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Physical activity levels and motivational responses of boys and girls: A comparison of direct instruction and Tactical Games Models of games teaching in physical education

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Abstract

The purpose of this study was to independently determine the levels of moderate-to-vigorous physical activity (MVPA) and self-determined motivation of both boys and girls as they participated in prolonged units of invasion games (i.e. 6-12 lessons) through two pedagogical models; direct instruction and the Tactical Games Model (TGM). It was hypothesized that given the differences in domain interaction and lesson structure, both boys and girls would gain higher levels of physical activity (PA) and possess higher quality motivation during TGM-based lessons when compared to direct instruction lessons. Seventy-two children aged 11-12 years; (42 boys, 30 girls) were randomly assigned to either a control or intervention group (TGM). Children wore RT3® triaxial accelerometers over a 12 week period to objectively measure time spent in MVPA. The System for observing Fitness Instruction Time (SOFIT) tool was completed during each lesson to additionally assess lesson context information and teacher behavior. SDT questionnaires were also completed, pre and post-intervention. Boys in the TGM condition displayed significantly higher levels of MVPA in both rugby and football activities in comparison to the control group although no significant differences in motivation were noted post-intervention. While girls in the TGM condition recorded comparable PA levels in the football sessions, they recorded significantly lower PA activity levels in the netball lessons. There were no significant differences in girls' motivation post-intervention. It is recommended that future studies build on this research by continuing to examine PA and the quality of student motivation while using GCAs over prolonged unit lengths (i.e. greater than 12 lessons) using structural equation modeling techniques to assess the relationships between, and mediating influences of, SDT constructs on PA levels.

Keywords: Tactical Games Model, direct instruction, physical activity, student motivation, physical education

Introduction

Given the growing concerns regarding low physical activity (PA) levels amongst children and the potential associated health consequences (Health and Safety Executive, 2008), the school physical education lesson has been highlighted as the place to reach most young people to promote a healthy active lifestyle (e.g. McKenzie and Lounsbery, 2008). The Institute of Medicine (IOM; 2013) in the United States (US) and the Association for Physical Education (AfPE; 2008) in the United Kingdom (UK) have both outlined that students should engage in MVPA for at least 50% of the physical education lesson, targets that are typically not met in the US or UK by boys or girls (e.g. Fairclough and Stratton, 2005a; McKenzie et al., 2006). One explanation for these findings could potentially be the current domination of the multi-activity curriculum in physical education where there has been an over-reliance on a direct instruction model (Roberts & Fairclough, 2011). In this model constituent parts of sports and games are broken down and techniques are practiced in isolated, decontextualized conditions where practice is unlikely to generalize to actual game conditions (Light et al., 2012).

The direct instruction model is divided into a lesson format of: introductory activity, a skill/drill practice phase focused on developing and improving technique or aspects of technique, followed by a game (Blomqvist et al., 2001). The main aim of this model of teaching is to develop 'technical proficiency' (Oslin and Mitchell, 2006, p. 627) as it emphasizes a 'skills first' orientation where skills are learned 'before the introduction of rules and game play'. This model of teaching is also characterized by what Light and Kentel (2010) call a 'hard' masculinized pedagogy where the teacher is an authoritative expert passing on objectified knowledge, resulting in a power imbalance between the teacher and the students. Moreover, this 'hard', masculinized form of PA and sports participation has tended to marginalize some learners, particularly girls, and affect their engagement in, and motivation for, physical education and PA (Armstrong and Welsman, 2006).

As a way of expanding the focus of physical education and its goals and purposes beyond a 'training' model, Metzler (2011) offered seven alternative pedagogical models that are used within the curriculum outside direct instruction. One such model, the Tactical Games Model (TGM) is an Americanized derivative of the Teaching Games for Understanding (TGfU) approach (Bunker and Thorpe, 1986). Bunker and Thorpe critiqued the direct instruction model of games teaching, arguing that most students obtained little game understanding during physical education lessons taught using this model and, as a result, possessed inflexible techniques and poor decision-making skills (see Stoltz and Pill, 2014 for a further review).

In contrast to the direct instruction model, game centered approaches (GCAs) such as TGfU and TGM present an initial game form first, introducing skill practice second and 'when needed'. As Mitchell, Griffin and Oslin (2006) note, the *what* therefore comes before the *how* in GCAs such as the TGM. This refutes the notion that quality game play cannot emerge until the core techniques are mastered a priori (Oslin and Mitchell, 2006, p. 627) and instead offers a way of linking techniques and tactics with the aim of promoting skillful and intelligent performance. This link between tactics and technique is promoted in the TGM by the utilization of a game-practice-game format that Oslin and Mitchell (2006) argued 'assisted teachers in lesson planning and instruction' (p. 629).

In an example of the TGM game-practice-game format, the first phase of the lesson focuses on an initial game form that is modified to 'represent its advance form and exaggerated to present the students with tactical problems' (Mitchell, Oslin & Griffin, 2006, p. 13). Representation of its advanced form occurs by the teacher using smaller-sided versions of games such as a 5 vs. 5 game of soccer or 'High Fives' netball. Exaggeration occurs when games are 'conditioned' with changes to secondary rules such as increasing the number of goals students may be able to score a goal into in 5 vs. 5 soccer. As students play in this initial modified game form, they develop knowledge of the games rules through conditions that have

been applied. Questioning by the teacher then further develops students thinking about how to solve the tactical problems of the representative and exaggerated game form. Mitchell et al. (2006) note that this questioning is a critical part of the teachers planning for the lesson. Through this skillful questioning and further game play practice, students begin to realize they need to be able to, for example, dribble and/or pass the ball effectively in order to open up potential scoring opportunities for their team-mates. At this point, a formal skills practice can be set up to help students work on these critical elements of the technique, and although these dribbling and/or passing skills are now the focus of the lesson, the students were not advised of this at its start. The lesson is then concluded with a further game play portion to reinforce the need for dribbling and/or passing skills so as to be able to change the point of attack quickly and expose the defensive team.

Roberts and Fairclough (2011) found that physical education lessons centered on the direct instruction model resulted in high levels of inactivity. They argued this was related to, a) high levels of teacher management time, b) too much time in lessons being centered on skill and drill practice, and, c) the teachers overuse of full-sided versions of games (e.g., 11 vs. 11 soccer or 5 v 5 basketball). Moreover, within these full-sided games some students were left to 'sit out' on the sidelines. While Roberts and Fairclough (2011) focus was on boys only, it revealed English physical education teachers' over-reliance on the 'hard' direct instruction model to the detriment of students' PA levels. They intimated that involvement in small-sided modified/conditioned games, a staple feature of GCAs, could potentially increase students' (both boys and girls') PA levels.

