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The effect of Sports-based Physical Activity programme on teachers' relatedness, stress and exercise motivation

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Abstract

Background: Teacher wellness affects teaching performance and students' academic achievement; hence, teacher wellness matters and should be a concern to educational researchers and practitioners. There are several teacher wellness approaches, but no one of them specifically focuses on a Sports-based Physical Activity programme.

Objective: To evaluate the effects of a Sports-based Physical Activity programme on teachers' relatedness, stress and motivation towards physical activity.

Method: Middle school teachers ($n = 32$) volunteered to participate in the research as programme participants ($n = 12$) or non-programme participants ($n = 20$). The Sports-based Physical Activity programme included 7 weeks of training in Catchball, a team sport and a tournament as the culminating event. The study adopted a mixed-methods design: a quasi-experimental design collecting quantitative data from online surveys and a case study design collecting qualitative data from interviews with the programme participants, non-participants and the school principal.

Results: Repeated-measures analysis of variance revealed that the Sports-based Physical Activity programme was effective in relatedness, $F(1, 30) = 5.16$, $p = .031$, $\eta_p^2 = .147$, and in one of the six motivation subscales, external regulation, $F(1, 30) = 4.23$, $p = .048$, $\eta_p^2 = .124$. The qualitative analysis findings supported the programme's contribution to teachers' relationship, stress and exercise motivation.

Conclusion: Overall, the programme was effective in promoting teachers' relationships in school, controlling levels of teachers' stress and fostering teachers' motivation towards physical activity. Further studies are required to examine the impact of a Sports-based Physical Activity approach in diverse school contexts and its impact on student learning.

Keywords

Exercise regulation, physical activity, relatedness, stress, teachers, team sports

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Introduction

Teachers are known to play a significant role in students' lives; thus, teacher wellness, including physical and mental health, is a major concern for society (Bajorek et al., 2014; Lauzon, 2001). The state of teacher wellness directly affects teaching performance, the ability to address students' needs and stability in schools – all of which influence students' academic achievement. For this reason, teachers' well-being matters and should be of concern to educational researchers and practitioners. The US Centers for Disease Control and Prevention (CDC) recognised the worth of wellness among school teachers and promoted programme implementation at schools. Studies of employee wellness programmes in private business and industries have shown positive outcomes on employees' health and well-being. In 2000, the CDC suggested that US state governments provide assistance to schools for staff wellness programmes. As a result, 67% of states followed the CDC recommendations and initiated some type of school wellness programmes (Eaton et al., 2007). Consequently, several teacher wellness programmes reported their effectiveness on general well-being, physical fitness, absenteeism and student academic achievement (e.g. Anderson et al., 1999; Blair et al., 1984, 1986; Briner and Dewberry, 2007; Dewberry and Briner, 2007).

The concept of wellness is broad-based and includes diverse dimensions (Konu, 2002). For this reason, effective teacher wellness programmes need to be holistic, including various components, such as consulting, mentoring, mindfulness, health examination and physical activity (PA). Including PA as part of a teacher wellness programme is both reasonable and feasible. It is well-known that regular participation in PA affords benefits for somatic and psychological wellness (Scully et al., 1998); hence, PA has been seen as a leading facilitator of better well-being. In addition, many schools already have key facilities and staff to support PA programmes (Allegrante, 1998). Therefore, schools may be considered ideal sites for promoting adult health through school staff PA programmes (Eaton et al., 2007; Heidorn and Centeio, 2012).

Several studies have focused on the effects of PA on teachers. Blair and colleagues (1984) evaluated the impact of a 10-week health promotion programme on teachers. Results from this study demonstrated increased participation in vigorous exercise, improved physical fitness, weight loss, lower blood pressure, a higher level of general well-being and lower levels of job stress. In another descriptive cross-sectional study, Puig-Ribera and colleagues (2015) found that higher levels of PA among university faculty and staff were related to higher mental well-being and higher work productivity. Interestingly, the study found that less sedentary time throughout the workday was also significant. The authors suggested that a workplace PA programme does not necessarily have to be intensive and that promoting 'sitting less' may positively impact work productivity and mental well-being.

