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Improving teachers' work-related outcomes through a group-based physical activity intervention during leisure-time

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Abstract

Grounded in self-determination theory, this study examines the effects of a leisure-time physical activity (LTPA) intervention with work colleagues on work-related outcomes of relatedness satisfaction, engagement factors, satisfaction, and burnout subtypes. Fifty-seven teachers (M_{age}=46.81±7.90), from two secondary schools randomized as an experimental (n=22) or control (n=35) group, participated in the study. Thirty-two sessions based on playful, strength, aerobic, and back pain prevention activities were performed two days per week throughout one academic year. The experimental group teachers reported significant improvements in relatedness satisfaction, vigor, absorption, and satisfaction at work compared to the control group teachers and their own baseline scores. Results highlight that two weekly sessions of LTPA with work colleagues can lead to positive work-related outcomes among teachers.

Keywords: teachers, leisure-time physical activity, intervention, relatedness satisfaction, engagement, burnout.

Introduction

A high prevalence rate of burnout among secondary school teachers has been shown in a recent systematic-review (García-Carmona, Marín, & Aguayo, 2018). Teacher stress and burnout may have devastating outcomes on their health and quality of life (e.g., anxiety, depression, sleep problems; Abós; Sevil-Serrano; Kim, Klassen, & García-González, 2019; Yu, Wang, Zhai, Dai, & Yang, 2015), but they also have high organizational and interpersonal costs for schools and administrations (e.g., sickness absence, conflicts among colleagues; Rabasa, Figueiredo-Ferraz, Gil-Monte, & Llorca-Pellicer, 2016; Skaalvik & Skaalvik, 2016), and a negative impact on students' quality of education (e.g., low motivation and academic achievement; Klusmann, Richter, & Lüdtke, 2016). These stressful working conditions have also negatively affected teachers' satisfaction and engagement at work (Skaalvik & Skaalvik, 2015, 2016). Recent research shows that secondary school teachers' job satisfaction has plummeted since the beginning of the 21st century (Anaya & López, 2014). Due to the serious consequences and very high costs (i.e., at individual, interpersonal and organizational levels) of work-related burnout, and the decreasing satisfaction and engagement in teachers, there is an urgent need for effective solutions.

Different types of burnout interventions (i.e., cognitive behavioral, mindfulness/meditation, professional development, psychoeducational, social support, and socio-emotional skills) have reported small, but statistically significant positive effects on reducing burnout among teachers (Iancu, Rusu, Măroiu, Păcurar, & Maricuțoiu, 2018). Likewise, various types of work-engagement interventions (i.e., personal/job resource building, leadership training, and health promotion) seem to show small, but significantly positive effects on increasing employees' engagement (Knight, Patterson, & Dawson, 2017).

Alternatively, a body of research evidences that teachers' health- and work-related problems may be prevented through leisure activities (Brajša-Žganec, Merkaš, & Šverko, 2011), especially by participating in regular physical activity (PA) (Bogaert, De Martelaer, Deforche, Clarys, & Zinzen, 2014). Recent studies with employees have shown that both group-based PA (i.e., that takes place with other colleagues) and leisure-time PA (LTPA) (i.e., that takes place during non-working hours) may induce physical and psychological benefits (Andersen et al., 2015; White et al., 2017). The current study adds to this emerging body of literature by investigating the possible effects that a LTPA intervention with work colleagues may have on a set of teachers' work-related outcomes (i.e., relatedness satisfaction, engagement factors, job satisfaction, and burnout subtypes); a topic that no study has addressed in this field to date.

Physical activity and work-related outcomes

PA, which is defined as "any bodily movement produced by skeletal muscles that results in energy expenditure" (Caspersen, Powell, & Christenson, 1985, p. 126), may encompass physical exercise, sports, and physical activities as part of daily living (e.g., active commuting), including, therefore, both worksite PA (i.e., that takes place during people's working hours and inside the workplace) and LTPA (Powell, Paluch, & Blair, 2011). Although the overall benefits of regular PA on physical, social, and psychological health have been widely proven (e.g., Eime, Young, Harvey, Charity, & Payne, 2013), only a small percentage of teachers met moderate-to-vigorous PA recommendations (Nikolovski & Sarić-Tanasković, 2006; Webber et al., 2012). With regard to work-related outcomes, over the last decades several mechanisms have been suggested to explain how regular PA participation affects employees' psychological functioning (Naczenski, de Vries, van Hooff, & Kompier, 2017). However, the underlying mechanisms of this association have not been fully

elucidated yet (Ginoux, Isoard-gautheur, & Sarrazin, 2019). A combination of physical, social, and physiological mechanisms may offer preliminary support to understand this proposed association.

The physical health benefits of PA, such as a lower risk of metabolic syndrome, musculoskeletal complaints, diabetes mellitus, and different types of cancer, have been well-established (Moore et al., 2016; Pedersen & Saltin, 2015). It thus seems logical to assume that regular PA participation can also benefit work-related parameters in a roundabout way, via increasing employees' physical health (Sui, Smith, Fagan, Rollo, & Prapavessis, 2019). In support of this agreement, two recent studies have shown that installing bike desks in the office for a 5-month period positively influences employees' work engagement, attention, and motivation, by improving employees' physical health indicators (Torbeyns et al., 2016; Torbeyns, de Geus, Bailey, Decroix, & Meeusen, 2017). In addition, literature reviews and longitudinal studies have found consistent associations between physical health, lower levels of work absenteeism (e.g., Darr & Johns, 2008), and burnout among employees (e.g., Kim, Ji, & Kao, 2011).

The social health benefits from PA such as the development of a social network and improved social skills is also well-documented. Regular PA may strengthen employees' relatedness and social support through various mechanisms. A wide variety of different types of PA and sports are often performed with others (White et al., 2017). According to the social interaction hypothesis, the social relationships and social support that emerge among those who take part in regular group-based PA activities may help to deal with physical and mental health problems (Ransford, 1982; Teychenne, Ball, & Salmon, 2008) by creating broader social networks, avoiding feelings of loneliness, and increasing personal resources such as self-esteem (Pels & Kleinert, 2016). Within the work-context, group-based PA participation

with work colleagues can provide a large number of opportunities for social interactions (Bruton, Vurnakes, Martin, Perry, & Henderson, 2012). A sense of belonging and warm relationships with work colleagues in group-based PA sessions may, consequently, be effective in improving relatedness satisfaction among teachers at work (Andersen et al., 2015; Arrogi, Schotte, Bogaerts, Boen, & Seghers, 2017). In parallel, a growing body of research based on the self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2017), has widely shown how these warm interpersonal relationships with work colleagues at work can facilitate positive work-related outcomes (i.e., engagement, job satisfaction) and even conceal burnout feelings (e.g., Abós, Haerens, Sevil, Aelterman, & García-González, 2018; Abós, Sevil, Julián, Martín-Albo, & García-González, 2018). To illustrate, a friendly working environment (i.e., by increasing teachers' interpersonal relationships) could improve confidence among teachers and facilitate collaboration among them (e.g., interdisciplinary projects).

