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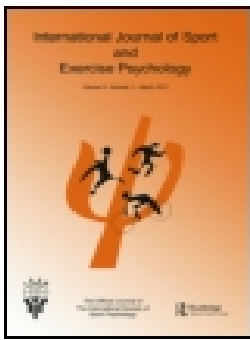
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## Peer and parental processes predict distinct patterns of physical activity participation among adolescent girls and boys

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### ABSTRACT

Parents and peers play a key role in adolescents' physical activity (PA). However, limited research has explored whether the processes by which significant others impact male and female adolescents' PA differs across discrete patterns of PA participation. This study examined whether parent and peer support, pressure, acceptance and teasing were associated with distinct PA patterns among adolescent girls (groups comprising Organised Dance; Team Sport; Individual Sport; Walk/Run/Outdoor games; Non-Participation) and boys (groups comprising Individual Sport; Team Sport; Mixed Type; Non-Participation). Nine hundred ninety-five students ( $M$  age = 13.72 years,  $SD$  = 1.25) from eight secondary schools in Ireland completed measures of support (mother, father, peer), parental pressure, peer acceptance, teasing and a diary outlining the frequency, context, duration and intensity of their engagement in PA. Multinomial logistic regression revealed mothers' support was significantly associated with female team sport ( $OR = 1.09$ ,  $p = 0.42$ ) and individual sport ( $OR = 1.24$ ,  $p < .001$ ) but not male PA participation ( $p > .05$ ). Father support was related to male individual sport ( $OR = 1.09$ ,  $p = .023$ ), team sport ( $OR = 1.15$ ,  $p < .001$ ) and mixed type ( $OR = 1.16$ ,  $p < .001$ ) PA behaviour, highlighting the significance of support from same gender parent. All female PA classes reported higher perceived friend support than non-participants ( $OR = 1.23$ – $1.45$ ,  $p < .001$ ) highlighting the importance of peers for girls' involvement in high and low levels of organised and non-organised PA. Gender differences were also evidenced across PA patterns for teasing, pressure, and peer acceptance. The findings underscore the importance of considering gender and pattern of PA participation when examining social influences on youth PA and identify target processes for intervention efforts.

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### KEYWORDS

Support; peer acceptance; teasing; gender; sport; pressure

Regular participation in moderate-to-vigorous physical activity (MVPA) is associated with a range of positive physical and psychological outcomes among young people including greater cardiovascular health and decreased risk of excess weight, depression, and anxiety (Strong et al., 2005). Irrespective of these health benefits most adolescents are

failing to achieve World Health Organization recommended physical activity (PA) guidelines of 60 min of MVPA daily (WHO, 2010; Woods et al., 2018). Moreover, longitudinal research demonstrates an age-related decline in MVPA during the teenage years with PA dropout occurring approximately one year earlier for girls than boys (Nader et al., 2008). While overall levels of adolescents' MVPA have been widely researched in the literature, the nature and type of PA behaviours that constitute total involvement has received limited attention, representing an important gap in the literature. Adolescent boys and girls can accumulate MVPA in different contexts reflecting organised PA (guided by a coach or instructor) such as sport (e.g., team or individual sport) and non-sport PA classes (e.g., dance); and non-organised PA (undertaken without coach or instructor) including informal games (e.g., tag, soccer) and exercise (e.g., jog) (Bengoechea et al., 2010). In the context of the present study, sport refers to a subset of PA that can be undertaken individually or within a team, where participants have a defined goal (Khan et al., 2012).

In addition to assessing overall levels of PA, person-orientated approaches are increasingly being used to identify subgroups of young people that engage in similar patterns of PA. Agans and Geldhof (2012) derived five clusters of male and female high school students on their participation in organised sport, which reflected participation in team sport, individual sport, a combination of team and individual sports, dance, and non-participation. However, organised non-sport PA (e.g., gym, aerobics) and non-organised PA (e.g., walking, jogging) behaviours were not considered yielding an incomplete picture of adolescents' PA patterns. In another study, Liu et al. (2013) identified PA profiles among young people based on physical activities that contributed most strongly to total energy expenditure. PA participation preferences were found to differ across gender, with approximately three-quarters of adolescent girls comprising the "dancers/walkers/runners" class whilst most boys were characterised within the "basketball and runner" group. Nonetheless, the context in which PA was undertaken (e.g., with or without coach) was not addressed, resulting in a limited understanding of adolescent pattern of engagement in organised and non-organised PA. In light of these limitations in existing research, one focus for the present study is to identify social processes that are associated with boys' and girls' participation in different patterns of PA, rather than just focusing on overall levels of PA.

## **Social processes and PA**

Inherent to adolescent PA participation are interpersonal interactions in the form of group activities undertaken alongside peers, or via parental influence comprising supportive or controlling actions. Significant others therefore serve as primary socialising agents for young people's PA behaviours (Mendonça et al., 2014). A lack of research has explored whether the processes by which significant others impact male and female adolescents' PA differ across discrete patterns of PA participation. A greater understanding of the role of parents and peers in inhibiting and facilitating different profiles of PA participation is therefore warranted to promote PA engagement among youth.