Rationale for a Sports-based Physical Activity approach

To date, the majority of PA intervention studies have focused on individual exercise and its impact on physical outcomes, measuring activity dose (intensity, duration or frequency) and changes in physical health-related parameters (e.g. Blair et al., 1984; Resnicow et al., 1998; Wieneke et al., 2016). Recently, several researchers have gone one step further to examine the nuanced effects of group PA participation. Kanamori and colleagues (2016) examined 21,684 participants aged 65 or older for their regular exercise routines and the differences between people exercising alone and people exercising with others. Results from this study indicated that increased group exercise led to healthier participants. The authors concluded that 'although exercising alone and exercising with others both seem to have health benefits, increased frequency of exercise with others has important health benefits regardless of the total frequency of exercise' (Kanamori et al., 2016: 5). Another

large-scale, cross-sectional study analysed data from 1,237,196 adults in the USA (Chekroud et al., 2018) and found that physical exercise had a high correlation with self-reported mental health. Researchers found that the correlation was higher for team sports followed by cycling, and aerobic and gym activities, respectively. Interestingly, more exercise was not always better.

Team-based sports can facilitate unique group dynamics, including collaboration to work with each other, dependency and cooperation towards a common goal. It seems that an intervention that engages teachers in a collective and cooperative PA programme is a worthy research topic. Therefore, researchers in this study focused on the implementation of a Sports-based Physical Activity programme and the evaluation of its impact on teachers' mental well-being.

Purpose of this study

Despite several examples, school staff PA programmes are rarely studied, and research in this area remains at an early stage of development (Erwin et al., 2013; Hunt and Metzler, 2017). Thus far, most school staff PA programmes adopt individual exercise (rather than team sports activity) and focus on the physical aspects of health, which is only one facet of wellness. The current study focused on a Sports-based Physical Activity programme and its psychological influence on participants. The purpose of the study was to examine the effects of a Sports-based Physical Activity programme on teachers' relatedness, stress and motivation. The following research questions guided this study: (1) Does a Sports-based Physical Activity programme improve teachers' relationships in the school? (2) Does a Sports-based Physical Activity programme lower teachers' stress? and (3) Does a Sports-based Physical Activity programme increase teachers' autonomous motivation towards PA?

Methods

To investigate the Sports-based Physical Activity programme effects, researchers adopted a mixed-methods design. By collecting data from both quantitative and qualitative resources, different data may support or complement each other, providing added value and increasing the validity and trustworthiness of the research findings (Creswell et al., 2003).

Participants

The researchers contacted four school administrators in a major, urban southeast area of the USA. One middle school agreed to participate. A month before launching the programme, researchers attended a school faculty meeting and introduced the Sports-based Physical Activity programme, its purpose, content and operation, and recruited volunteers for the research component. Eighty-seven teachers from the middle school received the recruitment email with a link to an institutional review board (IRB)–approved[1] consent form and a pre-survey using Qualtrics online survey system. Teachers consented to participate in this study either as the programme participant (treatment group) or non-programme participant (control group). A total of 32 teachers volunteered for the study as programme participants ($n = 12$) or non-programme participants ($n = 20$).

Intervention

Upon beginning the study, participants were introduced to the organised team sport, Catchball, which resembles Volleyball. Since Volleyball is an Olympic sport, many participants were familiar with its fundamentals and could quickly transition to Catchball. In Catchball, players must catch the

ball and can hold it for 1 second before passing it or tossing it across the net. This major modification creates a slower-paced game allowing people without major athletic abilities to be engaged and participate in a sports-based PA opportunity that they might not otherwise. One participant volunteered as the leader of the group. This individual served as the team captain and was responsible for leading practices, coordinating schedules, managing equipment and recording attendance. Each practice session lasted approximately 2 hours and included a warm-up, skills practice, game tactics and a pickup game. Although the team captain had the responsibility for all practice sessions, research assistants provided additional support. The culminating event concluded the 7-week Catchball programme with a game of Catchball between the school's team (comprised of the teachers) playing against another Catchball team (not from the school). All school students, teachers and administrators were invited to cheer on the school's team during this culminating event.

Study design

This mixed-method study adopted a quasi-experimental design collecting quantitative data from an online survey before and after the programme implementation (pre-/post-test control group design). In addition, it included a case study design collecting qualitative data from focus group interviews.