Previously, Yelling et al. (2000) measured the PA of six girls using Heart Rate Monitoring (HRM) and found that higher levels of PA occurred in lessons that had higher levels of games-based activity. One obvious limitation to this study, however, was the small number of participants (N=6) and a lack of prolonged assessment of PA within both skill dominated and games-based lessons. More recently, Van Acker et al. (2010) also used HRM

to measure a larger sample of students' PA (N=235) within korfball lessons taught using a European derivative of TGfU, the 'invasion games competence model'. Findings showed that these game-focused lessons produced MVPA levels over 50% criterion identified by the IOM and AfPE, with girls reaching levels higher than their male classmates. While possibly indicating some of the benefits of GCAs in meeting the 50% MVPA criterion, a limitation of this study was that PA assessment was only conducted during a one-off lesson, meaning that like the Yelling et al. (2000) study, there was a lack of consideration of the potential between lesson variations in MVPA that may occur over the course of a prolonged unit of work (i.e. 6-12 lessons). The authors also acknowledged that the higher reported levels for girls could be due to the issues surrounding HRM where girls typically have a slower HR recovery and a higher HR than boys, an issue that could be overcome by using an alternative measurement instrument such as accelerometers (Stratton, 1996).

Not only do previous studies suggest that GCAs such as TGM can benefit student PA levels, separate studies examining student motivation levels also suggest that this is a significant factor in students' propensity to engage in physical education. For example Jones, Marshall and Peters (2010) suggest that the environment or motivational climate within which physical education lessons are delivered can greatly effect students' intrinsic motivation and perceived competence. One theory that is supportive of the importance of such dimensions is that of Self-Determination Theory (SDT; Ryan and Deci, 2000). SDT is based upon three innate psychological needs: competence, autonomy and relatedness (Ryan and Deci, 2000). If these innate needs are satisfied (need satisfaction), the individual becomes more autonomously motivated and this, in turn, gives rise to high quality motivation (Ryan and Deci, 2000). According to SDT, autonomous motivation (i.e. self-regulated behavior; McLachlan and Hagger, 2010) falls broadly into two forms: intrinsic and identified motivation. Figure 1 represents the continuum of motivation, which illustrates examples of identified and intrinsic motivation which fall at the self-determined end of the continuum

(higher quality motivation). SDT also suggests a large distinction between autonomous motivation and controlled motivation (Deci and Ryan, 2000). Whereas autonomous motivation gives rise to higher quality motivation, controlled motivation is found at the lower quality end of the spectrum (away from self-determined values) in the form of external or introjected motivation (see figure 1).

Individuals who display high levels of autonomous motivation become more intrinsically motivated and therefore feel more stimulated and motivated by physical education. This has been shown to lead to an increase in levels of PA during physical education lessons (Lonsdale et al., 2009) as well as greater engagement in PA outside of school (Haerens et al., 2010) and continuation of physical activity beyond the school years (Ntoumanis, 2001). Similarly, Standage et al. (2005) established that when a self-determining environment is created, students' intrinsic motivation and satisfaction was enhanced, thus providing indications that autonomous environments may help predict participation and effort during physical education (Standage et al., 2005).

To help build on this research it is therefore relevant to examine how curriculum strategies in physical education, and in particular the use of pedagogical models (Metzler, 2011), affect both PA levels and factors associated with student motivation, such as intrinsic motivation and perceived competence. For example, Jones et al. (2010) investigated changes in the six subscales of Intrinsic Motivation Inventory (IMI) (perceptions of interest/enjoyment, sport competence, effort/importance, choice, pressure/tension and usefulness) to ascertain differences between 11-14 year old groups taught using a direct instruction and a TGfU approach in single-sex groupings over the course of a six-week unit of work on basketball. Controlling for baseline scores on the IMI with an analysis of covariance, they found significant differences on all six subscales at the conclusion of the unit, also noting significant gender and interaction effects where 'girls perceived TGfU related activities to fulfill individual needs and provide satisfaction more than boys' (p. 61). Jones and colleagues

206 further identified that an increase in intrinsic motivation levels for students in the TGfU group
207 may have resulted from the fun and enjoyment that a student experienced due to TGfU's
208 games-orientated approach, a link which has also been shown in previous research (Griffin et
209 al., 1995). Perceived choice was also identified as a factor lending to increases through
210 intrinsic motivation i.e. that TGfU provides an autonomous environment compared to direct
211 instruction approaches where the majority of decisions are made by the instructor (direct
212 teaching style) (Goudas et al., 1995). Moreover, different domain interactions (Metzler, 2011)
213 such as the teacher emphasizing the cognitive and tactical components of play and,
214 importantly, using 'softer' pedagogies (Light and Kentel, 2010) such as questioning to
215 support problem-solving via discussion, debate and dialogue during TGM lessons allows the
216 teacher time to listen, give praise and respond to the answers encouraging more autonomous
217 (intrinsic) motivation within the lesson. Within an educational environment it has been shown
218 that these 'softer' pedagogies inherent within TGM, namely listening, responsiveness to
219 children's comments, giving students the opportunities to talk, praising signs of improvement
220 and encouraging student effort were all positively correlated with significant increases in
221 autonomous (intrinsic) motivation (Reeve and Jang, 2006). More recently, De Meyer et al.
222 (2014) found that as the frequency of controlling teacher behaviors increased, students
223 reported their teachers as more controlling which in turn made students feel more pressured to
224 engage in physical education. In addition, there was an indirect relationship between
225 controlling teacher behavior and amotivation.
226 These examples are similar to the SIRF strategies (i.e., supportive, intrinsic,
227 responsive and flexible) used by Mandigo et al. (2008) in their creation of 'autonomy
228 supportive' games lessons to investigate differences on constructs of SDT between boys and
229 girls when taught via this approach. Mandigo et al. (2008) delivered a series of one-off
230 'autonomy supportive' games lessons in one of four games categories to 759 students in 37
231 different co-educational upper elementary-aged classes. Results gained from a 22-item

questionnaire drawing on SDT's theoretical model as well as qualitative comments from students, found significant sex differences with girls reporting higher optimal challenge, perceived autonomy-support, and enjoyment whereas boys reported higher levels of perceived competence. Mandigo et al. (2008) also further noted that students who participated in net/wall games scored significantly higher on self-determined motivation compared to those in invasion games, with no differences between boys and girls. One limitation in this study was that students participated in only one lesson and there have been few follow-up studies aside from that of Jones et al. (2010) to further substantiate these findings, especially over prolonged unit lengths and in different games/categories of games.