## **Parent support and pressure**

Parental social support in the PA context refer to behaviours or comments that facilitate PA outcomes which are important to the child (Dorsch et al., 2016; Fredricks & Eccles,

2005). Parental support comprises numerous forms including instrumental support (e.g., providing opportunity and materials, attending practices and competitions) and emotional support (e.g., offering praise and encouragement and feedback). Empirical reviews examining correlates of PA behaviour consistently indicate that parental support is positively related to adolescent PA (e.g., Khan et al., 2020; Mendonça et al., 2014; Yao & Rhodes, 2015). However, parent and child gender may moderate the role of perceived parental support among young people's PA participation. Kirby et al. (2011) found that perceptions of support from the same gender parent were more strongly related to adolescent PA. Thus, mothers appear to exert a greater influence over daughters' PA levels while boys are more strongly impacted by paternal behaviours (Edwardson et al., 2014; Kirby et al., 2011).

The significance of parental support may also differ as a function of the type of PA performed. Limited research undertaken on the context of young people's PA participation indicates that perceived support from mother and father for PA is more strongly related to adolescents organised as compared to non-organised PA (Heitzler et al., 2006; Spink et al., 2006). However, the influence of support from each parent on different patterns of male and female adolescents' PA participation is not well understood.

Parents can also negatively influence young people's PA experiences by exerting pressure over participation and criticising performance (Amado et al., 2015; Weiss & Kipp, 2018). Parental pressure in the PA context has been defined as "a pattern of directive and controlling parental behaviours designed to prompt athlete responses and outcomes that are important to the parent" (O'Rourke et al., 2011, p. 400). Pressure may include careful monitoring of the PA, unsolicited technical instruction and the communication of disapproval. Parental pressure has been linked to negative outcomes for youth PA, such as higher anxiety, lower self-esteem and drop-out (Fraser-Thomas et al., 2008; O'Rourke et al., 2011).

Perceived levels of parental pressure may differ dependent on the type of activity performed. Qualitative research has revealed that individual sport participation elicited greater parental pressure than team sport as the outcome is contingent on individual rather than collective performance (Bengoechea & Streat, 2007). Further research is needed to determine whether perceived parental pressure is differentially associated with male and female adolescents' PA participation profiles.

### ***Peer support, acceptance and teasing***

Peers also play a significant role in adolescents' PA behaviours given that team sports, organised physical activities, and unstructured play are typically performed alongside friends and classmates. Peer support in the PA context comprises instrumental support (such as sharing materials/resources, partaking in PA together) and emotional and motivational support (e.g., providing encouragement or praise for PA) (Fitzgerald et al., 2012). Peer support such as encouragement and friend involvement in physical activity is positively related to adolescents' PA (Lawler et al., 2020a, Martins et al., 2020; Mendonça et al., 2014). Gender may also moderate the influence of peers on adolescent involvement in PA and sport. Indeed, previous research has highlighted the salient role of friends on adolescent girls' PA participation (Weiss et al., 2013; Zook et al., 2014). However, a dearth of

research has examined whether friend support differentially impacts adolescent participation in discrete patterns of PA.

The wider peer group can also influence adolescent PA behaviours through feelings of acceptance or victimisation. Acceptance refers to feelings of belonging and being liked, where victimisation refers to the experience of being the target of peers' aggressive behaviour including teasing (Fitzgerald et al., 2012). Higher perceptions of peer acceptance are associated with team sport participation among boys and girls (Garn, 2016; Ullrich-French & Smith, 2009). In contrast, negative interpersonal interactions such as teasing directed at one's appearance or athletic ability can deter participation in PA as young people are likely to avoid PA contexts that may incite victimisation (Lawler et al., 2020a; Fitzgerald et al., 2012; Slater & Tiggemann, 2011). However, a lack of research has examined whether teasing experiences differ dependent on the PA context.

### **The current study**

In summary, few studies to date have explored whether parental and peer processes differently impact adolescents' physical activity patterns. Moreover, it is largely unknown whether social influences vary by gender for different patterns of adolescents' PA involvement. To facilitate a greater understanding of the mechanisms through which parents and peers impact male and female adolescents' involvement in different patterns of PA, the current study will take account of both positive and negative interpersonal interactions and gender-specific patterns of PA participation.

The present study will build on this research and attempt to address existing gaps in the literature by examining whether perceptions of mother support, father support, parental pressure, friend support, peer acceptance, and teasing are associated with distinct patterns of PA among adolescent girls and boys. Based on prior research it is hypothesised that adolescents characterised by profiles of organised sport participation will demonstrate a greater likelihood of high perceived support from mother, father, and friends, greater peer acceptance and a lower likelihood of teasing than non-participants (Fitzgerald et al., 2012; Heitzler et al., 2006; Spink et al., 2006; Ullrich-French & Smith, 2009). However, as few studies have explored adolescents' PA patterns to date, limited evidence exists to guide directional hypotheses regarding social processes and alternate profiles of adolescents' PA participation.

### **Method**

Ethical approval to conduct the study was obtained from the School of Psychology Ethics Committee within the university.

#### ***Recruitment and participants***

Sixteen secondary schools located in Dublin, Ireland, were randomly chosen from a list of secondary schools in Ireland. School principals were initially informed about the study by letter sent through the post. A follow-up call was made approximately one-week later, and eight principals agreed to take part. Three schools permitted the researcher to invite students from Grades 7–11 to participate, two schools granted access to all

Grades 7 and 8 students whilst one school permitted access to the Grade 7 student cohort only. In the remaining two schools, the researcher was permitted to access to approximately half of the student classes in Grade 9. A time was arranged for the lead researcher to talk to students about the study and invite participation. Parental consent forms were distributed to students to take home. Students who returned signed parental consent forms were subsequently assembled during a regularly scheduled class. Participants were informed that their participation was voluntary and they could withdraw from the study at any point without penalty. Willing participants provided written informed assent.