As regards physiological mechanisms, empirical research has evidenced that psychological stress at work might be managed through regular PA (Klaperski, von Dawans, Heinrichs, & Fuchs, 2014). The cross-stressor adaptation hypothesis is one of the most accepted mechanisms to explain this association (see Sothman, 2006). According to this mechanism, regular PA leads to biological adaptations (e.g., influencing individual's sedation patterns, decreasing hormone production, and lowering blood pressure), which decrease physiological responses, not only to PA-related stressors but also to stressors in general, including job stressors (Klaperski, von Dawans, Heinrichs, & Fuchs, 2013; Sothman, 2006). Given that empirical research shows that fast recovery from stress prevents numerous health-related problems (Chrousos, 2009), a cross-stressor adaptation by participating in PA is considered a central health-protective mechanism. Interestingly, this buffering and correct adaptation to stress has been pivotal to prevent burnout experiences and intention to quit the

job in teachers, as well as to benefit their engagement at work (Gluschkoff et al., 2016; Skaalvik & Skaalvik, 2016). Moreover, regular PA may induce changes in several neurotransmitters and neuromodulators such as noradrenaline, dopamine, and serotonin (5-HT), resulting in the reduction of burnout levels, better mood, and an increase of energy (Schuch et al., 2016). Similarly, a wide range of studies based on job-stress recovery processes (e.g., Feuerhahn, Sonnentag, & Woll, 2014; Sonnentag, Venz, & Casper, 2017) point to off-job PA as a key factor to inhibit work stress, replenish depleted resources, and optimize work engagement levels.

Group-based physical activity

Despite the aforementioned overall benefits of PA in work-related outcomes (e.g., Naczenski et al., 2017; Stults-Kolehmainen & Sinha, 2014), a recent body of research additionally suggests that regular PA participation with work colleagues may also be associated with additional social and psychological health benefits among employees (e.g., Jakobsen, Sundstrup, Brandt, & Andersen, 2017; White et al., 2017). Several group-based PA interventions at worksites have shown improvements, not only in PA levels but also in relatedness satisfaction in LTPA (Harden et al., 2015) and in their work (Andersen et al., 2015; Bruton et al., 2012). For example, in a group-based PA intervention at a worksite conducted by Podlog & Dionigi (2009), several employees manifested the friendship and camaraderie that they experienced with their work colleagues. Likewise, Andersen et al. (2015) and Bruton et al. (2012) reported the benefits of a group-based PA intervention at the workplace for enhancing worksite social capital, integration, and interpersonal interactions among employees. A possible mechanism could be explained by the social interaction hypothesis (Ransford, 1982; Teychenne et al., 2008; White et al., 2017), which suggests that participating in PA with other people may generate psychosocial benefits. To date, however,

there are no studies in teachers that have assessed the impact of conducting a group-based PA intervention during LTPA with work colleagues.

Leisure-time physical activity among teachers

Systematic reviews and longitudinal studies have widely shown that employees may improve work-related outcomes, such as reducing burnout or increasing work engagement by taking part in any form of PA interventions, both at the worksite (Abdin, Welch, Byron-daniel, & Meyrick, 2018; Naczenski et al., 2017) and in their leisure-time (Abu-Omar & Rütten, 2008; Bernaards et al., 2006; White et al., 2017).

Within the teaching field, recent research has suggested that PA interventions during working hours are not feasible for most secondary school teachers (Bogaert, De Martelaer, Deforche, Clarys, & Zinzen, 2015). A mixed-method study among secondary school teachers, conducted by Boagert et al. (2015), concluded that individual job-related responsibilities (e.g., teaching, preparing lessons, meetings with parents), organizational barriers (e.g., few free hours and different teaching schedules among teachers), and a lack of resources and sports facilities (e.g., sharing sport facilities with Physical Education teachers or other schools), make it difficult to implement PA interventions during school hours. Given that both worksite PA interventions and LTPA interventions have proven to be effective to improve work-related outcomes (e.g., Abdin et al., 2018; Bernaards et al., 2006; White et al., 2017), and taking into account teachers' working conditions, particularly in Spanish schools[1],

[1] In Spain, secondary school teachers have to work at school for at least 25 hours per week (i.e., 5 to 6 hours per day, with a short break of 25 to 30 minutes). Of those 25 hours, they are teaching for approximately 20 hours. The rest of the hours are spent carrying out other school tasks, such as department meetings, teacher/tutor meetings, commissions,

promoting LTPA interventions seems to be the most feasible choice (Bogaert et al., 2014, 2015). For example, Bogaert et al. (2014) found that participating in LTPA was significantly and positively related to perceived physical and mental health, job satisfaction, and negatively related to stress and absenteeism in secondary school teachers. Likewise, a significantly negative relationship between LTPA and burnout in childcare teachers was found in another study (Carson, Baumgartner, Matthews, & Tsouloupas, 2010). Yet, it seems important to note that despite these preliminary and correlational findings among teachers, to the best of our knowledge, there are no studies that have examined the effectiveness of LTPA interventions with work colleagues on teachers' work-related outcomes. Hence, designing, developing, and assessing LTPA interventions among teachers seems necessary.

Theory-driven physical activity interventions

According to the most recent Special Eurobarometer (2018), one of the main perceived barriers to PA in adults is lack of motivation. To overcome barriers to PA, it therefore seems justified to design theory-driven interventions to engage teachers and maintain the beneficial effects of PA over time (Prestwich et al., 2014). One of the most widely-used theoretical frameworks to explain human behavior is SDT, which offers individuals support for them to develop more autonomous and internalized forms of motivation (Deci & Ryan, 1985; Ryan & Deci, 2017). SDT has been used to guide interventions in many and varied contexts, including PA settings (Fortier, Duda, Guerin, & Teixeira, 2012). These SDT-based interventions facilitate and maintain PA behavior change

interviews with parents, library services, among others. In addition, during these hours, teachers have to prepare their lessons, evaluate exams, and prepare and adapt materials for their students, among other tasks.

by satisfying the three basic psychological needs (i.e., autonomy, competence, and relatedness) through the creation of a need-supportive environment (e.g., Kwasnicka, Dombrowski, White, & Sniehotta, 2016; Rodrigues et al., 2018).