Purposes

Our objective in this study was to independently determine the levels of MVPA and self-determined motivation of both boys and girls as they participated in prolonged units of invasion games (i.e. 6-12 lessons) through two pedagogical models; direct instruction and the TGM. It was hypothesized that given the differences in domain interaction and lesson structure, both boys and girls would gain higher levels of health-enhancing PA and possess higher quality motivation during TGM-based lessons when compared to direct instruction lessons.

Methods

Participants and settings

This study was conducted in two co-educational state middle schools in the East of England. A total of 72 students from two classes at each school were recruited into the study (n = 30 girls). Classes from the schools were randomly selected from the Year seven age group (11-12 years; girls $M = 11.4$, $SD = 0.5$ years and, boys $M = 11.22$, $SD = 0.40$ years). Free school meal (FSM) eligibility was similar (9 % and 12 %) for both schools and close to the national average of 12.1 % (DfES, 2005). Comparable numbers of students (597 and 675)

were enrolled at each school with ethnicity (78.7 % and 84.6 % white British for school one and two, respectively) also broadly matched. All research procedures received approval from the University Research Committee, head teachers and physical education teachers from the schools involved. Informed consent was obtained from parents/guardians as well as children involved in the study using approved University and school system protocols.

Research design

The aim of this study was to evaluate the extent to which two different pedagogical models would independently affect levels of MVPA and self-determined motivation of boys and girls, using a quasi-experimental pretest-posttest design. While Harvey and Jarrett (2013) suggested that the practice-referenced approach is useful to expand the contextual knowledge of GCA's, they also recognized that 10 of the 44 GCA studies published since 2006 have utilized a comparative approach showing that it remains a popular research design in this area (e.g. Gray and Sproule, 2011). And recently, Hastie et al. (2013) also employed a comparative approach to demonstrate the differential effect of Sport Education and direct instruction on students' competence and knowledge.

A total of 4 classes participated in the study; two all girl classes in school A (n = 30), and two all boys classes in school B (n = 42). At each school one class was randomly selected and taught using the TGM and one class direct instruction (control) (school A 'all girls' n = 17 CON, n = 13 INT, school B 'all boys' n = 19 CON, n = 23 INT). This arrangement was employed to ensure a within groups design where responses of boys and girls were compared between models i.e. girls CON –girls INT and boys CON –boys INT to reveal differences within sex.

Two female teachers were recruited in school A, with one teaching the control class and the other teaching the intervention (TGM) class. Similarly, at school B, two male teachers were recruited to teach the control and intervention (TGM) classes. Different teachers taught

283 the control and TGM classes to avoid contamination of the data (i.e. aspects of the TGM
284 intervention filtering into the control sessions).
285 Prior to data collection, a meeting was held with the teachers selected to plan lessons
286 using the TGM (Mitchell et al., 2006) and overview model benchmarks (Metzler, 2011). Both
287 TGM teachers had experience of the concepts surrounding TGM and previously had attended
288 a University based training course focused on TGM. Teachers were not aware, however, of
289 the specific aims of the study. A meeting was also held with the two control teachers to
290 discuss the study protocol, request future lesson plans and overview model benchmarks
291 (Metzler, 2011). Both control group teachers were familiar with the direct instruction model
292 and reported at this meeting that the direct instruction model mirrored their current approach
293 to teaching games. Additional descriptions of the direct instruction and TGM model sessions
294 are provided in the intervention section that follows.
295 Forty-eight lessons were observed in total over a 12-week period; 24 lessons at each
296 school (school A - 12 lessons control, 12 lessons TGM, school B - 12 lessons control, 12
297 lesson TGM), taught by four physical education specialists (2 men, 2 women). The activities
298 were netball (activity 1 – 6 lessons) and football (activity 2 – 6 lessons) for girls and rugby
299 (activity 1 – 6 lessons) and football (activity 2 – 6 lessons) for boys. All lessons took place
300 outdoors.
301 **Intervention**
302 The weekly control and TGM sessions ran in parallel at each school with lesson
303 objectives being matched within and between schools. While male and female teachers taught
304 the similar units of work, they adapted their lesson objectives and delivery according to
305 whether the session used the TGM or the direct instruction model.
306 For the direct instruction model, teachers followed a ‘traditional’ lesson structure
307 outlined by Blomqvist et al. (2001) where an introductory activity was followed by a skills
308 phase focusing on developing and improving skill technique and this was then progressed into

a game in the latter part of the lesson. For example, in the boys' rugby session (week 1 – passing) the teacher sent the students on a warm-up. They were then split into pairs and asked to make two lines. The task was to pass the rugby ball back and forth in pairs across the width of the rugby pitch in their pairs. Extending the distance between the lines to increase passing distance then developed this drill further. After a brief discussion about the drill the teacher then placed the students in a tag rugby game situation (11 vs. 11). The units of work were organized in such a way that the teacher centered learning in each lesson on one major technique/skill with a subsequent game situation.

The TGM teachers followed a three-part lesson recommended by Mitchell et al. (2006) which focused on an introductory modified (representative and exaggerated) game, followed by a skills phase before returning to the initial modified game form. For example, in the girls' netball session (week 3 – scoring) the teacher would start with a warm up and give some general knowledge about the skill of shooting. The teacher then set up a game situation (6 vs. 6) with the condition that students must shoot when possible and that they must hit the target. The students were then taken out of the game and a shooting practice was then set up. The teacher would then ask guided questions in line with the guidelines outlined by Mitchell et al. (2006) to aid learning (e.g. 'What should you do when you are this close to the goal?' 'Why should you shoot in that situation?' 'Where should you aim when you shoot?' 'What should other players on your team do when their goal shooter or goal attack have the ball?' 'Where is the best place to provide support?'). The final part of the lesson involved the same conditioned game, this time, with the additional condition that each team must make a specific number of shots during the game (decided by the teacher dependent upon ability). For netball, the first part of the unit focused on off-the-ball support and movement, and moved on to defending space and winning the ball to then transition to attack. In the boys' lessons the football and rugby units of work were organized in such a way that students first worked on

maintaining possession of the ball for the first part of the unit, and then progressed on to defending space and winning the ball.

Fidelity of intervention

The TGM and control lessons were assessed using benchmarks to ensure that both approaches were implemented correctly and were not detrimental to learning outcomes (Metzler, 2011). Example benchmarks for the direct instruction model include: Teacher presents clear and effective task presentations, teacher provides high rates of positive and corrective feedback, teacher uses a brisk pace through content progression, teacher breaks unit content into a series of small learning tasks leading to larger learning goals, etc. Example benchmarks for the TGM model include: teacher uses tactical problems as the organizing center for the learning tasks, teacher begins each lesson with a game form to assess students knowledge, teacher uses deductive questions to get students to solve tactical problems, etc. (for a complete list of model benchmarks, see Metzler, 2011).