The sample comprised 995 adolescents (386 boys and 609 girls) aged between 12 and 17 years ( $M = 13.72$ ,  $SD = 1.25$ ) from Grades 7–11 across eight secondary schools in Dublin, Ireland. Students were drawn from 84 classes in six community schools, one designated disadvantaged school and one fee-paying school. With regard to ethnicity, 71% of participants were White, 7% were Black, 6% were Asian and 3% described themselves as “Other” or “Mixed Race”. Data on ethnicity were missing for 11% of participants. With regard to school grade, 36% of the sample was in Grade 7, 22% in Grade 8, 28% in Grade 9, 1% in Grade 10, and 12% in Grade 11.

### **Data collection**

The study employed a survey design. Participants who provided assent were gathered in groups in a classroom during school time to complete the survey. Participants read and completed the survey on an individual basis. The researcher was present at all times in the room with groups of participants so that participants could ask questions if they were unsure about anything. Completion of the survey took approximately 35 min.

### **Measures**

Participants completed a survey first comprising a Physical Activity Recall Seven Day Diary (hereafter called PAR-7DD) followed by measures of social support, parental pressure, peer acceptance and teasing. The order of scales was identical in all surveys.

#### **Physical Activity Recall Seven Day Diary**

Adolescents reported any PA undertaken over the past 7 days and provided details about the type of activity, context of participation (organised/non-organised), duration, and activity intensity (light, moderate, vigorous). Participants were provided with written cues and examples of physical activities typically performed at light, moderate and vigorous intensity to support understanding. A PA index card, containing additional information and examples pertaining to each of the required fields on the PAR-7DD (Lawler et al., 2017) was provided to aid survey completion (see [Appendix](#)). Organised PA undertaken within school and community settings was assessed through three questions: (1) “Do you play on any sport or PA teams for the school?” (2) “Are you a member of any sport or PA clubs?” and (3) “Do you currently attend any PA classes?”. Participants were asked to list the sports/PA in which they engaged.

Based on the data from the PAR-7DD, latent class analysis was run in MPlus 7.1 (Muthén & Muthén, 2011) to derive gender-specific profiles or classes of adolescent PA based on participation in (i) organised team sport (e.g., soccer), (ii) organised individual sport

(e.g., martial arts) and non-sport PA classes (e.g., dance);(iii) non-organised PA (informal games (e.g., tag, soccer)) and exercise (e.g., walk, jog); and (iv) the duration and intensity of the activity (i.e., if it was Moderate to Vigorous Physical Activity (MPVA)). Classes that achieved at least a daily mean of 60 min of MPVA were labelled “active”. Classes that achieved at least 60 min of MVPA on three to six days over the past week were labelled “leisure active”. Any classes without these designations, involved low levels of MVPA characterised as less than 60 min MVPA on three days per week. Classes without these labels indicated lower levels of MPVA. The results of this analysis have been reported previously (Lawler et al., 2017).

The findings revealed six distinct classes for girls reflecting (1) Organised Run/Swim & Dance/Gym i.e., dual participation in individual sport (i.e., cross-country running/swimming) and organised PA classes (e.g., dance) (2.6% of girls); (2) Organised Dance (e.g., Irish dance, ballet) (12.8%); (3) Leisure Active Team Sport (23%) (e.g., Gaelic football, basketball); (4) Active Individual Sport (e.g., kickboxing, athletics) (9.5%); (5) Walk/Run/Outdoor games (non-organised PA only) (17.1%); and (6) Non-Participation (35%). In contrast, five classes emerged for boys representing (1) Leisure Active Gym (e.g., spin class, cardiovascular machines) (2.8%); (2) Leisure Active Individual Sport (e.g., karate, swimming) (17.6%); (3) Active Team Sport (e.g., soccer, rugby) (31.3%); (4) Active Mixed Type (i.e., dual participation in non-organised PA and team sport) (25.2%); and (5) Non-Participation (23.1%).

### *Mother and father support*

Parental support for PA was assessed through five items (Prochaska et al., 2002; Sallis et al., 2002). Participants were asked to reflect over a typical week and indicate the extent, to which each parent provided encouragement to be active, undertook a PA with them, provided transport to a PA setting, viewed PA practices or told them they were doing well in physical activities. Frequency of behaviours was recorded on a five-point scale ranging from “not at all” (1) to “everyday” (5). The items were summed together to calculate a total support score for each parent with higher scores reflecting perceptions of higher social support among adolescents. Satisfactory internal consistency for the scale has been reported – Prochaska et al. and Sallis et al. reported Cronbach alpha coefficients of 0.77 and 0.78, respectively. Satisfactory Cronbach alpha coefficients were also evidenced in the present study for mother support (.77) and father support (.85).

### *Parental pressure*

The Pressure subscale of the Parental Involvement in Activities Scale (PIAS; Anderson et al., 2003) consists of ten items that measure perceived parental control over participation in organised sport and PA (e.g., “My mum or dad sign me up for sport or PA lessons without asking me if it’s okay”) and pressure to perform to a high standard (e.g., “My mum or dad get upset when I don’t do as well as they would like me to in sports and PA”). Responses were rated on a four-point scale that ranged from “disagree a lot” (1) to “agree a lot” (4) with one item being reverse scored (i.e., “When it comes to sport or PA, my mum or dad think that the most important thing is that I have fun”). Scores were summed together with higher scores representing perceptions of higher parental pressure in relation to sport and PA. Ryan Dunn et al. (2016) reported high internal



consistency for this scale ( $\alpha = 0.76$ ), while Anderson et al. (2003) reported internal consistency of 0.71. Cronbach's alpha for the scale in the present study was 0.80.

