Lim, B. S. C., How, Y. M., Tan, S. H, Wang, C. K. J., & Kamarova, S. (2016). Adolescents' self-determination profiles in physical education: Introjection and its implications. International Sports Studies, 38(2), 4-20.

Adolescents' self-determination profiles in physical education: Introjection and its implications

Boon San Coral Lim & Yew Meng How
National Institute of Education, Singapore

Ser Hong Tan
Nanyang Technological University, Singapore

Chee Keng John Wang
National Institute of Education, Singapore

&

Sviatlana Kamarova
Curtin University, Perth, Australia

Abstract

An important outcome of the teaching-learning process in physical education is a physically active student who also demonstrates the intention to be active outside of the school context and/or after graduation. Students typically have multiple and simultaneous motives for behaviour that collectively determine the overall quality of their motivation. As such, the purpose of this study was to examine the behavioural regulations of Singapore junior college students and determine their distinctive motivational profiles. The results offered support for the notion that moving towards autonomous forms of behavioural regulation was advisable for higher levels of intention and sustained adherence to physical activity, since they were likely to involve stronger feelings of personal investment, autonomy and self-identification. The effects of high introjection scores on physical activity intention and physical activity levels were highlighted and discussed in this study.

Keywords: physical education, physical activity, self-determination theory, behavioural regulations, cluster analysis

Introduction

Self-determination theory (SDT: Deci & Ryan, 1985; Deci & Ryan, 2000) proposes that all humans need to feel competent, autonomous, and related to others. Social contexts that facilitate satisfaction of these three basic psychological needs will support people's inherent activity, promote more optimal motivation, and yield the most positive psychological, developmental, and behavioural outcomes (Ryan & Deci, 2000a). In contrast, social environments that thwart satisfaction of these needs provide less optimal forms of motivation and have deleterious effects on a wide variety of

well-being outcomes (e.g., Deci & Ryan, 2000; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004).

In SDT, the incentive to perform an activity can emanate from external sources or the self, unless the motives' intensity is too low to initiate action (i.e., as in a state of amotivation). Individuals can be intrinsically motivated when they are engaged in activities for their inherent satisfaction (they want to); extrinsically motivated when they are pursuing rewards or avoiding punishment (they have to); or amotivated, when they show no regulation towards an activity (they do not care). Therefore, two extremes have been distinguished: an autonomous or volitional versus a controlled or pressured regulation. Deci & Ryan (1985, 1991, 2002) have further characterised extrinsically motivated behaviours by four types of regulation: external regulation (e.g., rewards and punishment), introjected regulation (e.g., feelings of guilt and self-worth), identified regulation (e.g., achievement of personal goals; means to an end) and integrated regulation (e.g., personally endorsed values, goals and needs). Amotivation, extrinsic motivation, and intrinsic motivation, are ordered along a self-determination continuum, and movement along this continuum is in part governed by internalising motives for participating (Prusak, Treasure, Darst, & Pangrazi, 2004).

Different types of behavioural regulations reflect qualitatively different reasons for a chosen behaviour and influence an individual's approach to an activity. This includes effort put in and enjoyment reported in Physical Education (PE) classes, participation in physical activity (PA), and the intention to be physically active during leisure time. The study of motivation has received large amounts of attention in sport and exercise psychology as the mental component is vital and often appears to be critical to the experience of different levels of activity, by means of behavioural change, increasing activity, persistence in exercising, and excellence. Empirical evidence suggests that PA is more likely to contribute to health, physical well-being, and alleviation of stress, when it is performed on regular bases (Hagger & Chatzisarantis, 2005). Additionally, lack of activity and increasing growth of sedentary lifestyles has been repeatedly connected to a number of negative health and well-being outcomes such as higher risk of cardiovascular disease, overweight/obesity, negative psychosocial outcomes, type II diabetes, and decreased skeletal health (e.g., Biddle, Gorely, & Stensel, 2004; Warburton, Nichol, & Bredin, 2006; Watts, Jones, Davis, & Green, 2005). Nevertheless, a range of recent research (e.g., Brodersen, Steptoe, Boniface, & Wardle, 2007; Troiano et al., 2008) has shown that young people in many countries do not exercise on regular bases to gain health benefits.