A researcher and assistant were present at each physical education lesson (control and TGM) to assess the teachers fidelity to model benchmarks. The teacher, prior to the testing / lesson observations taking place, informed children that the researcher/assistant would be present during lessons. The researcher and assistant were positioned within view of the lesson but were seated strategically as to not provide any disruption.

Lesson plans were obtained prior to their implementation to ensure each lesson followed the characteristics of each pedagogical model. For example, in the TGM condition, lesson plans were checked for deductive questions and that the teacher planned to begin each lesson with a game form to assess student knowledge. Where necessary, the lead researcher provided any feedback on these plans.

Data Collection

SOFIT

SOFIT is described as 'a momentary time sampling and interval recording system designed specifically to quantify factors believed to promote health-related PA' (McKenzie and Sallis, 1991). SOFIT is split into three phases (McKenzie and Sallis, 1991). The first phase involves the observation of students' PA levels. The activity level is coded against numbers 1-5 all of which have been validated using HR monitors (McKenzie and Sallis, 1991), with 1 = lying down, 2 = sitting, 3 = standing, 4 = walking and 5 = very active.

The second coding phase involves coding the context of the lesson. Four randomly selected children in each lesson were observed as per the SOFIT training manual (McKenzie, 2002). Lesson context codes are as follows; M = general content (transition, break, management), P = knowledge content (physical fitness), K = general knowledge (rules, strategy, social behavior, technique), F = motor content fitness, S = skill practice and G = game play. The final phase involves the coding of teacher behavior; P = promotes fitness, D = demonstrates fitness, I = instructs generally, M = manages, O = observes, T = off task. The first author and an assistant were present for all observed SOFIT data collection (SOFIT data was collected for each lesson within the study). On a rotational basis, the PA levels of four randomly selected students (different each lesson), the lesson contexts in which they occurred and teacher behaviors were observed, and coded every 20s using momentary time sampling as per the standard SOFIT protocol (McKenzie, 2002).

RT3® triaxial accelerometry

In addition to PA monitoring using SOFIT, PA levels during each lesson were additionally measured using RT3® triaxial accelerometers. All children placed an accelerometer onto their waistband whilst in the changing rooms prior to each physical education lesson. The RT3® measures acceleration of movement across three axes (x, y and z) and this data is subsequently converted to activity counts. The RT3 activity counts have been successfully validated in a laboratory setting against oxygen uptake relative to body mass ($R = 0.87$, $p < 0.01$ level) (Rowlands et al., 2004). A one second epoch was used in

order to minimize underestimation of any short bouts of high intensity exercise that may occur with longer duration epochs (Rowlands, 2007). RT3 activity counts for each lesson were converted to metabolic equivalents using the Rowlands et al. (2004) cut off points, and frequencies were then calculated to establish time spent in MVPA. Activity thresholds (counts/min) were as follows; sedentary <288 (<1.5 METs), light 288-969 (1.5 METs), moderate 970-2332 (3 METs) and vigorous >2333 (6 METs) activity (Rowlands et al., 2004). These were then reintegrated to match the 1 second epoch setting used for this study.

Self-determination questionnaire

The constructs included in SDT were assessed pre and post intervention using standard protocols based on components of a previously validated questionnaire developed by Standage et al. (2005). Standage et al. (2005) developed this questionnaire to measure all aspects of SDT within a sport and physical education context. Self-determination was assessed by measuring 5 variables on a Likert scale ranging from 1 = strongly disagree to 7 = strongly agree. More specifically, the questionnaire measures the three innate needs of autonomy, competence and relatedness alongside questions relating to the continuum of SDT (levels of intrinsic motivation) and positive/negative affect which have been previously shown to be indices of the function of autonomous regulation (Standage et al., 2005). Need satisfaction was assessed by measuring three variables: autonomy – 6 items (e.g. I have some choice of what I want to do) with one reverse-scored item 'I have to force myself to do the activities', competence – 5 items (e.g. I think I am pretty good at PE), relatedness – 6 items (e.g. with the other students in this PE class I feel supported). Intrinsic motivation was assessed using 4 items (e.g. I take part in this PE class because PE is exciting). Positive and negative affect was assessed on a 9 item scale (e.g. in this PE class I feel happy). Previous research (Standage et al., 2005; Standage et al., 2003) with similar age participants to the current study have shown alpha coefficeients ranging between 0.80 and 0.96 for these scales

and can be considered internally reliable based on the 0.70 alpha criterions set by Nunnally and Bernstein (1994).

Enjoyment

The enjoyment scale was taken from the subscales of the Intrinsic Motivation Inventory (McAuley, Duncan and Tammen, 1989). Enjoyment was assessed on a 5 item scale (e.g. I usually find that time flies when I am playing sport). Each item was answered on a 5-point scale ranging from 1= "strongly disagree" to 5 = "strongly agree." Previous work (Fairclough, 2003) with similar aged British children in PE has found internal reliability for this scale with an alpha coefficient of 0.79. The questionnaire was completed during registration time to cause minimal disruption to other school activities.

Observer reliability

Each lesson was analysed using SOFIT, following an intensive training period. This consisted of the first author and research assistant coding protocols, and analysing other physical education lessons with an experienced SOFIT observer. Observer agreements were calculated following the training and observer agreements in excess of 85% were achieved for both observers with the 'expert' before the study lessons were coded (van der Mars, 1989). Inter-observer reliability checks were calculated for 20% of the lessons (randomly selected). Interval-by-interval agreement between observers were 90% for activity level, 88% for lesson context and 88% for teacher behavior, which exceeded the minimum levels of agreement suggested by van der Mars (1989) and exceeded the minimum levels of reliability for SOFIT as described by McKenzie (2002).

Data Analyses

SOFIT

Descriptive SOFIT data (means and SDs) were calculated using per cent of class time as the unit of measurement following standard protocols outlined by McKenzie (2002). Independent sample t-tests were then employed to establish any significant differences

between conditions in lesson contexts and lesson time for girls and boys classes. A bonferroni correction was employed to counteract multiple comparisons within the subsections of 'lesson context' and 'teacher behavior'. Therefore, statistical significance was set a priori at $p < .01$ for 'lesson context' and 'teacher behavior', but remained at $p < .05$ for 'student behavior'.

RT3® Accelerometry

RT3® data for each child was downloaded after every lesson. RT3s ® that did not contain any data either due to absence or neglecting to wear the device were excluded from the study (n=6, 8% of sample). Mean percentage of time spent in MVPA during physical education for each activity according to condition and sex was calculated. A 2 x 2 between-groups ANOVA was employed to test for sex differences in time spent in MVPA across the two conditions (control vs. TGM). A follow up split file by sex approach was incorporated to indicate within group differences between the sexes for the control and TGM conditions due to an insufficient number of groups to produce post hoc analysis. Prior to conducting the between-groups ANOVA, shapiro-wilk and subsequent levene's tests revealed that data met the parametric assumptions therefore the alpha level was set at $p < 0.05$.