### *Peer support*

Four items were used to assess peer support for PA including encouragement, praise, direct participation in PA with peer, and adolescent encouragement of peer PA (Prochaska et al., 2002; Sallis et al., 2002). Participants rated the frequency of support behaviours (e.g., "Do friends tell you that you are doing well in physical activities or sports?") during a typical week on a five-point Likert-type scale ranging from "not at all" (1) to "every day" (5). Higher scores reflect increased perceptions of peer support for PA. The peer support scale has evidenced good internal reliability (0.81; Beets et al., 2006). Cronbach's alpha was 0.74 in the present study.

### *Peer acceptance*

The Social Acceptance subscale of the Self-Perception Profile for Adolescents (Harter, 1988) was used to assess the extent to which adolescents feel accepted by peers. The subscale comprises five items (e.g., "Some teenagers have a lot of friends BUT other teenagers don't have very many friend"). Participants selected one response and indicated whether the statement was "sort of true" or "really true" for them. Each item was scored on a scale from 1 to 4 with higher values reflecting greater perceived acceptance from peers. Cronbach's alpha for the scale from several studies has been high ( $\alpha = 0.81$ – $0.85$ ; Rose et al., 2012) and was 0.73 in the present study.

### *Teasing*

Slater and Tiggemann (2011) developed four items to measure teasing experiences specific to the PA domain (e.g., "Have people made fun of you because of how you look?"). Three additional items were designed for the current study to evaluate negative comments targeting one's level of competency in sport and physical activity, i.e., "Have people laughed at you or made fun of you for not being fit enough?", "Have people laughed at you because you are not fast enough?" and "Have people made fun of you for not being good at PA or sport?". Responses were scored on a five-point scale that varied from "never" (1) to very "often" (5). The seven items were summed to provide a total teasing score. Higher scores reflect higher levels of teasing experienced within a PA context. Slater and Tiggemann reported satisfactory Cronbach's alpha for the four-item scale for girls (0.71) and lower reliability for boys (0.65). The Cronbach's alpha for the seven-item teasing scale in the present study was 0.73.

### *Analytic strategy*

In order to address the research questions for the present study, multinomial logistic regression was performed using SPSS version 21 (IBM, 2012) to examine how social processes of mother support, father support, parental pressure, friend support, peer acceptance, and teasing are associated with or predict classes of PA participation separately for boys and girls. The Non-Participation class was used as the reference group in both cases. Odds ratios (with 95% confidence intervals) were calculated which enable comparison between the reference class and each PA latent class. Sample size guidelines for

multinomial logistic regression recommend a minimum of 10 cases per independent variable (Hosmer et al., 2013). To meet these assumptions, one class was removed from the male (Leisure Active Gym,  $n = 11$ ) and female (Organised Run/Swim & Dance/Gym,  $n = 16$ ) samples. Multinomial logistic regression was then performed on the remaining PA participation profiles.

## Results

Descriptive statistics for the social variables across adolescent girls' and boys' PA participation profiles are shown in Table 1. The results of the multinomial logistic regression analysis are presented in Table 2 for girls and boys.

### Predictors of adolescent girls' classes of PA

The first analysis addressed the following research question: how are social processes of mother and father support, parental pressure, peer support, peer acceptance and teasing associated with different patterns or classes of PA participation among girls.

For all female PA classes there was a significantly greater likelihood of reporting high levels of peer support for PA compared to the Non-Participation class (reference class), with the highest probabilities evidenced in the Leisure Active Team Sport (OR:1.45, 95% CI:1.32–1.60,  $p < .001$ ), Active Individual Sport (OR:1.41 95% CI:1.25–1.59,  $p < .001$ ), Walk/Run/Outdoor games (OR:1.24, 95% CI: 1.13–1.36,  $p < .001$ ) and Organised Dance (OR:1.23, 95% CI: 1.11–1.36,  $p < .001$ ) classes. Compared to the Non-Participation profile, girls in the Active Individual Sport (OR:1.24, 95% CI: 1.12–1.37,  $p < .001$ ) and Leisure Active Team Sport (OR:1.09, 95% CI: 1.01–1.18,  $p = 0.042$ ) were significantly more likely to report higher perceptions of mother support. Girls characterised by participation in