Quantitative data collection. All individuals who consented to participate in the research study completed pre- and post-survey questionnaires. The researcher administered the pre-survey 2 weeks before launching the Sports-based Physical Activity programme. The pre-survey questionnaire consisted of three main sections: the Need for Relatedness Scale (NRS-10), the Perceived Stress Scale (PSS) and the Behavioral Regulation in Exercise Questionnaire–3 (BREQ-3). These sections were designed to assess relatedness, perceived stress and PA motivation, respectively. After the 7-week-long Sports-based Physical Activity programme, all study volunteers ($N = 32$) received the post-survey questionnaire which included the pre-survey sections and an additional section of programme satisfaction questionnaire.

NRS-10. Grounded in basic needs theory (Ryan and Deci, 2000), relatedness is defined as the extent to which an individual feels connected to others and the sense of belongingness to the community (Sun and Chen, 2010). Participants' perceived relatedness was measured using a modified subscale of the NRS-10 (Richer and Vallerand, 1998). Preceded by the stem 'In my relationships with my school colleagues I feel', participants responded to 10 items using a 7-point Likert-type scale anchored by 1 = strongly disagree to 7 = strongly agree. Using Cronbach's alpha coefficients, previous work with similar-aged participants in a physical education programme supported the internal reliability of NRS-10 (Standage et al., 2006).

PSS. The PSS (Cohen and Williamson, 1988) was used to measure teachers' stress levels before and after the programme intervention. The PSS is a 10-item self-report instrument to measure the degree to which situations in one's life are appraised as stressful. In addition, the instrument considers personal and contextual factors that influence the extent to which a person may view a situation as stressful (Cohen et al., 1983). The PSS was revised by Cohen and Williamson (1988) and is designed to measure the degree in which one perceives aspects of life as uncontrollable, unpredictable and overloading. This study used the PSS-10 because it is among the most accepted and widely used measures of stress available and there is ample evidence supporting its reliability and validity (Roberti et al., 2006).

BREQ-3. The BREQ-3 operationalises exercise motivation across a self-determination continuum and includes subscales that assess intrinsic, integrated, identified, interjected and external regulation, as well as motivation. It has 24 items and uses a 5-point Likert-type scale, anchored by 0 = not true for me and 4 = very true for me (Markland and Tobin, 2004). It is theoretically based on Self-Determination Theory (SDT) (Ryan and Deci, 2000) which is a popular theoretical framework for the investigation of motivation in exercise psychology. One aspect of the theory that has generated particular interest is its multidimensional conceptualisation of intrinsic and extrinsic motivation. According to SDT, there are varying forms of motivation that qualitatively represent different ways in which a behaviour can be regulated. SDT proposes six different forms of regulation: amotivation, external regulation, introjection, identification, integration and intrinsic regulation. The BREQ-3 is a revised version of BREQ-2 and has been shown to have adequate validity and reliability (González-Cutre et al., 2010).

Quantitative analysis. Repeated-measures analysis of variance (ANOVA) was utilised to compare programme participants and non-participants with changes in stress level, exercise motivation and relatedness over the intervention. In this 2 (pre–post) × 2 (group) ANOVA, pre–post measurement (pre-survey vs post-survey) was a within-subject factor, and programme participation (Sports-based Physical Activity programme participants group vs control group) was a between-subjects factor. The independent variable was participation in the Sports-based Physical Activity programme, and the dependent variables were measurement scores for the three instruments. Mauchly's test was used to assess the assumption of sphericity for all measures.

The hypotheses for this study were that the Sports-based Physical Activity programme would result in a significant change in the dependent variables, whereas there would be no significant change in the dependent variables for the control group (non-participants). This implied that the interaction results would be meaningful. This study examined interactions appeared in ANOVAs; if there had been a significant difference, a simple main effect test was conducted following Bonferroni's method. Alpha was set at .05 for statistical significance. Data were analysed using SPSS Version 25 (IBM Corp., 2017).