Self Determination questionnaire

Cronbach's alpha levels were calculated for all scales to assess the internal consistency of the measures. Cronbach's alpha levels greater than 0.70 were classed as acceptable (Kline, 1998). A MANCOVA was employed, using the baseline data as covariates to assess any differences in self-determination constructs between sexes and conditions. Although the data initially violated the normality assumption necessary to perform a MANOVA, the robustness of the MANOVA was preserved once significant univariate and multivariate outliers were removed (Field, 2009; Tabachnick and Fidell, 2007). The alpha level was set at $p < 0.05$. Version 17.0 of SPSS (SPSS Inc, Chicago, IL) was used for all statistical analyses.

Results

In this section we overview, in turn, the results from each of the data collection methods. The section begins with reference to the lesson length, then moves onto to the various aspects of the SOFIT and accelerometry-based data before presenting results from the self-determination questionnaire, pre and post intervention.

Lesson Length

Lesson length in school A was $M = 36.06$, $SD = 2.17$ minutes versus $M = 38.23$, $SD = 1.84$ minutes for control and TGM classes, respectively ($p>0.05$). In school B lesson length was $M = 36.27$, $SD = 2.87$ versus $M = 36.31$, $SD = 1.66$ minutes for control and TGM classes, respectively ($p>0.05$).

SOFIT

Student behavior

Tables 1 and 2 represent the average percentages of lesson time spent in MVPA and in different lesson contexts for girls and boys for each activity over the 12-week study. MVPA levels of girls were not statistically different based on condition for either activity 1 (netball) ($p = 0.37$) or activity 2 (football) ($p = 0.58$) (see table 1). Boys reached significantly higher levels of MVPA in the TGM lessons for both activity 1 (rugby) ($p < 0.01$) and activity 2 (football) ($p < 0.03$) in comparison to the control condition (see table 2).

Lesson context

For the girls' groups there were no significant differences in lesson context variables in the netball lessons. Fitness activity was lower in the TGM condition as was time spent managing, with time on general knowledge higher. Interestingly, while time engaged in skill practice was slightly less in the control condition, time in game play was similar in both conditions. In the girls' football activity less time was spent in fitness activity ($p = 0.02$) and managing the lesson in the TGM condition. Additionally of note was the greater time in game play in the TGM football sessions when compared to those in the control condition (13.2% higher on average; see table 1). In the boys' rugby sessions, while the TGM teacher managed

488 the students slightly more, less time was spent in skill practice and more in game play (see
489 table 2). This pattern was repeated in the football sessions with the teacher again spending
490 less time in skill practice and more in game play in the TGM condition.

491 ***Teacher behavior***

492 Of interest in the girls' TGM netball sessions was the high levels of general instruction
493 by the TGM teacher, which was, on average, just under 18% higher when compared to the
494 control condition (see table 1). This, alongside the fact that the TGM teacher engaged in less
495 observation may be linked to the reason why time spent on general knowledge was higher
496 (see Lesson Context section), and also why they spent less time in game play compared to the
497 control condition (see table 1). In the boys' football sessions, the TGM teacher instructed less
498 and observed more (see table 1). In the boys' rugby lessons, the TGM teacher observed more
499 than the control group teacher and demonstrated fitness significantly less ($p = 0.02$).
500 Instruction by the TGM teacher, was, however, reduced in the football sessions compared to
501 the rugby sessions and the TGM instructed less and observed more than the control condition
502 teacher (see table 2).

503 ***RT3® Accelerometry***

504 Student PA levels were measured directly from the accelerometry measurements. The
505 initial between groups ANOVA revealed significant effects of sex ($F = 21.07$, $p < .05$),
506 condition ($F = 33.60$, $p < .05$) and a significant interaction effect of sex x condition ($F =$
507 33.26, $p < .05$). Follow-up univariate tests revealed some contradictory results to the SOFIT
508 data, in that, girls' MVPA was significantly different ($p < 0.05$) between the control and TGM
509 lessons in the first activity of netball with the control groups levels of PA higher (45.76% ±
510 2.88) than the TGM group (43.13% ± 4.16) (see table 3). There was no significant difference
511 in the second activity of football, although MVPA was slightly higher in the TGM group
512 (53.65% ± 7.87) when compared to the control group (50. 93% ± 5.75) (see table 3).

Boys displayed significantly higher levels of MVPA during both rugby ($p < 0.001$) and football ($p < 0.001$) activities in the TGM lessons (55.73% ± 3.94 and 67.76% ± 7.08 for rugby and football, respectively) when compared to the control lessons (41.04% ± 5.10 and 54.57% ± 7.30 for rugby and football, respectively) (see table 3).

Self Determination questionnaire

Internal Consistency

Cronbach's alpha levels for the variables autonomy (.71), competence (.79), relatedness (.93), intrinsic motivation (.86) and enjoyment (0.83) attained the apriori internal consistency criterion of $\alpha = 0.70$ (Nunnally and Bernstein, 1998). Positive and negative affect (.54) did not reach the set internal consistency criterion and was therefore disregarded from further discussion.

Multivariate Analysis of Variance – Pre-Intervention

At baseline pre-intervention, MANOVA revealed no significant main effects in SDT constructs for sex (Wilks' Lambda = .33; F = 1.18, $p > .05$) or condition (Wilks' Lambda = .05; F = 2.24, $p > .05$).

Multivariate Analysis of Covariance – Pre-Post Intervention

Main effects of MANCOVA revealed a significant main effect for sex (Wilks' Lambda = .63; $F = 3.26$, $p < .05$). However, MANCOVA revealed no significant main effects in SDT constructs for either condition (Wilks' Lambda = .87; $F = .79$, $p > .05$) or interaction effects of sex*condition (Wilks' Lambda = .78; $F = 1.57$, $p > .05$), thus no follow-up analyses were conducted. Pre and Post values for SDT constructs by sex and condition can be found in table 4.

Discussion

The purpose of this study was to independently determine the levels of MVPA and self-determined motivation of both boys and girls as they participated in invasion games units taught via direct instruction and the TGM. In the first two parts of this section, we discuss the

539 results generated from the PA activity before moving on to overview the results regarding
540 student motivation. We finish the discussion with some notes on the limitations of the current
541 study and suggestions for future research.