Autonomy refers to individuals' needs to feel volitional in self-regulated decisions (Ryan & Deci, 2017). To illustrate this, autonomy support for PA may be provided to teachers by encouraging them to participate in LTPA, listening and attending to their interests and preferences, or providing them with health literacy information related to PA benefits. Competence refers to individuals' needs to feel effective and capable of achieving desired outcomes (Ryan & Deci, 2017). For instance, teachers may receive competence support for PA by providing positive and constructive feedback after, during and before the activity sessions, providing achievable goals and progressive challenges with increasing difficulty. Lastly, relatedness refers to individuals' needs to feel mutually connected to significant others and experience warm interpersonal relationships (Sparks, Lonsdale, Dimmock, & Jackson, 2017). To illustrate this, teachers may receive relatedness support for PA by establishing a respectful and comfortable environment, offering multiple opportunities to improve their interpersonal relationships, participating in PA in different groups and with different work colleagues, or performing activities or tasks with a one-point solution (e.g., cooperative games). Importantly, recent empirical evidence in the PA domain has shown an association between a relatedness-supportive environment and relatedness need satisfaction (Sparks et al., 2017). Grounded in SDT, therefore, improvements in the need for relatedness at work in teachers could also trigger benefits in terms of work-related outcomes (e.g., Abós, Sevil, Julián, et al., 2018). Based on the abovementioned advantages of LTPA participation among teachers, motivational theories such as SDT seem essential to guide LTPA interventions and facilitate long-term maintenance of PA.

Study aim and hypothesis

Although previous cross-sectional studies have suggested the benefits of PA participation with work colleagues (Jakobsen et al., 2017; White et al., 2017), and during leisure-time with teachers (Bogaert et al., 2014, 2015), to date, no intervention studies have examined its effects on work-related outcomes in one of the most stressful social professions, such as teaching (García-Carmona et al., 2018). To fill this gap, the present study aims to assess the effectiveness of a LTPA intervention with work colleagues on teachers' work-related outcomes. It was hypothesized that, compared to the control group and baseline values, the intervention group would show improvements in relatedness satisfaction at work, work engagement factors, job satisfaction, and burnout subtypes at work.

Methods

Design, participants, and procedure

A quasi-experimental design was carried out on a convenience sample of teachers from two public secondary schools in Huesca (Aragon, Spain). Both schools were similar in terms of school community size, class sample size, school schedules, and facilities. As observed in Figure 1, all secondary school teachers (n=226) from the two schools were invited to voluntarily participate in the study. One school was randomly assigned to the experimental condition. Initially, a sample of 106 secondary school teachers (58 from the experimental group and 48 from the control group) decided to participate in the study. After applying the inclusion criteria (i.e., attending more than one session in the experimental group and completing all the questionnaires in the pre-test and post-test measurements in both groups), a final sample of 57 secondary school teachers (M_{age}=46.81±7.90) participated in this study: the experimental group comprised 22 (M_{age}=47.73±7.98; 100% females), while the control group comprised 35 (M_{age}=45.89±7.82; 43% females). Further information on the

sociodemographic characteristics and differences between the experimental and the control groups is provided in Table 1.

<INSERT TABLE 1 ABOUT HERE>

The intervention lasted from November to June (eight months). Prior to the research, all teachers were informed about the nature of the study, requirements, and benefits of participating. Further, before starting the group-based PA intervention, participants were informed that their anonymity would be preserved in the data collection process and in the future scientific dissemination of the study. During the week prior to the start of the intervention (i.e., November), a pre-test assessment was conducted for all teachers. The post-intervention testing was carried out one week after the intervention program ended (i.e., June). Data collection took place at each school (i.e., experimental and control groups) and questionnaires were administered in paper-and-pencil format. Teachers had five weekdays to complete the questionnaire and deposit it in a mailbox located in the staffroom of each school. The study protocol was approved by the Ethics Committee for Clinical Research of Aragon (CEICA) and the Educational Services of the Government of Aragon.

<INSERT FIGURE 1 ABOUT HERE>

Measures

Sociodemographic characteristics. Teachers' sociodemographic details in terms of age, gender, living situation, number of children, type of contract, full- or part-time work, years of teaching experience, and years at current school, were measured.

Relatedness satisfaction at work. Teachers' relatedness satisfaction at work was measured using the four items corresponding to the relatedness satisfaction factor (e.g., “When I am with the people from my work environment, I feel understood”) from the Spanish version of the Basic Psychological Needs at Work Scale (BPNWS-Sp; Abós, Sevil,

Julián, et al., 2018). Teachers' responses were registered on a 6-point Likert scale ranging from 1 (“strongly disagree”) to 6 (“strongly agree”). In the present study, the Cronbach alphas, both in the pre- and post-test for relatedness satisfaction, were .88 and .93, respectively.

Work engagement. Teachers' work engagement was measured using the Spanish version of the Utrecht Work Engagement Scale (UWES; Schaufeli, Martinez, Marques-Pinto, Salanova, & Bakker, 2002). This scale includes 17 items that evaluate vigor (six items; e.g., “At my work, I feel bursting with energy”), dedication (five items; e.g. “I find the work that I do is full of meaning and purpose”), and absorption (six items; e.g., “I am immersed in my work”). The items were registered on a 7-point Likert scale ranging from 0 (“never”) to 6 (“always”). This questionnaire has shown adequate psychometric properties in previous research with teachers (e.g., Høigaard, Giske, & Sundsli, 2012). In the present study, the Cronbach alphas both in the pre- and post-test, for vigor, dedication, and absorption, were .86/.92, .89/.91, and .73/.86, respectively.

Job satisfaction. Teachers' job satisfaction was measured using a Spanish translation of the Teacher Job Satisfaction Scale (TJSS; Skaalvik & Skaalvik, 2011). This four-item scale includes one single factor (e.g., “I look forward to going to school every day”). This scale was translated from English to Spanish following the guidelines of the International Test Commission (Muñiz, Elosua, & Hambleton, 2013). Teachers' responses were registered on a 6-point Likert scale from 1 (“strongly disagree”) to 6 (“strongly agree”). This scale has shown adequate psychometric properties in past research with teachers (e.g., Abós, Sevil, Martín-Albo, Julián, & García-González, 2018). In the current study, the Cronbach alphas, both in the pre- and post-test for job satisfaction, were .88 and .86, respectively.