Qualitative data collection. This study utilised aqualitative methodology to examine the perceived effectiveness of the intervention programme. As opposed to the quantitative surveys focusing on the outcome of the programme, qualitative data revealed the process, providing additional insight for programme evaluation (Teddlie and Tashakkori, 2009). The focus group interviews were conducted with three different groups: teachers who participated in the Sports-based Physical Activity programme ($n = 4$), teachers who did not participate in the Sports-based Physical Activity programme ($n = 4$) and the school administrator ($n = 1$). Each interview followed a semi-structured protocol and lasted 45 minutes.

Qualitative data analysis. The interview data were analysed categorically. Transcriptions of each interview were coded initially via a grounded theory framework (Strauss and Corbin, 1998) with respect to teachers' relatedness, stress and motivation. Researchers used constant comparative method in which themes and subcategories were constantly compared and revised as new themes and categories emerged from the transcriptions.

Integration of data sources. A study that applies multiple data sources must integrate its findings; this can be done during data collection, data analysis and interpretation, or in a combination of places (Creswell et al., 2003; Johnson and Onwuegbuzie, 2004). In this study, data integration involved connecting quantitative results to qualitative findings as a sequential exploratory strategy

Table 1. Demographic information.

Group	Count	Age	Sex (female/male)
Programme participants	$n = 12$	$M = 40.08$ (range: 24–55)	10/2
Non-programme participants	$n = 20$	$M = 47.50$ (range: 28–67)	16/4
Total	$N = 32$	$M = 44.53$	26/6

Table 2. NRS-10 mean scores.

Group	*n*	Pre	Post	Mean difference
Programme participants	12	9.92	11.03	1.11
Non-programme participants	20	10.71	10.41	–0.30

NRS-10: Need for Relatedness Scale.

(Creswell et al., 2003). Quantitative analysis was undertaken to confirm whether the programme was effective to improve target variables (relatedness, stress and motivation) when compared to non-participants. It was followed by qualitative analysis and focus group interviews. This phase involved connecting the statistical findings with the themes that emerged through the focus group interviews. This integration strategy verified findings from both quantitative and qualitative analysis.

Results

Quantitative findings

Thirty-two teachers (participants, $n = 12$; non-participants, $n = 20$) responded to both the pre- and post-survey. See Table 1 for participants' demographic information. The study intended to verify the effect of the Sports-based Physical Activity intervention programme through repeated-measures ANOVA comparing participants and non-participants with changes in stress level, exercise motivation and relatedness over the intervention.

Relatedness. ANOVA results indicated no significant pre–post main effect for NRS-10, $F(1, 30) = 1.71$, $p = .201$, $\eta_p^2 = .054$, whereas there was a significant interaction between pre–post measures and the group assignment with a large effect size, $F(1, 30) = 5.16$, $p = .031$, $\eta_p^2 = .147$. Following the main effect analysis, a simple main effect analysis was conducted to compare the case of participant group and non-participant group. The simple main effect analysis with Bonfferoni's method showed that participants' post NRS-10 score was significantly higher than their pre-measurement score, $F(1, 11) = 5.13$, $p = .031$. There was no significant difference between the non-participants' post score and pre score, $F(1, 19) = 0.616$, $p = .439$. See Table 2 for the NRS-10 mean scores and mean changes in the two groups' pre and post measurement.

Stress. PSS-10 scores were analysed in a 2×2 ANOVA with pre–post (pre-intervention vs post-intervention) as a within-subject factor and the group assignment (participants vs non-participants) as a between-subjects factor. ANOVA results indicated no significant pre–post main effect in PSS, $F(1, 30) = .01$, $p = .919$, $\eta_p^2 = .0$. The interaction was also not significant in PSS, $F(1, 30) = 0.128$, $p = .723$, $\eta_p^2 = .004$. For the participant group, the PSS score changed from 14.9 to 14.7 decreased

Table 3. PSS mean scores.

Group	*n*	Pre	Post	Mean difference
Programme participants	12	14.9 (moderate)	14.7 (moderate)	–0.25
Non-programme participants	20	12 (low)	11.5 (low)	–0.45

PSS: Perceived Stress Scale.

Table 4. BREQ-3 ANOVA results.