**Table 1.** Descriptive statistics for adolescent girls' and boys' PA classes on parent and peer variables.

|                                 | Mother Support<br><i>M (SD)</i> | Father Support<br><i>M (SD)</i> | Parental Pressure<br><i>M (SD)</i> | Friend Support<br><i>M (SD)</i> | Peer Acceptance<br><i>M (SD)</i> | Teasing<br><i>M (SD)</i> |
|---------------------------------|---------------------------------|---------------------------------|------------------------------------|---------------------------------|----------------------------------|--------------------------|
| <b>Girls' PA Classes</b>        |                                 |                                 |                                    |                                 |                                  |                          |
| Organised Dance                 | 12.35 (4.00)                    | 10.35 (4.64)                    | 16.75 (4.52)                       | 10.11 (3.08)                    | 14.83 (3.13)                     | 14.36 (5.37)             |
| Leisure Active Team Sport       | 15.39 (3.85)                    | 15.20 (4.75)                    | 16.22 (4.27)                       | 12.16 (2.78)                    | 16.04 (2.88)                     | 12.24 (4.20)             |
| Active Individual Sport         | 15.91 (4.16)                    | 13.35 (5.37)                    | 19.08 (4.91)                       | 12.08 (3.19)                    | 15.12 (3.65)                     | 13.21 (4.93)             |
| Walk/Run/Outdoor games          | 12.35 (4.25)                    | 10.94 (4.56)                    | 16.50 (4.98)                       | 10.13 (2.95)                    | 14.78 (3.72)                     | 13.63 (4.62)             |
| Non-participation               | 11.09 (3.94)                    | 10.14 (4.56)                    | 15.65 (5.00)                       | 8.28 (2.92)                     | 15.26 (3.12)                     | 12.85 (4.41)             |
| <b>Boys' PA Classes</b>         |                                 |                                 |                                    |                                 |                                  |                          |
| Leisure Active Individual Sport | 12.70 (4.09)                    | 12.79 (5.03)                    | 18.01 (5.47)                       | 10.55 (3.57)                    | 14.99 (3.50)                     | 12.40 (4.50)             |
| Active Team Sport               | 14.05 (4.75)                    | 14.67 (5.18)                    | 17.80 (5.53)                       | 12.76 (3.27)                    | 16.24 (2.59)                     | 10.84 (3.53)             |
| Active Mixed Type               | 14.40 (4.61)                    | 15.09 (5.27)                    | 18.06 (5.82)                       | 13.86 (3.38)                    | 16.17 (3.07)                     | 11.23 (3.78)             |
| Non-Participation               | 11.01 (5.04)                    | 10.29 (4.99)                    | 17.18 (5.45)                       | 10.13 (3.43)                    | 14.19 (3.46)                     | 12.60 (3.85)             |

**Table 2.** Odds ratios dependent on peer and parental processes for being classified into a specific PA class with Non-Participation class as reference group.

| Girls' Physical Activity Classes |                                 |                            |                            |                            |
|----------------------------------|---------------------------------|----------------------------|----------------------------|----------------------------|
|                                  | Organised Dance                 | Latent class [OR (95% CI)] |                            |                            |
|                                  |                                 | Leisure Active Team Sport  | Active Individual Sport    | Walk/Run/Outdoor games     |
| Mother Support                   | 1.07 (0.98–1.16)                | <b>1.09 (1.01–1.18)*</b>   | <b>1.24 (1.12–1.37)***</b> | 1.04 (0.96–1.12)           |
| Father Support                   | 0.97 (0.90–1.04)                | <b>1.14 (1.06–1.22)***</b> | 1.01 (0.94–1.09)           | 1.00 (0.94–1.07)           |
| Parental Pressure                | 0.98 (0.92–1.04)                | 0.96 (0.91–1.02)           | <b>1.07 (1.01–1.14)*</b>   | 0.97 (0.92–1.03)           |
| Friend Support                   | <b>1.23 (1.11–1.36)***</b>      | <b>1.45 (1.32–1.60)***</b> | <b>1.41 (1.25–1.59)***</b> | <b>1.24 (1.13–1.36)***</b> |
| Peer Acceptance                  | 0.95 (0.87–1.04)                | 1.02 (0.93–1.11)           | 0.97 (0.87–1.08)           | 0.93 (0.86–1.01)           |
| Teasing                          | <b>1.08 (1.02– 1.15)**</b>      | 1.04 (0.98–1.11)           | 1.05 (0.97–1.13)           | 1.05 (0.99–1.11)           |
| Boys' Physical Activity Classes  |                                 |                            |                            |                            |
|                                  | Leisure Active Individual Sport | Latent class [OR (95% CI)] |                            |                            |
|                                  |                                 | Active Team Sport          | Active Mixed Type          |                            |
| Mother Support                   | 1.03 (0.94–1.11)                | 1.04 (0.96–1.12)           | 1.03 (0.95–1.11)           |                            |
| Father Support                   | <b>1.09 (1.01–1.17)*</b>        | <b>1.15 (1.07–1.23)***</b> | <b>1.16 (1.08–1.25)***</b> |                            |
| Parental Pressure                | 1.02 (0.95–1.08)                | 1.01 (0.95– 1.07)          | 1.02 (0.95–1.08)           |                            |
| Friend Support                   | 1.01 (0.92–1.12)                | <b>1.17 (1.07–1.29)**</b>  | <b>1.31 (1.18–1.45)***</b> |                            |
| Peer Acceptance                  | 1.06 (0.96–1.18)                | <b>1.16 (1.05–1.28)**</b>  | <b>1.14 (1.02–1.27)*</b>   |                            |
| Teasing                          | 0.99 (0.91–1.08)                | <b>0.92 (0.84–0.99)*</b>   | 0.93 (0.86–1.0)            |                            |

Note: All estimates compared to baseline non-participation group where bold corresponds to differences with  $*p < .05$ ,  $**p < .01$ ,  $***p < .001$ .

Leisure Active Team Sport were also more likely to report significantly higher perceptions of support from father (OR:1.14, 95% CI: 1.06–1.22,  $p < .001$ ) than the Non-Participation group. In addition, Active Individual Sport participants reported significantly higher perceptions of parental pressure (OR:1.07, 95% CI: 1.01–1.14,  $p = .029$ ) relative to girls represented by a profile of Non-Participation, while Organised Dance members were significantly more likely to be teased (OR:1.08, 95% CI: 1.02–1.15,  $p = .009$ ) than the Non-Participation group. Peer acceptance did not emerge as a significant predictor of female PA class membership ( $p > .05$ ).