542 **Physical Activity**

543 It was hypothesized that both boys and girls would gain greater levels of health-
544 enhancing PA during TGM when compared to direct instruction lessons. In terms of PA, boys
545 in the TGM condition were more likely to exceed the 50% MVPA criterion set by the IOM
546 and AfPE given both the accelerometry (p <0.001) and the SOFIT (p = 0.03) MVPA
547 measures were significantly higher than those in the control condition. In contrast, girls'
548 accelerometry scores for the TGM condition were significantly lower than the control in the
549 TGM netball sessions, suggesting girls in the TGM condition were less likely to meet the 50%
550 criterion when compared to the control group. Having said that, these results were not
551 replicated in the SOFIT instrument where girls in both the TGM and control conditions were
552 below the 50% criterion. In addition, activity levels measured by SOFIT were higher for girls
553 in the TGM condition when compared to the control, although these were not significant.

554 These findings were different to those in previous research conducted by Van Acker et
555 al. (2010) who found that girls engaged in significantly greater amounts of MVPA than boys
556 (69.9 % vs. 56.8 %). However, the differences between the studies should be acknowledged.
557 Firstly, Van Acker and colleagues used co-educational classes and within those chose what
558 they reported to be a gender-neutral activity of korfball during co-educational lessons which is
559 in contrast to the present study that observed single-sex lessons and different invasion games,
560 some of which could typically be considered as gender-specific, particularly netball.
561 Fairclough and Stratton (2005a) further acknowledged that studies quantifying MVPA during
562 physical education can be skewed by the type of activities that boys and girls take part in;
563 girls may take part in different activities that do not require as much body mass loading and
564 therefore the opportunities for the accumulation of MVPA may be less frequent. This could

565 lend some explanation for the lower MVPA levels displayed by the girls, particularly in
566 netball, which does not have the same characteristics as the two invasion games of football
567 and rugby (Fairclough and Stratton, 2005a). Moreover, SOFIT analyses revealed that girls in
568 the TGM condition spent less time in game play (26.1%) compared to the control condition
569 (28.7%) in the netball lessons (see Table 1). Increased games based activity during the PE
570 lesson has previously been shown to produce higher levels of PA in netball contexts with year
571 7 girls (Yelling et al., 2000). Secondly, Van Acker et al. (2010) used heart rate telemetry and
572 therefore physiological differences between boys and girls (i.e. girls have higher heart rates)
573 could offer some rationalization to these results. Third, the current study was undertaken over
574 the course of 12 physical education lessons, 6 lessons in one activity and 6 in another,
575 whereas Van Acker and colleagues' study was conducted over one single lesson, albeit with a
576 greater sample size.

577 The current study showed that the observational SOFIT PA assessment tool did not
578 highlight any significant differences in MVPA between the control and intervention classes
579 for girls during activity 1, netball, which is contradictory to the objective accelerometry data
580 that did show the differences. Moreover, there were discrepancies in the percentage of
581 MVPA between boys in the control condition during activity 1, football, measured by SOFIT
582 (27%) when compared to the objective accelerometry data (41%). Fairclough and Stratton
583 (2005b) have outlined that SOFIT may provide different results to objectively measured PA
584 due to the different dimensions of activity that each methods measures i.e. RT3 accelerometry
585 = movement and SOFIT = behavior. Moreover, we would add to this that in SOFIT only a
586 small sample of individuals within the class are measured, i.e. N = 4 whereas we were able to
587 generate data on all individuals in the class with the accelerometers, maybe giving a more
588 representative indication of the class MVPA than is possible with SOFIT. Having said that,
589 SOFIT was still a useful data generation tool as it provided important information that linked

590 lesson context and teacher behavior to PA levels (Scruggs et al., 2005; Fairclough and
591 Stratton, 2005b).

592 **Student Motivation**

593 It was hypothesized that both boys and girls would have higher quality motivation
594 during TGM when compared to direct instruction lessons. This was not substantiated in this
595 study, for either boys or girls. The results are in contrast to previous research by Jones et al.
596 (2010) who noted increases on all six variables of the IMI for groups taught using a tactical
597 approach when compared to direct instruction. Moreover, Mandigo et al. (2008) found girls'
598 noted higher levels of optimal challenge, perceived autonomy-support, and enjoyment and
599 boys reported higher levels of perceived competence after a one-off autonomy supportive
600 games lesson with a large sample of Canadian upper elementary students.

601 The reasons for the differences in results in the current study may have been the result
602 of its focus on invasion games, which in the study of Mandigo et al. (2008) received the
603 lowest ratings for self-determined motivation of all four game categories also receiving more
604 negative comments. Having said that, this is contradictory to the findings of Jones et al.
605 (2010) who noted significant differences in motivation in TGfU and direct instruction groups
606 taught through basketball. Noteworthy is the differences between the current study and that of
607 Jones et al. Firstly, the sample size of Jones and colleagues' study was over twice as large as
608 this current study (N=202 participants) giving greater power in the statistical analyses to
609 detect differences. Second, Jones et al. focused on one activity of basketball, rather than
610 conducting the study with two different activities. Supporting these observations, in the
611 current study the students' familiarity with the chosen activities, where they would have likely
612 participated in a number of 'traditional' sport units such as netball, football and rugby units
613 previously, may also have potentially 'watered-down' any likely effects of a change in
614 instructional approach by the teacher, as previously indicated by Mandigo et al. (2008).

615 Choosing different activities in the future, like basketball, may therefore have different effects
616 on student motivation (Jones et al., 2010).
617 A further explanation for the lack of significant differences in motivation may have
618 been the variability in the delivery of the TGM model by the respective teachers. For
619 example, the SOFIT lesson context analyses indicated that in netball, the TGM teacher spent
620 similar amounts of time in both skill practice and in game play as the control condition
621 teacher and more time providing knowledge and managing the activity. The larger bout of
622 knowledge in the first activity for the TGM teacher possibly caused the higher levels of
623 instruction in that activity, which may possibly have been due to the teacher's higher level of
624 content knowledge within that activity. The time spent managing and providing knowledge
625 were reduced by the girls TGM teacher in the second activity of football where the class spent
626 more time in game play, similar amounts of time in knowledge and skill practice and
627 significantly less time in management than the control condition. Decreasing levels of
628 management as well as the knowledge component in the second activity reduced time spent
629 instructing students and created space for the students to explore the tactical problems set by
630 the teacher within game play which was also linked to more time observing. In a similar vein,
631 the teacher of the TGM boys' group spent much more time instructing in the first activity of
632 rugby than he did in the football activity, possibly as he became more familiar with the model.
633 De Meyer et al. (2014) have recently found that increases in controlling teacher behaviors
634 affect the quality of motivation in physical education. They suggested that teacher's need to
635 do more than simply refrain from using controlling behaviors but, for example, encourage
636 initiative (e.g. by setting up modified games independently of the teacher), offer meaningful
637 choices (e.g. giving the students ownership of changing the rules of the modified game being
638 played), and give a meaningful and personal rationale for, as well as cultivate and display
639 interest in, the activity itself (e.g. by linking activities to opportunities to be active outside of
640 class).