Scale	$F(1, 30)$	p	η_p^2
RAI (Overall Index)	0.523	0.475	.017
Amotivation	2.962	0.096	.090
External regulation	4.231	0.048*	.124
Introjected regulation	1.387	0.248	.044
Identified regulation	1.543	0.224	.049
Integrated regulation	1.875	0.181	.059
Intrinsic regulation	0.013	0.912	.000

ANOVA: analysis of variance; RAI: Relative Autonomy Index.
*p value: Significant at the $p < .05$ level.

by 0.25. For non-participants, it was 12 and dropped to 11.55 decreased by 0.45. Table 3 shows the mean scores and mean changes in two groups' pre and post measurement.

Motivation. BREQ-3 yielded one overall score (RAI: Relative Autonomy Index) and six subscales. The scores were analysed in a 2×2 ANOVA (pre–post $\times$ group assignment). There was no significant interaction in the overall score, $F(1, 30) = 0.523$, $p = .475$, $\eta_p^2 = .017$. Among the subscales, there was a significant interaction effect only in external regulation score, $F(1, 30) = 4.23$, $p = .048$, $\eta_p^2 = .124$. See Table 4 for the ANOVA interaction results on BREQ-3 scores. Further simple main effect analysis showed that the programme participants' post external regulation score ($M = .83$, $SE = .24$) was significantly higher than pre score, $M = .44$, $SE = .22$; $F(1, 11) = 6.36$, $p = .017$.

Qualitative findings

To compare qualitative findings with quantitative results, interview transcripts were analysed according to the three research questions: relatedness, stress and motivation.

Relatedness. It is well-known that teachers spend much of their time isolated from their colleagues, and social interaction opportunities among teachers are limited (Davis, 1986). This was the case with the school of the present study. Interviewees noted that the social interaction and communication between teachers was limited and there was a desire to increase it. The school administrator noted that he 'saw teachers that never really talked to one another'. One of the non-participant teachers indicated that, as teachers, they 'don't get to see a lot of colleagues that we have in the building'. This notion was reinforced by one participant teacher who noted that '(her) department is very like separate from the rest of the school because they do a lot of stuff in house'. That said, the intervention programme helped teachers address the isolation issue at the school. Interviewees acknowledged that the Sports-based Physical Activity programme gave them a chance to connect

across subject areas, departments and grade levels. Participants established relationship ties with colleagues as they sought an active lifestyle. As one participant noted,

> It's just my third year so there's a lot of faces that I don't know still. And so I thought it would be a great way to get to know people outside of their classrooms and different grade levels. And I definitely needed the exercise.

Another participant said,

> I definitely gained friendships and I am able to walk the halls and actually say hi to people and call people by name. And connect on a deeper level than just how are you. And then on a personal level.

The statements voiced by participants were congruent with the result of NRS-10 questionnaire. The Sports-based Physical Activity programme featured a team sport and a competitive event where the whole school community, including students, were invited. These two factors (team sport and competitive event) caused increased practice frequency and deepened the interaction among participants, resulting in a successful increase in feelings of belonging and affiliation.

Stress. Interviewees shared how the Sports-based Physical Activity programme affected the stress levels experienced at school. Unmanageable workloads hinder teachers' abilities to take care of their own health, as one of the teachers indicated, 'I'm not doing anything but doing my work. I'm not taking care of myself. I'm not doing any of that'. Another teacher shared very similar thoughts: 'Something that's preached to us a lot. Self-care, self-care, and we're like, when are we gonna fit that in?' The Sports-based Physical Activity programme created a convenient 'excuse' for the teachers to take care of themselves. As one participant said,

> I think a big thing with the teaching profession is it's so hard to leave your job in your classroom or at the workplace. . . . Our kids are always on our mind, and they're always following us. 'What can we do better for them? Oh, how should we have handled that differently today to better serve students?' When we were able to go to Catchball practice and have time, we didn't talk about work.

Another participant who was both a teacher and attended graduate school at the same time shared that 'I know for me, personally, when I was doing Catchball, grad school wasn't stressing me out. Teaching wasn't stressing me out. I was fine'. For her, the Sports-based Physical Activity programme was a time for stress relief.