Burnout at work subtypes. Teacher burnout subtypes were measured using the Spanish short-version of the Burnout Clinical Subtype Questionnaire (BCSQ-12; Abós, Sevil-Serrano, Montero-Marín, Julián-Clemente, & García-Gonzáez, 2019). This scale consists of 12 items (four items per factor) assessing respondents' overload (e.g., "I overlook my own needs to fulfil work demands"), lack of development (e.g., "My work doesn't offer me opportunities to develop my abilities"), and neglect (e.g., "I give up in response to difficulties in my work"). Teachers' responses were provided on a 7-point Likert scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). In the current study, the Cronbach alphas, both in the pre- and post-test for overload, lack of development, and neglect were .89/.91, .84/.86, and .86/.95, respectively.

Intervention program

The present group-based intervention with work colleagues comprised 32 sessions of LTPA consisting of a combination of 10 cooperative and playful sessions (31%), 11 strength sessions (34%), seven aerobic sessions (22%), and four back pain prevention sessions (13%), held from November to June. This intervention was exclusively offered to the teachers from the experimental group; the control group did not receive any PA intervention. Prior to the start of the intervention, experimental group teachers were informed at a meeting about the benefits and risks of inactivity with the aim of encouraging teachers to participate in the PA program. Given the efficacy demonstrated by playful, strength, and aerobic activities in previous PA interventions among employees (e.g., Bruton et al., 2012; Gerber et al., 2013), the initial design of this LTPA intervention aimed to develop these three types of sessions. However, other aspects such as total number of sessions, weekly frequency of sessions, or the schedule of the sessions were not decided before the program began. With the intention of providing autonomy, the aim was for teachers to gradually decide about these nuances based on their interests, preferences, and availability. Likewise, the possibility of adding new PA

content was progressively offered. To illustrate, as a consequence of back pain experienced at work by some teachers, four back pain prevention sessions were also held at the end of the intervention. In short, after a first welcome session, the early sessions were generally based on cooperative and playful games with the aim of creating a friendly and trusting environment among participants. Then, during the winter months (i.e., December to February), these cooperative and playful sessions were combined with strength sessions because both were carried out indoors. Next, strength sessions, held outdoors, during the spring months (i.e., March to May), began to be combined with aerobic sessions. Finally, four back pain prevention sessions were performed during the last two months of the intervention (i.e., May and June). At the end of each session, benefits of different types of PA were usually discussed with the aim of encouraging and empowering teachers to keep up PA on a regular basis and to achieve a more active lifestyle. All sessions were conducted under the supervision of a PA and Sport Sciences graduate and were commonly held twice per week for one hour (on Tuesday and Thursday) during teachers' leisure-time (5 PM to 6 PM). Both the days and the session schedules were decided and agreed by the majority of the participants during the first session. Importantly, the intervention program was interrupted during Christmas and Easter vacation. Further details on the description of the activities of each type of session, timing, place, and main aim are reported in Table 2.

<INSERT TABLE 2 ABOUT HERE>

Given that SDT has widely demonstrated that a need-supportive environment may have the potential to initiate and maintain PA behavior (Kwasnicka et al., 2016; Rodrigues et al., 2018), the intervention was also designed to provide the experimental group teachers with autonomy, competence, and relatedness support for PA. The aim of developing this need-supportive environment was to satisfy BPNs (i.e., autonomy, competence, and relatedness) in order to improve teachers' rate of adherence to PA intervention. These need-supportive

strategies were designed and implemented by the PA and Sport Sciences graduate with the supervision of a research team. Although this person was also an expert in the SDT framework and had previously carried out different SDT-based PA interventions, the need-supportive strategies were co-developed and co-supervised by the research team during each PA session in order to ensure their implementation. The main strategies used to create a need-supportive environment through the 32 PA sessions are reported in Table 3.

<INSERT TABLE 3 ABOUT HERE>

Data analysis

Levene and Shapiro-Wilk tests were performed to confirm the assumptions of homogeneity of variances and normality of distribution, respectively (p>.050). Descriptive statistics (i.e., mean and standard deviation) were calculated for all study variables, and Cronbach's alpha coefficient was conducted to assess the scale reliability. Further, baseline differences in sociodemographic characteristics between the experimental group and the control group were assessed by conducting chi-square tests (for categorical variables) and independent samples t-tests (for continuous variables). Likewise, baseline differences in dependent variables between genders were assessed by conducting two multivariate analyses of variance (MANOVA). The first one was performed with the final study sample (i.e., n=57; 22 from the experimental group and 35 [15 females] from the control group), whereas the second one was conducted using only the sample of experimental school teachers at baseline (i.e., 58; 42 females and 16 males). In addition, a third MANOVA was carried out to analyze possible differences in dependent variables between teachers participating in the intervention (i.e., n=22) and those who were subsequently excluded from the intervention group (i.e., n=36). A partial correlation analysis was conducted to examine the relationship between the teachers' participation rates and post-test dependent variables, controlling the dependent

variable levels at baseline. To examine the effect of the intervention program, a 2 x 2 (time x group) ANOVA with repeated measures over time (pre- and post-test) was independently conducted on each dependent variable of the study (i.e., relatedness satisfaction at work, vigor, dedication, and absorption, job satisfaction, overload, lack of development, and neglect). Between- and within-group comparisons using Bonferroni correction were examined. Partial eta squared (η_p^2) effect sizes above .01 were considered small, above .06 moderate, and above .14 large (Cohen, 1988). All analyses were performed using IBM SPSS v.20.0.

Results

Preliminary analysis

Table 1 shows baseline sociodemographic characteristics of the participating teachers. There were no significant differences in age, living situation, number of children, teaching experience, years at current school, type of contract (i.e., permanent or temporary), and type of working day (i.e., full-time or part-time) between the experimental group and the control group (p>.050). Because the experimental group was composed exclusively of female teachers, significant differences (p<.001) in gender distribution were found between the experimental group and the control group. Consequently, using the final study sample (i.e., n=57; 22 from the experimental group and 35 [15 females] from the control group), possible differences in terms of gender in the dependent variables of the study at baseline were examined by means of MANOVA, resulting in a non-significant gender effect (Wilks' Lambda=.858; F(8,48)=0.992; p=.455; η_p^2=.142). Likewise, using only the initial sample of experimental school teachers (n=58), gender differences between the 42 female and the 16 male teachers were also examined in the dependent variables at baseline values. Results of this MANOVA did not show a significant gender difference, either (Wilks' Lambda=.937;

F(5,52) =0.703; p=.623; η_p^2=.063). Therefore, gender was not included as a covariate in further statistical analyses.