### Predictors of adolescent boys' classes of PA

The second analysis addressed how social processes of mother and father support, parental pressure, peer support, peer acceptance and teasing were associated with different classes/profiles of PA compared with the non-participation class among boys.

Relative to the Non-Participation class, boys characterised by participation in Active Mixed Type (OR:1.16, 95% CI:1.08–1.25,  $p < .001$ ), Active Team Sport (OR: 1.15, 95% CI:1.07–1.23,  $p < .001$ ), and Leisure Active Individual Sport (OR:1.09, 95% CI: 1.01–1.17,  $p = .023$ ), were more likely to report significantly higher perceptions of father support for PA. Members of the Active Team Sport and Active Mixed Type PA participation profiles were more likely to report significantly higher perceptions of support from peers (OR:1.17, 95% CI:1.07–1.29,  $p = .001$ ; OR: 1.31, 95% CI: 1.18–1.45,  $p < .001$ ) and acceptance from peers (OR:1.16, 95% CI:1.05–1.28,  $p = .005$ ; OR: 1.14, 95% CI: 1.02–1.27,  $p < .025$ ), respectively than the Non-Participation class. In addition, boys in the Active

Team Sport class (OR:0.92, 95% CI:0.84–0.99,  $p = .038$ ), were also significantly less likely to report being teased than the Non-Participation class. Perceptions of mother support and parental pressure did not emerge as significant predictors ( $p > .05$ ) of male PA class membership.

## Discussion

The present study builds on prior research by examining whether parental and peer processes are differentially associated with discrete profiles of PA participation among adolescent girls (Organised Dance; Leisure Active Team Sport; Active Individual Sport; Walk/Run/Outdoor games; Non-Participation) and boys (Leisure Active Individual Sport; Active Team Sport; Active Mixed Type; Non-Participation). In partial support of our first hypothesis, adolescents characterised by profiles of organised sport participation demonstrated a greater likelihood of high levels of perceived support from mother, father, and friends, greater peer acceptance and a lower likelihood of teasing than non-participants. However, the results from the multinomial logistic regression indicated that social predictors differed depending on gender and type of sport considered (team v individual). In contrast, associations between parental and peer variables and other profiles of PA participation (Organised Dance; Walk/Run/Outdoor games; Active Mixed Type) were not hypothesised due to the lack of studies implementing person-orientated approaches to assess adolescents' PA patterns. The results and implications of this exploratory analysis are addressed below.

### Parental processes

Firstly, in respect to parental processes, adolescent girls characterised by Active Individual Sport and Leisure Active Team Sport participation reported higher levels of mother support, while the latter also perceived higher levels of father support compared to the non-participation group. Perceived support from mother and father did not however predict participation in less active non-sport PA profiles. This finding indicates that parental support plays an important role in helping adolescent girls to achieve moderate-to-vigorous sport participation, confirming previous research that organised sport participation is associated with higher levels of parental support (Davison & Jago, 2009; Duncan et al., 2005; Reimers et al., 2019). Furthermore, qualitative studies indicate that active girls are more likely to undertake PA with parents and report higher level of parental encouragement to be active than their sedentary counterparts (Casey et al., 2009; Martins et al., 2015).

The results also build on prior research that found social support is more strongly related to children's and adolescents' organised PA participation than non-organised PA by providing a more nuanced understanding of this relationship (Heitzler et al., 2006; Spink et al., 2006). Previous studies have typically considered organised PA (e.g., dance) and sport (e.g., team, individual) simultaneously, despite these types of PA reflecting distinct behaviours. The current findings therefore underscore the need to explore separate sources of parental support for different patterns of PA as they do not appear to have equivalent effect on female adolescents' PA behaviours.

Among the male cohort, all the PA participation profiles (Leisure Active Individual Sport; Active Team Sport; Active Mixed Type) were more likely to report higher perceptions of father support compared to the Non-Participation group. However, mother support was not significantly associated with adolescent boys' PA participation. The findings highlight the significance of perceived support from fathers for young males PA participation. Moreover, the results are in line with prior research which suggests that boys are more strongly influenced by father support whilst mothers exert a greater effect on daughters' PA levels (Edwardson et al., 2014; Kirby et al., 2011). The father-son and mother-daughter association has been evidenced among children under 10 years, which suggests that parents can impact adolescents' PA patterns indirectly through early socialisation of attitudes and beliefs conveying value of sport participation, with parental influence continued throughout adolescence (Rodrigues et al., 2018; Strandbu et al., 2019; Weiss & Kipp, 2018).

The findings further demonstrate that male and female latent classes characterised by active and leisure active levels of sport participation were associated with higher levels of perceived support from mother, father or both parents, while lower active classes were not. Young people represented by these PA profiles must also be considered as active participants in these support-related processes, that is, those individuals actively engage in sport and therefore elicit higher levels of parental support owing to a greater demand for transportation to and from training, which likely results in higher parental observation and praise (Beets et al., 2006).

With respect to parental pressure, Active Individual Sport participants demonstrated higher levels of parental pressure than non-participants, however this relationship was only significant for adolescent girls. In line with this findings, Bois et al. (2009) revealed that female adolescent tennis players perceived greater parental pressure than their male counterparts. Moreover, Weiss and Weiss (2007) found that early adolescent female gymnasts who perceived greater parental pressure reported lower desire to sustain sport participation, which underscores the importance of decreasing parental pressure and increasing parental support. Taken together, the findings pertaining to parental processes indicate that father support is important for both male and female adolescents' sport participation, but other processes such as mother support and parental pressure also matter for females specifically. Thus, parents appear to exert a greater effect on their daughters' PA participation rather than their sons'.