One of the major, stressful schoolwide events is the administration of the schoolwide standardised testing. Interviewees shared that this year, the anxiety levels around testing were significantly lower than years past. As one participant shared,

> It (testing) had all the components to definitely have the stress there with new platforms and new training and just different factors like that. It was totally different this year for testing for all of us . . . The stress was not there. It was like people showed up, and they were ready. They had more so of a fixing mindset, a positive outlook like, 'This is what we have to do. We got this. Y'all got this. Let's get it done together'.

Even the school principal who observed the whole process of the Sports-based Physical Activity programme noted that the programme helped teachers relieve the stress indicating

> This week of testing and last week of testing, it has really been calm. I think sometimes in education we ramp, ramp, ramp, ramp, ramp on the test and I'm one of those rampers right, but just to have some times

> to relax, some calm before the storm starts. I think we had a very smooth test administration. Very smooth, stress level low, not a lot of test anxiety and we put a lot of focus on the test, prepping for this test, but anxiety stripped, from teachers and students was low.

While the PSS findings demonstrated no significant difference for stress levels between programme participants and non-participants, the qualitative results implied that the Sports-based Physical Activity programme helped decrease (or at least control) the teachers' stress levels during the schoolwide standardised testing.

Motivation. In responding to questions regarding motivation to join in and continue the programme, interviewees provided perspectives on the reasons for their motivation. The competitive nature of the Sports-based Physical Activity programme contributed to mixed feelings among school teachers. Those who elected to participate in the Sports-based Physical Activity programme were excited about the match and wanted to have additional competition. One participant specifically indicated that he has 'seen the benefit in getting into an organised sport . . . (hope to) get more teams involved, and have some people to play against'. In contrast, one of the non-participants did not appreciate the competitive nature, saying 'I would like to have participated in another way only because I think I would have been a weak link on the competition part'. Another non-participant shared a concern about the level of competition and his fear of injury as the reason for not joining the programme.

Team affiliation was a key feature of the Sports-based Physical Activity programme. Participants indicated that being a member of a team was a key motivating factor for them. One participant said, 'Knowing that there were other people that were relying on me to be there so we could play the game really helped motivate me to be active'. Another teacher indicated that the transformation from colleagues to teammates caused teachers to 'really held each other accountable'. Another participant offered his thoughts as follows:

> You coming to practice today? You gonna be there? Like she said, there was a lot that wanted to pull me out, and I just said nope, got practice, got responsibilities. It's more so you're not wanting to let yourself down, but you more don't want to let your team down. Because everybody is counting on each other and for that, it was good.

In this regard, the increased social connection sustained an improved involvement in the programme. Although the quantitative results from the BREQ-3 survey indicated that there was no significant difference between participant group and non-participant group in motivation scores, the change on the external motivation factor is noteworthy. Despite the non-significant ANOVA result of the overall score, the significant effect on the external regulation subscale was aligned with the qualitative finding of team affiliation as a key contributing factor to participants' motivation.

Discussion

The purpose of this study was to examine the effect of the Sports-based Physical Activity programme. Specifically, researchers implemented the programme and evaluated its impact on teachers' relatedness, stress and motivation towards PA levels. In terms of relatedness, ANOVA results revealed a significant interaction effect on NRS-10 score between pre–post measures and the group assignment. The following main effect analysis showed that the programme significantly increased participants' relatedness. The qualitative findings demonstrated a similar effect, as well. Interview

responses consistently indicated the meaningful consequences of social interaction among participating teachers. According to the analysis, the Sports-based Physical Activity programme facilitated and forged the connection among participating teachers. The results of this current study are congruent with previous studies that examined the social effects of team sport participation among K-12 students (Allen, 2003; Allen et al., 2015; Macphail et al., 2004).

To date, no published studies have examined teachers as team sport participants and their feelings of relatedness. Heider (2005) examined the effect of mentoring programmes to support early career teachers feeling isolation and showed the worth of different types of mentoring approaches through qualitative methods. Compared to that mentoring programme, the Sports-based Physical Activity was found to be effective in expanding teachers' feelings of belonging and affiliation while pursuing their physical well-being.