On the other hand, differences between teacher-participants (i.e., n=22) and teacher non-participants (i.e., teachers from the experimental school who were subsequently excluded; n=36) from the experimental group were also investigated at baseline. MANOVA showed a non-significant main interaction effect (Wilks' Lambda=.922; F(5,52)=0.882; p=.500; η_p^2=.078). More accurately, between-group univariate contrasts showed no significant effects between these two referred groups in any dependent variable of the study, resulting in p-values ranging from .121 (absorption) to .766 (relatedness satisfaction).

Intervention fidelity and program attendance

Of the 34 teachers who filled out the pre- and post-test, 12 were excluded from the study because they only attended the first meeting session, resulting in an experimental group of 22 teachers. Overall, and similar to previous studies (J. R. Hunter, Gordon, Bird, & Benson, 2018), the main reason that was given to not continue participating in the LTPA intervention was incompatibility of personal schedules, and other family and work responsibilities. Average attendance to the PA sessions was 11.25±3.40. The most normal attendance (i.e., mode) was 12 teachers per session, which occurred six times (i.e., 19% of the PA sessions). The least attended PA session comprised four teachers, while the session with the highest teacher participation comprised 18. Both occurred once. Attendance remained stable throughout the PA intervention, although the first and last sessions were the most frequented. The teacher who attended fewer PA sessions did so five times (16%), while the teacher who participated more times did so in 27 of 32 sessions (84%). Finally, partial correlations showed that teacher participation rates in the intervention group were significantly and positively related to relatedness satisfaction (r=.56, p=.003), vigor (r=.44,

p=.017), absorption (r=.65, *p*<.001), and job satisfaction (r=.43, *p*=.028) at post-test, controlling the dependent variable levels at baseline. Yet, teacher participation rates were not significantly related to dedication or burnout at work in the intervention group.

Intervention effects

Results indicated a significant main interaction effect (group x time) of the LTPA intervention with a medium effect size on relatedness at work (Wilks' Lambda=.919; F(1,55)= 4.848; *p*=.032; η_p^2=.081), vigor (Wilks' Lambda=.906; F(1,55)=5.697; *p*=.020; η_p^2=.094), absorption (Wilks' Lambda=.881; F(1,55)=7.412; *p*=.009; η_p^2=.119), and job satisfaction (Wilks' Lambda=.929; F(1,55)=4.191; *p*=.045; η_p^2=.071). Yet, no significant main interaction effect (group x time) of the LTPA intervention was found in dedication (Wilks' Lambda=.994; F(1,55)=0.326; *p*=.571; η_p^2=.006) and burnout subtypes of overload (Wilks' Lambda=.985; F(1,55)=0.818; *p*=.370; η_p^2=.015), lack of development (Wilks' Lambda=.991; F(1,55)=0.476; *p*=.493; η_p^2=.009), or neglect (Wilks' Lambda=.991; F(1,55)=0.513; *p*=.477; η_p^2=.009).

Between-group effects. As observed in Table 4, no significant differences were found between the experimental group and the control group at baseline values in any dependent variable of the study. Yet, after the intervention program (i.e., at post-test) the experimental group reported significantly higher values in relatedness satisfaction at work (F(1,55)=8.211; *p*=.006; η_p^2=.130), vigor (F(1,55)=14.413; *p*<.001; η_p^2=.208), absorption (F(1,55)=16.829; *p*<.001; η_p^2=.234), and in job satisfaction (F(1,55)=9.921; *p*=.003; η_p^2=.153) than the control group.

Within-group effects. The experimental group showed a significant increase in relatedness satisfaction at work, vigor, absorption, and job satisfaction compared to their baseline values. Moderate-to-large effect sizes were found in these work-related outcomes

(for further details, see Table 4). No significant differences in any of the study variables were shown in the control group.

<INSERT TABLE 4 ABOUT HERE>

Discussion

Despite the large number of interventions that focus on improving outcomes such as engagement or burnout among teachers (e.g., Iancu et al., 2017; Knight et al., 2017), no study has yet investigated the effectiveness of a group-based leisure-time PA intervention on teachers' work-related outcomes. The main findings of this study highlight that two sessions of LTPA per week, during practically one academic year, with work colleagues from the same school, improve relatedness satisfaction, vigor, absorption, and job satisfaction, but not dedication and burnout, among a sample of Spanish secondary school teachers. Understanding the contributions of a LTPA intervention with work colleagues could provide valuable information to develop theory-driven PA interventions focused on increasing psychological functioning among teachers.

Consistent with our hypothesis, a medium effect size was found in teachers' relatedness satisfaction at work after the intervention program. Results of this study are in line with a few previous interventions in other professions that have suggested the effectiveness of group-based PA with work colleagues in order to improve their integration and interpersonal relationships (Andersen et al., 2015; Bruton et al., 2012; Podlog & Dionigi, 2009). All these results are congruent with the social interaction hypothesis (Ransford, 1982; Teychenne et al., 2008; White et al., 2017) which suggests that participating in PA with other people may generate psychosocial benefits. For example, in a group-based worksite PA intervention among office employees, participants explained that it was enjoyable to

participate in PA with work colleagues and talk about things in a non-work setting (Andersen et al., 2011). Such programs could be very interesting because Skaalvik and Skaalvik (2015) reported that the teaching profession does not offer enough time to share experiences and develop social links among teachers. One potential explanation for the improvements in relatedness satisfaction at work in the present study is that the LTPA intervention was developed with teachers from the same school. These results reinforce the importance of developing LTPA interventions with work colleagues from the same school to establish warm interpersonal relationships at work. In addition, the type of PA sessions (e.g., cooperative and playful sessions) and the strategies providing support to teachers' relatedness satisfaction in LTPA (see Table 3) could explain the improvements in interpersonal relationships in LTPA, and, consequently at work.

The development of the LTPA intervention with work colleagues was also effective in increasing teachers' work engagement and job satisfaction by reporting large and moderate interaction effect sizes, respectively. Our results showed larger effect sizes than previous interventions based on personal/job resource building, leadership training, and health promotion, which reported small, but positive and significant effects on increasing employees' engagement (Knight et al., 2017). The larger effect sizes found in this LTPA intervention show promising results in terms of improving employees' engagement. These results are in line with other worksite PA interventions that have been effective in increasing well-being and satisfaction at work among different types of employees, including the university teaching staff (Abdin et al., 2018). Yet, to our knowledge, this is the first study that analyzes the effects of a LTPA intervention with work colleagues on teachers' work engagement and job satisfaction. Despite the scarcity of PA intervention studies on teachers, our results are in line with previous cross-sectional studies on teachers that have suggested that LTPA may be beneficial for teachers' positive work-related outcomes (e.g., Bogaert et al., 2014). Research on recovery

processes has demonstrated that off-job PA may have a particularly high potential to recover from job stress, and increase well-being and engagement at work (Sonnentag et al., 2017), which could explain the results found. Likewise, PA could also moderate stress levels (i.e., the cross-stressor adaptation hypothesis; see Sothman, 2006), resulting in a state of satisfaction that could be transferred to the work context owing to physiological mechanisms (i.e., influencing sedation patterns, decreasing hormone production, and lowering blood pressure) (Stults-Kolehmainen & Sinha, 2014).