### **Peer processes**

All of the female PA classes (Organised Dance; Leisure Active Team Sport; Active Individual Sport; Walk/Run/Outdoor games) relative to those who refrained from participation, were more likely to report higher perceptions of support from friends underscoring the importance of friend support for helping girls to engage in both high and low levels of organised and non-organised MVPA. In support of these findings, Gut et al. (2020) found that adolescents characterised by participation in organised sports with friends demonstrated higher levels of PA than those who engaged in other patterns of PA. Direct peer participation in PA and encouragement may also be of particular relevance for individuals engaging in more unstructured forms of exercise or informal outdoor games (e.g., walking, jogging, basketball, soccer) (Martins et al., 2020). The findings demonstrate that support from

peers represents an important mechanism for promoting PA across adolescence and points to the importance of peer-focused PA interventions for girls.

In contrast, for boys', friend support was associated with Active Team Sport and Active Mixed Type profiles of PA participation but not Leisure Active Individual Sport. Thus, for males it appears that friend support predicts patterns of PA participation comprising team sport alone or in combination with non-organised games while individual sports such as martial arts, which are more solitary in nature, are not dependent on support from friends. The findings build on the existing literature which has shown that friend support is positively related to adolescents' PA by demonstrating a clear gender discrepancy, with support from friends playing a more pertinent role in girls' rather than boys' PA behaviours.

Furthermore, the findings demonstrated that peer support was more strongly related to adolescent's PA participation than parental support, which resonates with previous studies that peers take on an increasingly important determining role during this developmental period (Beets et al., 2006; Kirby et al., 2011). In addition, consistent with prior research (e.g., Mendonça et al., 2014), higher levels of support from both friends and parents was associated with more active profiles of PA participation for adolescent boys and girls, highlighting the significance of both parents and peers for fostering MVPA among youth.

Peer acceptance in contrast, was not significantly associated with female adolescents' PA participation. However, male members of the Active Team Sport and Active Mixed Type groups were more likely to report higher levels of perceived acceptance from peers than the Non-Participation group. Team sport participation appears to be especially salient in gaining social status among boys but not girls (Lawler et al., 2020b). Sport participation is consistent with traditionally defined characteristics of masculinity, which may explain why male competency in team sport elicits greater peer approval than female athleticism which contradicts common notions of femininity (Anderson, 2008; Lawler et al., 2020b). In respect to negative interpersonal interactions, a surprising finding emerged in the female sample that has not previously been reported in the literature: those classified as Organised Dance participants were more likely to report teasing than non-participants. The teasing measure comprised indicators of being criticised in relation to weight and physical abilities. It is possible that girls who engage in such classes do so for aesthetic reasons and being teased about one's weight may serve a primary motivator for one's participation. However, additional research is needed to confirm this speculation. In contrast, male adolescents who were characterised by Active Team Sport participation were less likely to be teased than non-participants. Being part of a group, as is the case with team sport may therefore exert a protective effect over victimisation from others. A lack of research to date has examined whether teasing experiences may differ as a consequence of the PA setting, thus the present findings contribute to the literature in this area by suggesting that adolescent girls engaged in Organised Dance activities are at greater risk of teasing than those who do not partake in PA.

The current findings also extend past research by facilitating a more nuanced understanding of the relation between interpersonal factors and distinct patterns of adolescents PA participation, which may not be evident when total PA levels are the focus of investigation. The study overcomes gaps in the existing literature by providing a more detailed insight into the mechanisms by which social processes are related to distinct patterns of male and female adolescents' PA patterns. The findings increase our

understanding of peer processes on adolescents' PA by demonstrating that support from friends plays a particularly salient role in helping adolescent girls to engage in organised sport, dance, and non-organised PA at high and low levels of MVPA. In contrast, males classified by participation in team sport alone or in combination with non-organised PA reported higher friend support and peer acceptance, with the former group reporting lower levels of teasing. Thus, peer processes play a more prominent role in adolescent boys' team sport compared to individual sport participation.

### ***Implications of findings***

The present findings have practical implications for interventions targeting youth PA. Higher levels of perceived peer support have been linked to initiation of physical activity and continued participation over one-year among adolescents (Lawler et al., 2020a). The relative importance of friend support for all types of female PA participation, builds on this finding by highlighting the potential benefit of peer-focused PA interventions for promoting more active lifestyles among adolescent girls. Such strategies could be implemented that encourage adolescents to drop by with friends or involve adolescents undertaking sport, exercise or informal PA games with friends. Alternatively, peer-led interventions that capitalise on existing social process among young people might hold promise in increasing physical activity levels among young people. For example, recent findings from PLAN-A, a feasibility cluster randomised trial in which peer-nominated students encouraged physical activity participation during informal conversations with friends, revealed significant increases in adolescents' weekday MVPA one year later (Sebire et al., 2018). The finding demonstrates that peers can be utilised as significant agents of adolescent health behaviour change (Sebire et al., 2018).

Parents also represented important providers of support for PA participation, thus efforts to increase parental encouragement, spectatorship, transportation and co-participation in PA should form an essential element of interventions targeting increased MVPA participation among adolescents, particularly girls who are less physically active than boys (Reimers et al., 2019; Yao & Rhodes, 2015). Parents could be informed directly via newsletter or social media about the different ways in which they can support young people to be active. It is also important to determine at whom the intervention is aimed and whether participation in organised or non-organised PA is preferred as certain components can be excluded based on the gender of the target population. In addressing these factors, the effectiveness of interventions and subsequent PA participation across adolescence may be increased.