Regarding perceived stress, the quantitative analysis did not show a statistical significance. In the pre-test, the teachers at the subject school reported low stress levels as opposed to the previous surveys (American Federation of Teachers, 2017; Leung et al., 2009). The post-test results indicated that both participant and non-participant groups reported reduced stress levels, but minor differences (.25, .45, respectively). Hence, the repeated-measures ANOVA failed to distinguish participants from non-participants, $F(1, 30) = 0.01$, $p = .919$, $\eta_p^2 = .0$. The analysis of the qualitative findings suggested that participation in the Sports-based Physical Activity lowered the teachers' stress levels. One participant reflected on the stressful school culture and stress relief through the Sports-based Physical Activity programme. The misalignment between the quantitative and qualitative findings can perhaps be explained by the insensitivity of the PSS-10 instrument. While the questionnaire was brief and easy to respond, it hardly recognised job-specific or job-oriented stress. This warrants future studies precisely examining the effects of the programme on teachers' stress. For instance, the teacher burnout scale (Seidman and Zager, 1986) could be an alternative to measurement of teachers' job-specific stress level. Previous intervention studies that focused on teacher stress have shown statistically noticeable outcomes of lowering stress with diverse approaches such as mentoring, meditation, exercise, workshop and a mix of those (e.g. Anderson et al., 1999; Blair et al., 1984; David, 2000). Therefore, a Sports-based Physical Activity programme can be integrated with other suitable approaches for a better result.

In terms of teachers' motivation towards PA, the BREQ-3 demonstrated no significant differences between programme participants and non-participants except for the external regulation subscale. External regulation is defined as being physically active to satisfy an external requirement, such as rewards, sanctions, expectations and so on; it located the lowest end of a motivational continuum (Mullan et al., 1997). In the post-test, the participant group reported a significantly higher external regulation score than the non-participant group, $F(1, 30) = 4.23$, $p = .048$, $\eta_p^2 = .124$. These results were supported by the qualitative analysis outcomes. According to the qualitative analysis, participants indicated enhanced engagement in the activity. Especially, the competitive nature of the Sports-based Physical Activity programme and the sense of belonging motivated them to be involved in the Sports-based Physical Activity. These two motives, the competitiveness and the reliance, can be simply interpreted as winning a match and satisfying an expectation, each of which is known to drive external motivation in the realm of SDT. Despite the results showing that the teachers were extrinsically motivated with no self-determination, it is noteworthy that enhanced team morale led to unexpected successes. The teachers appreciated being with colleagues on a team, working together towards a common goal and supporting each other through this process. In many ways, teachers held each other accountable for the success of their team which, in itself, is a very successful result. SDT which guided the present study might not be optimal for such a motivating process through social interaction or group dynamics. Using a more a relevant theoretical framework, future studies can measure the impact of the Sports-based Physical Activity programme on teachers'

motivation towards PA at a deeper level. Furthermore, it would be interesting to examine the impact of a Sports-based Physical Activity approach on long-term PA participation.

The effectiveness of the Sports-based Physical Activity programme showed statistically significant results in relation to relatedness and one of six motivation subscales, whereas the qualitative investigation suggested that the Sports-based Physical Activity programme was effective in all the dependent variables to some extent. This lack of statistical power might be originated in the present study's limitations. For instance, the sample size was too small to avoid type II error and produce reliable results using the ANOVA (Cohen, 1988). Moreover, the intervention programme was delivered for only 7 weeks and that this may not have been sufficient to bring about change in the dependent variables. However, the Sports-based Physical Activity programme still accomplished meaningful results in that teachers voluntarily attended the programme without reward and the practice sessions were conducted after school, requiring teachers to stay beyond their workday. The study therefore adds to the body of research on school health promotion with unique practical implications.

Conclusion

This study made a contribution to teachers' wellness literature by examining the implementation of a Sports-based Physical Activity programme in school settings and its impact on key aspects, such as relatedness, stress and motivation towards PA. Quantitative and qualitative analyses pointed to the benefits teachers gained from programme participation. It is recommended that future studies examine the effectiveness of the programme in other, diverse settings and explore additional factors that may affect programme operation. This study focused on the benefits of the Sports-based Physical Activity programme for these teachers and did not consider the programme effects on the teaching environment and students' achievement scores. Future studies could extend the initial investigation to explore the impact of the programme on teaching performance, student learning and/or student health.

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Note

1. The university's institutional review board approved the study's research protocol (IRB Number: H18270).

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