According to SDT, another theoretical explanation of our results could be that improving relatedness satisfaction at work could also contribute to teachers' good psychological functioning at work (Ryan & Deci, 2017). Previous studies on teachers have shown associations between relatedness satisfaction at work and a wide range of work-related outcomes (e.g., work engagement; Abós, Haerens, et al., 2018; Abós, Sevil, Julián, et al., 2018). Yet, the present intervention has shown significant improvements in two factors of work engagement, such as vigor (i.e., high energy levels and resilience at work) and absorption (i.e., experience flow and full concentration while working), and in job satisfaction among the experimental group teachers, but not in dedication (i.e., experience enthusiasm, inspiration and sense of significance at work). It seems that the LTPA intervention with work colleagues could help towards teaching in a more energetic (i.e., vigor) and fully concentrated (i.e., absorption) way, but not in a more enthusiastic way (i.e., with more dedication). This could be explained because teacher dedication could be strongly related to teacher vocation, and, therefore, it is not easy to change intrinsic reasons, regardless of the type of intervention carried out (Fray & Gore, 2018). However, more research on the effects of LTPA with work colleagues in terms of dedication seems to be needed in order to refute this argument.

With regard to the effects of LTPA interventions with work colleagues on burnout subtypes, results reported a non-significant effect of the interaction of group and time. Our results are not aligned with past research where employees commonly showed improvements in stress and burnout after taking part in worksite group-based PA interventions (Conn, Hafdahl, Cooper, Brown, & Lusk, 2009; Naczenski et al., 2017). Given that teachers' burnout tends to increase over the academic year (Llorens-Gumbau & Salanova-Soria, 2014), when job demands become greater (Chang, 2009), these results are not as negative as might have been expected. In the teaching profession, this critical moment coincides with the end of the academic year, when teachers have to evaluate exams and student work, attend teacher and parent meetings, among other manifold teaching tasks. This could limit the positive effects of the LTPA intervention on teachers' burnout. Nevertheless, it is also noteworthy that very low values in teachers' burnout were found at baseline values (see Table 4), which may explain non-significant differences in the experimental group. These results suggest that a LTPA intervention with work colleagues may not be enough to decrease teachers' burnout in one of the most stressful professions (García-Carmona et al., 2018). Further qualitative studies may be useful to understand the lack of significant changes in decreasing teacher burnout.

Implications and recommendations for practice

Although results are considered promising and may encourage the educational administration and school policy-makers to implement LTPA interventions with work colleagues, it is important to take some implications and recommendations for practice into account for future research. One of the most important parts of any intervention is program attendance. In fact, the present study showed a significant and positive relationship between the teachers' participation rates in PA sessions and mostly work-related outcomes (i.e., relatedness, vigor, absorption, and job satisfaction). Yet, our participation rates were lower

than other worksite PA interventions conducted with employees (Abdin et al., 2018) or teachers (Aghdam, Sahranavard, Jahangiry, Jafarabadi, & Koushaa, 2016). Despite the development of a need-supportive environment, average attendance to the PA sessions was low. The incompatibility of personal schedules, and other family and work responsibilities could, therefore, explain the low PA attendance. In line with the explanation provided by Bogaert et al. (2015), it has to be noted that developing a PA program during teachers' leisure-time has many strengths, but it can also have additional barriers. In this sense, future studies could design PA programs with different schedules or days in order to reach most of the teachers (R. F. Hunter et al., 2018). As a peculiarity of our PA intervention, it should also be noted that all final participants were female. During the first meeting session, most of the participating teachers were female. One possible reason is that most of the teachers in the experimental school were females (72%). Another possible reason is that, at this first meeting, females expressed their desire to do cooperative and playful sessions. That is why, perhaps, male teachers were not motivated, and decided not to take part. Future PA interventions should include alternative activities in their initial design that could attract both genders, such as kin-ball or korfball among others.

Study limitations and directions for future research

Caution is warranted when interpreting the study results for the following reasons. Firstly, one of the main limitations of the present study was the lack of male teachers in the LTPA intervention, making it difficult to generalize the findings. Another important limitation that must be recognized was that only two secondary schools were involved to conduct the PA intervention, which resulted in a small convenience sample of teacher participants. Using a probabilistic random sample of school teachers from different secondary schools could avoid possible sample-related biases and lead to a better understanding of the effects of LTPA interventions on work-related outcomes. Further, assessing variables such as

students' socio-economic status (SES), school and class size, or parental involvement could contribute to more accurately determining the similarity between experimental and control groups in future PA intervention studies with teachers. More important, the LTPA intervention was not applied to all teachers in the experimental school. Whereas some teachers of the experimental school had the option of participating in the LTPA intervention and they did, others had the opportunity and decided not to participate, resulting in a self-selection bias. Consequently, the positive effects attributed to the LTPA intervention should be interpreted with caution. Secondly, the lack of a follow-up assessment makes it impossible to examine the maintenance of the intervention in terms of study outcomes. Nevertheless, the LTPA intervention was guided by one of the theoretical frameworks that has proven to be most efficient in improving the long-term effects of PA (Kwasnicka et al., 2016; Rodrigues et al., 2018). Consequently, work-related benefits could also be maintained over time. Thirdly, the quasi-experimental design of the study may also limit its generalizability. Consequently, to interpret these results, the limitations of quasi-experimental intervention studies should always be taken into account (see, Campbell & Stanley, 1963). Consistent with limitations observed in multicomponent PA interventions (Prochaska & Prochaska, 2011), it was not possible to determine either the condition of the LTPA intervention (i.e., leisure-time socializing vs. leisure-time socializing in the LTPA intervention) or the type of sessions (i.e., cooperative-playful, strength, aerobic, or back pain prevention) that had more or less effect on the study outcomes. Likewise, given that the control group did not receive any PA intervention, and there was only one experimental group, results may be attributable to the Hawthorne effect (i.e., the tendency of participants to work hard and to perform better simply because of the increased attention paid to them by an experimenter). Future studies should – as far as possible- conduct experimental designs in order to provide more insights into that question, comparing the effectiveness of having different experimental groups and PA

sessions. Fourthly, although the use of need-supportive strategies was revised by the research team in each PA session, there was no systematic observation of teaching behaviors. The observational methodology opens up a complementary avenue to assess not only the frequency and intensity of need-supportive and need-thwarting strategies of exercise instructors, but also to assess their correct implementation. Fifthly, PA levels were not measured in our study. This fact did not allow us to examine the extent to which teachers' PA levels may also be related to the work-related outcomes. Future PA interventions should use accelerometers to measure PA levels before, during, and after the intervention. Finally, the present study only focuses on the effectiveness of a LTPA intervention with work colleagues on some work-related outcomes. Although we do not consider this to be a study limitation, expanding knowledge of the effects of a LTPA intervention on other work-related outcomes (e.g., workaholic, flow, well-being, absenteeism), and other health-related behaviors (e.g., sleep quality, diet, alcohol and tobacco consumption), could be a new avenue of research.