### ***Strengths and limitations***

The strengths of this study include the relatively large sample size and person-orientated analysis, yet the limitations of the study must also be acknowledged. The number of years that adolescents participated in sport or physical activities in school or club settings was not assessed. Future studies should assess duration of adolescents' sport and physical activity participation to facilitate understanding of whether peer and parental processes differently influence recent or more established patterns of adolescents' PA. This information could be used to guide interventions targeting initiation or maintenance of

context- and gender-specific PA patterns. The omission of two small latent classes to fulfil sample size guidelines for conducting multinomial logistic regression represents another study limitation. Nonetheless, the current analyses facilitated the relative importance of various interpersonal factors to be examined simultaneously offering an advantage over alternate approaches such as testing individual covariates in separate multinomial logistic regression models or comparing differences across profiles on various characteristics, which permit only a crude assessment of univariate relationships. An additional limitation is the use of adolescents' reports of their activity levels. Self-report measures of PA while not unusual in the field are limited by participants' ability to accurately recall details of their PA and can be subject to social desirability bias. However, self-report methods are valuable for assessing activity setting which was of interest in the present study (Corder et al., 2008). Furthermore, a balance between validity and feasibility must be achieved (Trost, 2007) and given the sample size and resources available for the current study, it was not possible to collect an objective measure of PA. Finally, several studies have established the validity of self-report daily diary measures of PA with adolescents (e.g., Ekelund et al., 1999; Pate et al., 2003). However, future research should incorporate objective markers of PA that can complement self-report.

## Conclusion

The present study extends prior research by demonstrating that peer and parental processes are differentially associated with adolescent boys' and girls' participation in discrete patterns of PA. Mothers' support was associated with female PA participation but not male, while father support was related to male PA behaviour, highlighting the significance of perceived support from same gender parent. Parental support also plays a central role in helping adolescents, particularly girls, to achieve higher levels of MVPA. Friend support is more pertinent for girls' rather than boys' PA behaviours, underscoring the importance of friend support for helping girls to participate in organised sport, dance, and non-organised PA at high and low levels of MVPA. In contrast, males who engaged in team sport or mixed PA patterns reported higher levels of peer acceptance, which suggests that team sport participation may be especially salient in gaining social status among boys but not girls. Gender discrepancies were also evident in respect to teasing, with such experiences more likely for girls participating in Organised Dance, whilst among boys', team sport appeared to exert a protective effect over peer victimisation. The findings build on the existing PA literature base by highlighting the importance of considering both gender and pattern of adolescent PA participation when examining peer and parental processes on youth PA.

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## Appendix



- BEFORE School
- DURING School
- AFTER School

**Physical Activity includes:**

- **Exercise:** walking, jogging, weight-training, cycling
- **Sport:** Soccer, basketball, swimming, athletics, hurling, rugby, handball, tennis, badminton, Gaelic football, judo, karate, horse-riding, golf, gymnastics...

**Did you do the activity as part of...?**

- **A class or lesson** (e.g. dance, karate...)
- **A training session** (e.g. soccer club training)
- **A match or competition**
- **Unstructured activity** (e.g. walk, football kick about in park)

**Light (easy)**  
Heart rate & breathing are normal

**Moderate (medium)**  
Heart rate & breathing are faster than normal - may sweat a little

**Vigorous (hard)**  
Heart rate much faster, have to breathe deeper & faster - will probably sweat

| Day                      | NO | YES | Name of Activity/Sport   | Type of activity   | Minutes in Activity | Effort |          |          |
|--------------------------|----|-----|--------------------------|--|---------------------|--------|----------|----------|
|                          |    |     |                          |  |                     | Light  | Moderate | Vigorous |
| Monday<br>BEFORE school  | ✓  |     |                          | Class/Lesson <input type="radio"/> Training <input type="radio"/><br>Match <input type="radio"/> Unstructured <input type="radio"/>                          |                     |        |          |          |
| Monday<br>DURING School  |    | ✓   | Played football at lunch | 1. Class/Lesson <input type="radio"/> Training <input checked="" type="radio"/><br>Match <input type="radio"/> Unstructured <input checked="" type="radio"/> | 30mins              | ✓      |          |          |
| Monday<br>AFTER School   |    | ✓   | Hip Hop Dance class      | 1. Class/Lesson <input checked="" type="radio"/> Training <input type="radio"/><br>Match <input type="radio"/> Unstructured <input type="radio"/>            | 60mins              |        | ✓        |          |
| Tuesday<br>BEFORE school | ✓  |     | Swimming                 | Class/Lesson <input checked="" type="radio"/> Training <input type="radio"/><br>Match <input type="radio"/> Unstructured <input type="radio"/>               | 45mins              |        | ✓        |          |
| Tuesday<br>DURING School | ✓  |     |                          | Class/Lesson <input type="radio"/> Training <input type="radio"/><br>Match <input type="radio"/> Unstructured <input type="radio"/>                          |                     |        |          |          |
| Tuesday<br>AFTER School  |    | ✓   | Soccer                   | 1. Class/Lesson <input type="radio"/> Training <input checked="" type="radio"/><br>Match <input type="radio"/> Unstructured <input type="radio"/>            | 60mins              |        |          | ✓        |
|                          |    |     | Jog                      | 2. Class/Lesson <input type="radio"/> Training <input type="radio"/><br>Match <input type="radio"/> Unstructured <input checked="" type="radio"/>            | 20mins              |        | ✓        |          |