In addition, GCA researchers have previously noted that the teachers' skilful employment of 'soft' (Light and Kentel, 2010) learner-centred pedagogies such as questioning, encouraging, reinforcing, short bouts of silently observing, etc. (Metzler, 2011; McNeill et al., 2008) are of extreme importance in creating a congruency between the philosophy of GCAs and teacher behavior. Although the TGM lessons were not initially delivered exactly as we had hoped, we feel that it is possibly reflective of some of the difficulties teachers encounter when attempting to change their practice over such a short time period. As Light and Kentel (2010) note of Bourdieu's concept of *habitus* (i.e. habits of action), while it is not necessarily fixed, it is not easily changed. Shifting to a 'soft' pedagogical approach therefore takes time, hence the need for future research to continue to ensure that TGM interventions are of sufficient length to offer teachers time to develop the complex pedagogies associated with TGM (Casey and Dyson, 2009) and researchers time to sufficiently examine the variables under examination (Hastie et al., 2013).

Limitations and considerations for future research

Although this study has provided much needed research in the area of PA and the motivational aspects of GCAs, this study had limitations that need to be addressed in future research. Firstly, it would have been pertinent to conduct data analyses that would have examined the relations between, and mediating effects of, the motivational constructs of SDT on PA. This was not possible in this current study due to the sample sizes required for this type of analysis (circa N=200; Kline, 1998). For example, Standage et al. (2012) used structural equation modelling (SEM) to predict relationships between constructs of SDT and PA. With results from 494 secondary school pupils they found that autonomous motivation towards exercise positively predicted step counts. Examining the mediating effects of SDT constructs would therefore allow for greater insights into the specific aspects of TGM lessons that contribute to student motivation and, in turn PA levels. For example, changes in lesson

667 context (i.e. more time in modified/conditioned game play) and/or teacher behavior (i.e.
668 teachers increased use of questioning) may provide the students with a greater sense of
669 autonomy, competence and/or relatedness, which leads to a higher quality of motivation (i.e.
670 autonomous motivation) and consequently increases student PA levels. Thus, future work in
671 the area of pedagogical models could replicate the study of Standage et al. (2012) in a TGM
672 context, albeit we recognize the difficulty in doing so because recruiting participant numbers
673 similar to those of Standage and colleagues may prove challenging.

674 Second, it would have been advantageous to record SDT scores after the first activity
675 in which the student's participated in to be able to tease out effects of the different activities
676 on motivation levels. Third, it may have been pertinent to have two groups participate in the
677 TGM condition at each school in order to be able to compare scores between boys and girls in
678 each school setting, which would have also increased sample sizes to those of Jones et al.
679 (2010). Fourth, it may be pertinent to video record game play in order that game performance
680 data could be generated and triangulated with the accelerometry and/or SOFIT data as well as
681 compared across the two conditions. Consequently, in this current study we were not able to
682 make any claims as to the improvements in game performance, which may have resulted from
683 the greater time spent by the students in game play (Gutierrez and García-López, 2012). A
684 further consideration for future research in this area would be to consider using the System for
685 Observing the Teaching of Games in Physical Education (SOTG-PE; Roberts and Fairclough,
686 2012). This newly validated system was adapted from SOFIT and considers not just activity
687 levels but motor and locomotive performance of students engaged in game lessons. It further
688 allows the assessment of a wider range of lesson contexts other than simply 'game' (i.e.
689 whether the game is small-sided, modified/conditioned, etc.) and considers game-specific
690 teacher interaction behaviors such as whether interactions were technically or tactically
691 orientated and whether they were verbal or non-verbal.

692 **Conclusion – What this study adds**

693 Results from this current study add a much-needed contribution to our understanding
694 of the PA and motivational responses of boys and girls in single-sex classes taught using the
695 TGM providing some contrasting findings to previous research. This current study has further
696 elucidated the need for these studies to be conducted over an extended period of lessons in
697 order to provide the time to allow teachers to become fully conversant with the alternative
698 pedagogies they are employing and also to demarcate between the groups and individuals
699 within the variables under investigation (Hastie et al., 2013). Future studies can build on this
700 research by continuing to examine PA and motivational behavior of students while using
701 GCAs over prolonged unit lengths (i.e. greater than 12 lessons), comparing and contrasting
702 the results of boys and girls in both co-educational and single sex settings as well as using
703 SEM techniques to assess the relationships between, and mediating influences of, SDT
704 constructs on PA levels.
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708

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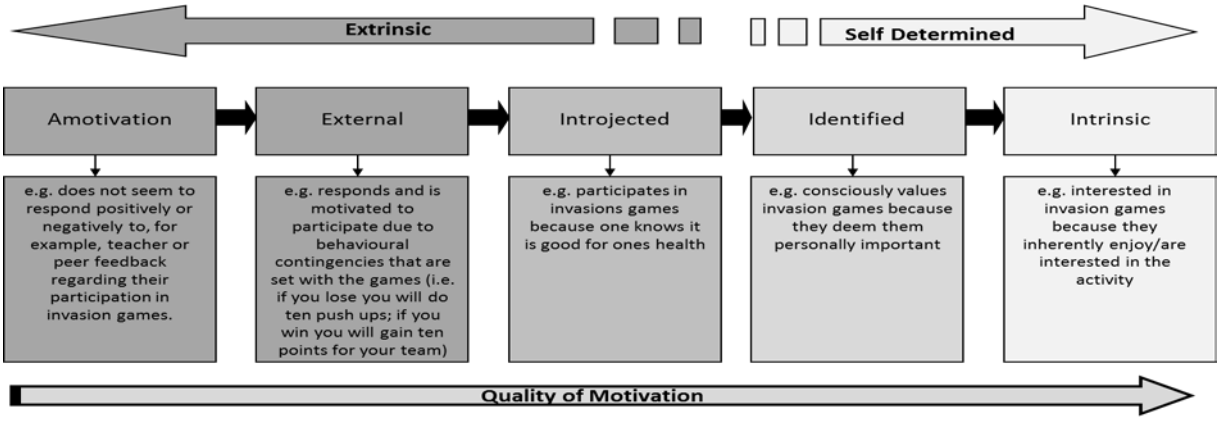
851