Conclusion

This study has shown that two sessions of LTPA per week, during one academic year with work colleagues from the same school, improve not only relatedness satisfaction at work but also positive work-related outcomes such as engagement and satisfaction at work among a sample of Spanish secondary school teachers. However, this intervention did not report improvements in dedication and burnout at work. This study does not just provide a promising, feasible, and healthy program to create a warm interpersonal relationship among teachers, but also a way to tackle the growing problem of low teacher engagement and satisfaction at work.

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Table 1. Differences in baseline sociodemographic characteristics between teachers in the experimental group and teachers in the control group.

	Experimental group (n=22)	Control group (n=35)	t or x^2 value
Age, mean (SD)	47.73 (7.98)	45.89 (7.82)	0.85
Gender, % female	100%	43%	19.36*
Living situation, % living with a partner	77%	77%	0.00
Number of children, mean (SD)	1.36 (1.21)	1.06 (1.05)	1.00
Teaching experience, years (SD)	19.73 (10.01)	18.54 (9.71)	0.43
Current school, years (SD)	5.50 (6.96)	6.51 (8.43)	0.47
Type of contract, % permanent	77%	80%	0.13
Working day, % full-time work	95%	86%	1.36

Note: SD = standard deviation; *p<.001.

Table 2. Timing, aims, description, places, and additional details about the four different types of PA sessions performed in the intervention.

Type and timing	Main aim(s)	Structure and description	Other details	Place(s)
Cooperative and playful sessions (1, 2, 3, 4, 5, 6, 9, 11, 13, and 17)	To create a friendly environment by using cooperative games.	The structure of the cooperative and playful sessions was as follows: warm-up, main part, and cool-down. Before starting each session, the objectives and tasks established were briefly explained. The warm-up always consisted of joint mobility exercises that were carried out individually or in pairs. The main part consisted of cooperative games or tasks with all teachers having to reach a common goal through shared decisions and collaboration. For example, among all the teachers, they tried to keep a ball in the air for as long as possible without dropping it, by hitting the ball with any part of the body. The cooperative and playful sessions ended with the teachers carrying out static and dynamic stretching exercises, and a brief summary, pooling their thoughts, discussing contents and defining the activities and goals of the following sessions.	Material, groupings, and tasks varied in each session. Each session had at least two different cooperative games. All sessions were accompanied with music.	Indoor: school sports facilities.
Strength sessions (7, 8, 10, 12, 14, 15*, 16, 20, 22, 24*, and 30)	To increase the teachers' muscle tone through circuit strength training.	The structure of the strength sessions was as follows: warm-up, main part, and cool-down. Before starting each session, the goals and exercises to be carried out were briefly explained. Exercises, series, and repetitions were explained using a chalkboard. The warm-up usually consisted of joint mobility exercises that were performed individually or in pairs. The main part of the session was characterized by circuit strength training consisting of at least 10 tasks that combined core stability, and lower and upper limb strength exercises. Further, low-intensity jogging and running exercises were included among the strength exercises. All the exercises were usually carried out in pairs or in small groups (i.e., three or four teachers), but never alone. Finally, teachers did static and dynamic stretching exercises, and then pooled their thoughts, discussing contents and characteristics for the following sessions.	Strength exercises and materials were varied in each session. All sessions were accompanied with music.	Indoor: school and university (fitness room*) sports facilities.
Aerobic sessions (18, 19, 21, 23, 26*, 27*, and 32)	To improve the teachers' aerobic endurance through trekking and indoor cycling sessions.	The aerobic sessions consisted of trekking in the area around Huesca. The walking intensity was low to moderate, meaning that participants could talk while walking. The distance and intensity increased slightly with each session. Further, two indoor-cycling sessions were conducted with the same intensity as the trekking sessions. At the end of the sessions, teachers did static and dynamic stretching exercises in	Trekking activities were carried out along different routes. The indoor-cycling sessions were accompanied with music.	Outdoor-Indoor: City of Huesca surroundings and university (fitness room*)

		groups, and discussed the exercises and goals for the following sessions.		sports facilities.
Back pain prevention sessions (25**, 28**, 29**, and 31***)	To prevent teachers' injuries and backaches.	The healthy back sessions were structured as follows. Before starting, the aims and exercises to be carried out were briefly explained. The first three sessions were conducted in a tatami room and consisted of exercises without material and/or with simple materials (e.g., balloons, fitball, bosu-ball, etc.). The fourth session was carry out in an indoor heated swimming pool and consisted of aquatic exercises aimed at preventing back pain using swimming materials (e.g., pull buoy, kickboard, pool noodles, etc.). Basic swimming skills were needed to participate in this session. At the end of each session the contents of the following sessions were discussed together.	Sessions held in the tatami room were accompanied by relaxing music. The entrance ticket to the indoor heated swimming pool was paid voluntarily by the participants.	Indoor: university (tatami room**) sports facilities and heated swimming pool***.

Table 3. Mapping of BPN support-based strategies for PA applied to the experimental group teachers.

Autonomy-supportive strategies for PA

- Teachers were informed about the session goals and activities.
- Teachers were involved in the choice of activities and type of sessions (e.g., back pain prevention sessions), type of music during the PA sessions (e.g., relaxation), and when (i.e., day and schedule) and where (e.g., teachers decided which routes they took for the trekking exercise) to participate in PA sessions, based on their interests and motivations.
- Teachers were encouraged and empowered to do autonomous PA, based on information about PA-friendly environments of the city of Huesca and surroundings (e.g., cycling and trekking routes, city parks), materials and resources (e.g., back pain prevention exercises, a list of swimming pool exercises), as well as awareness of types and intensities of PA (light, moderate, and vigorous) and its benefits.
- Teachers were encouraged to participate in exercise events (e.g., trekking, amateur running, cycling routes) carried out in the city of Huesca (Spain) throughout the PA intervention.

