented as mean ± standard deviation; EE, energy expenditure; HRR, heart rate reserve; MET, metabolic equivalents; PA, physical activity; SC, step count; *, **, and *** indicate significant differences between genders at the $p < .05$, $p < .01$, and $p < .001$ levels, respectively.

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Table 3
Indicators of intrinsic motivation for Latin partnered social dance.

	Women (*n* = 11)	Men (*n* = 7)
Positive		
Interest-enjoyment	5.85 ± 0.82	6.27 ± 0.64
Perceived competence	5.62 ± 0.89	5.27 ± 0.78
Effort-importance	4.86 ± 0.94	5.38 ± 0.93
Average	5.44 ± 0.96	5.64 ± 0.88
Negative		
Tension-pressure	1.96 ± 0.67	3.27 ± 1.11
Average	1.96 ± 0.67	3.27 ± 1.11

Note: data are presented as mean ± standard deviation.

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Table 4
Perceived benefits of Latin partnered social dance.

	Women (*n* = 11)	Men (*n* = 7)
Benefit		
Life enhancement	3.03 ± 0.42	2.72 ± 0.45
Physical performance	3.17 ± 0.56	2.66 ± 0.49
Psychological outlook	3.67 ± 0.33	3.45 ± 0.41
Social interaction	3.32 ± 0.48	3.32 ± 0.51
Preventative health	2.91 ± 0.58	2.57 ± 0.69
Average	3.22 ± 0.35	2.94 ± 0.40

Note: data are presented as mean ± standard deviation.