852 Figure 1: The spectrum of motivation quality within self-determination theory

853



854

855 Adapted from Standage et al. (2005) and Deci et al. (1991).

856 Table 1. % Mean (± SD) of girls SOFIT analyses by condition and activity

	% Mean ± SD (netball)				% Mean ± SD (football)			
	CON	**INT**	**t**	**Sig**	**CON**	**INT**	**t**	**Sig**
Student behavior (% lesson time)								
MVPA	41.0±4.3	45.5±6.9	-1.16	0.37	50.0±8.6	53.9±8.8	-0.66	0.58
Lesson Context (% lesson time)								
Management	23.2±2.7	17.4±3.23	3.49	0.07	21.6±0.9	12.5±3.5	5.01	0.04
General Knowledge	20.7±8.3	35.9±2.7	-3.60	0.07	21.8±3.8	27.9±9.8	-0.42	0.72
Physical Fitness	0	0	0	0	0	3.3±6.6	-1.00	0.42
Fitness Activity	11.5±1.4	6.8±0.7	5.40	0.03	8.0±1.9	2.7±0.6	5.71	0.02
Skill Practice	17.1±1.25	13.9±6.1	0.89	0.47	23.8±2.3	19.1±2.2	1.83	0.21
Game Play	28.7±14.0	26.1±2.5	0.40	0.73	21.1±9.4	34.3±4.6	-1.81	0.21
Other	0	0	0	0	0	0	0	0
Teacher behavior (% lesson context)								
Promotes Fitness	0	0.3±0.5	-1.00	0.42	0	0	0	0
Demonstrates Fitness	8.4±4.6	9.8±5.2	-0.25	0.82	7.4±3.5	6.2±2.2	0.82	0.50
General Instruction	30.6±8.6	48.5±17.9	-1.27	0.33	43.4±22.5	33.2±3.6	0.83	0.49
Manages	22.4±1.9	10.7±4.6	3.15	0.08	25.8±5.0	9.9±2.7	3.73	0.06
Observes	41.9±14.0	30.4±12.1	0.90	0.46	22.4±30.1	45.2±6.6	-1.20	0.35
Other Task	1.2±2.1	0.6±0.5	0.58	0.62	2.0±3.5	2.4±4.8	-0.25	0.83

857 Notes* $p < 0.05$, ** $p < 0.01$

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859 Table 2. % Mean (± SD) of boys SOFIT analyses by condition and activity

	% Mean ± SD (rugby)				% Mean ± SD (football)			
	CON	**INT**	**t**	**Sig**	**CON**	**INT**	**t**	**Sig**
Student behavior (% lesson time)								
MVPA	27.0±17.0	52.9±5.9	-3.53	0.02*	49.2±2.5	57.9±1.6	-5.6	0.03*
Lesson Context (% lesson time)								
Management	13.6±5.1	18.4±1.7	-2.37	0.07	11.2±2.2	16.3±4.3	-3.77	0.06
General Knowledge	39±15.0	22.8±5.4	2.92	0.04	24.6±0.9	16.2±5.8	2.07	0.17
Physical Fitness	0	1.3±2.6	-1.00	0.37	0	0	0	0
Fitness Activity	3.2±0.9	1.2±2.3	1.90	0.13	4.5±0.8	5.0±0.6	-0.29	0.80
Skill Practice	27.9±17.2	12.6±8.0	3.04	0.03	32.4±11.5	14.3±8.8	4.7	0.04
Game Play	17.8±26.2	46.1±9.5	-2.71	0.05	25.0±10.1	48.2±12.9	-2.9	0.10
Other	0	3.0±6.0	-1.00	0.37	0	0	0	0
Teacher behavior (% lesson context)								
Promotes Fitness	0	0	0	0	0	0	0	0
Demonstrates Fitness	19.7±11.5	7.2±4.2	3.62	0.02	6.0±4.7	1.6±2.8	0.78	0.49
General Instruction	66.0±8.1	60.4±7.9	0.86	0.44	65.9±26.2	44.0±13.5	1.02	0.41
Manages	10.6±5.0	13.9±5.7	-1.50	0.21	13.4±3.2	17.7±6.2	-3.66	0.07
Observes	3.3±3.3	14.3±11.3	-2.16	0.10	13.6±24.3	38.2±13.6	-1.34	0.31
Other Task	2.1±2.0	3.2±2.8	-0.76	0.49	0.7±0.8	0	1.59	0.21

860 Notes* $p < 0.05$, ** $p < 0.01$

861 Table 3. Descriptive Statistics: Overall % MVPA (Mean ± SD) according to condition, gender

862 and activity

			% MVPA (Mean ± SD)	F	Sig.
Girls	ACT1	CON Netball	45.76 ± 2.88	4.25	.049*
		INT Netball	43.13 ± 4.16		
	ACT2	CON Football	50.93 ± 5.75	1.20	.283
		INT Football	53.65 ± 7.87		
Boys	ACT1	CON Rugby	41.04 ± 5.10	95.05	.000*
		INT Rugby	55.73 ± 3.94		
	ACT2	CON Football	54.57 ± 7.30	29.58	.000*
		INT Football	67.76 ± 7.08		

863 *Denotes significance at the $p < .05$ level.

864

865 Table 4. Pre-post differences on self-determination for boys and girls in the control and TGM group.

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	Male						Female					
	Pre			Post			Pre			Post		
	CON (M±SD)	INT (M±SD)	Difference	CON (M±SD)	INT (M±SD)	Difference	CON (M±SD)	INT (M±SD)	Difference	CON (M±SD)	INT (M±SD)	Difference
Autonomy	4.66±1.18	4.97±0.81	-0.31	4.35±0.91	5.29±0.61	-0.94	4.46±1.04	3.89±1.26	0.57	3.92±1.09	3.70±1.30	0.22
Competence	4.92±0.92	4.58±0.74	-0.34	5.09±0.57	5.20±0.55	-0.11	4.97±0.67	4.23±1.31	0.74	4.80±0.90	4.73±0.82	0.07
Relatedness	5.55±1.10	5.03±1.40	0.52	5.45±0.80	5.72±0.68	-0.27	5.07±1.20	4.30±1.43	0.77	4.60±0.92	4.81±1.05	-0.21
Intrinsic Motivation	5.72±1.21	5.59±0.93	0.13	5.32±1.18	6.10±0.70	-0.78	5.65±1.21	4.96±1.66	0.69	5.00±1.04	4.58±1.32	0.42
Positive/Negative Affect	4.10±0.63	3.88±0.72	0.22	4.02±0.82	4.11±0.62	-0.09	3.78±0.73	3.71±0.94	0.07	3.56±0.53	3.76±0.56	-0.20
Enjoyment	4.68±0.40	4.70±0.43	-0.02	4.53±0.41	4.62±0.49	-0.09	4.60±0.40	4.48±0.59	0.12	4.29±0.68	4.20±0.74	0.09

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