Competence-supportive strategies for PA

- Teachers tried out a wide variety of new activities and materials.
- At least two different exercises were carried out in each session (with the only exception of the trekking and indoor cycling sessions), and multiple opportunities were offered to achieve success.
- Teachers received positive and constructive feedback before, during, and after PA sessions.
- The aims of the PA exercises were both individual or group (i.e., offering challenges).
- The goals and exercises throughout the PA intervention went progressively from simple to more complex.
- Individual challenges were designed to participate in exercise events held in Huesca and surroundings (e.g., participating and finishing an amateur race)

Relatedness-supportive strategies for PA

- The focus was on establishing a respectful and comfortable environment where teachers could improve their integration, collaboration, and interpersonal relationships.
- Teachers interacted in different types of grouping (i.e., individual, small groups, and large groups) and with work colleagues from the same school during the PA intervention program.
- Decisions about the intervention program, for example, schedules, types of sessions or different places to participate in PA were discussed in groups.
- Some intervention sessions were focused on cooperative games and teamwork activities with a one-point solution for all teachers.
- The PA professional was empathetic, friendly, a good listener, patient, good humored, and trustworthy during the PA sessions.

Table 4. Descriptive statistics of relatedness satisfaction, engagement, satisfaction and burnout at work in the experimental and control schools. Between- and within-group effects.

Test time		Pre-test (I)	Post-test (J)	Within-group contrast						
Study variables	Group	*M* (SD)	*M* (SD)	Mean Diff. (J-I)	Standard error	F (1.55)	*p*	η_p^2	95% CID	
									LL	UL
Teachers' need for relatedness at work										
Relatedness satisfaction	Exp	4.70 (0.53)[a]	5.23 (0.45)[a]	.53	.15	12.07	.001	.180	-0.82	-0.22
	Cont	4.40 (0.88)[a]	4.50 (1.11)[c]	.10	.11	0.70	.405	.013	-0.33	0.13
Teachers' work engagement										
Vigor	Exp	4.14 (1.08)[a]	4.67 (0.92)[a]	.53	.17	8.79	.004	.141	-0.88	-0.17
	Cont	3.69 (0.88)[a]	3.68 (0.89)[d]	-.01	.14	0.01	.920	.000	-0.27	0.29
Dedication	Exp	4.43 (1.08)[a]	4.49 (1.00)[a]	.06	.18	0.16	.689	.003	-0.38	0.25
	Cont	3.99 (0.96)[a]	3.94 (1.08)[a]	-.05	.12	0.16	.683	.003	-0.20	0.30
Absorption	Exp	4.11 (1.02)[a]	4.67 (0.85)[a]	.56	.18	8.78	.004	.140	-0.92	-0.18
	Cont	3.72 (0.76)[a]	3.62 (0.97)[d]	-.10	.14	0.41	.522	.007	-0.20	0.39
Teachers' job satisfaction										
Job satisfaction	Exp	4.20 (1.07)[a]	4.77 (0.79)[a]	.57	.18	9.46	.003	.116	-0.93	-0.19
	Cont	3.90 (0.89)[a]	3.97 (1.01)[c]	.07	.14	0.34	.561	.006	-0.38	0.21
Teachers' burnout subtypes at work										
Overload	Exp	3.31 (1.32)[a]	3.46 (1.31)[a]	.15	.35	0.17	.679	.003	-0.85	0.56
	Cont	3.54 (1.37)[a]	4.09 (1.50)[a]	.55	.28	3.92	.053	.067	-1.12	0.06
Lack of development	Exp	2.56 (1.26)[a]	2.72 (1.15)[a]	.16	.26	0.11	.526	.002	-0.44	0.62
	Cont	2.47 (0.76)[a]	2.85 (1.27)[a]	.38	.33	0.15	.061	.003	-0.79	0.54
Neglect	Exp	2.08 (0.85)[a]	2.08 (0.98)[a]	.00	.18	0.00	1.000	.000	-0.37	0.37
	Cont	2.09 (0.89)[a]	1.92 (0.96)[a]	-.17	.15	1.32	.254	.024	-0.12	0.47

Note: Exp = Experimental group; Cont = Control group; Diff. = Difference; CID = Confidence interval differences; LL = Lower limit; UL = Upper limit. Between-group differences are reported with superscripts (a, a = $p>.05$; a, b = $p<.05$; a, c = $p<.01$; a, d = $p<.001$)

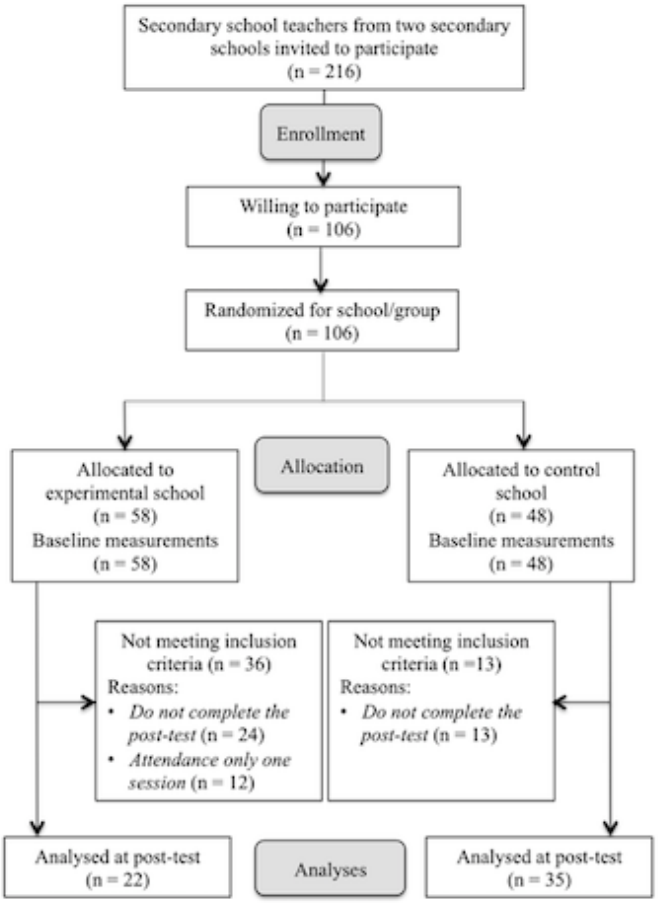

Figure 1. Participant flowchart.