One of the ways in which regular PA could be encouraged among students is through PE classes (Khalkhali, 2012). PE is recognised as a potentially important means of enhancing public health by creating positive attitudes towards exercise and by promoting health-related fitness programmes (Ntomanis, 2001). For instance, Sallis and McKenzie (1991) argued that positive experiences in PE could influence children to adopt physically active adult lifestyles that can improve public health. Given that PE in schools is identified as an important link by which young people can be encouraged to participate in PA to promote their health and well-being (Cale, 2000), it becomes clear that physical educators need to know their students and how to motivate them in PE, thus in turn, increasing the levels of PA in young people.

In a study by Taylor, Ntoumanis, Standage, and Spray (2010), the authors found that intrinsic motivation and identified regulation were adaptive in that both forms of

behavioural regulation were positively related to effort in PE classes at the between- and within-person levels. Changes in intrinsic motivation were also found to predict changes in intentions to exercise while changes in identified regulation were found to predict changes in leisure-time physical activity at the within-person level. Introjected regulation, external regulation and amotivation, on the other hand, were maladaptive, as they did not predict either intentions to exercise or leisure-time physical activity at the between-person level. Additionally, Khalkhali (2012) found that students who reported higher intrinsic motivation and identified regulation for PE significantly reported higher intentions to participate in PA during leisure time. On the other hand, students who reported higher introjected regulation and external motivation for PE significantly reported lower intentions to participate in PA during leisure time. No effect was found between amotivation and PA during leisure time. Similarly, a study by Zhang (2009) found that higher intrinsic motivation and identified regulation in PE predicted higher enjoyment of PA in students, and higher identified regulation predicted higher effort in PA in students.

Clearly, moving towards autonomous forms of behavioural regulation is advisable for higher levels of intention towards, and sustained adherence in PA, stronger feelings of personal investment, autonomy, and self-identification. The aim of SDT is to investigate people's inherent growth tendencies and innate psychological needs that are the bases for their self-motivation and personality integration, as well as the conditions that foster these positive processes. While previous studies have looked at the relationships between behavioural regulations and outcome variables, one under-investigated issue is the representation of the multiple forms of motivation proposed by SDT. Ryan and Deci (2007) suggested that individuals typically have multiple and simultaneous motives for behaviour that collectively determine the overall quality of their motivation. Each behavioural regulation reflects a qualitatively different reason for the behaviour. Rather than simply acknowledging students as intrinsically motivated or extrinsically motivated, identifying groups or clusters of students exhibiting different motivational profiles might prove instructive. Homogenous groups may be identified and strategies developed to increase the effectiveness of interventions to promote students' motivation in PE and cultivate healthy lifelong PA habits in them (Biddle & Wang, 2003).

Hence, the purpose of this study was to examine students' behavioural regulations in PE using cluster analysis to uncover distinct motivational profiles, and identify how the profiles differed with respect to the criterion variables of perceptions of teacher autonomy-support, reported enjoyment and effort, intentions to be physically active outside of school, and PA. With a better insight into the motivational profiles of the students and their association with relevant psychological and behavioural outcomes, recommendations can then be made to PE teachers for the design of cogent interventions and/or the adoption of more effective strategies for achieving the ultimate outcome of physically active students for life.

Methods

Participants and Procedure. A total of 344 students (149 males, 191 females, 4 did not specify their gender) aged between 16 and 19 years (M = 17, SD = 0.65) from three Singapore Junior Colleges took part in the study. Five intact classes were randomly

selected from both levels in each junior college. Ethical clearance was first obtained from the university's ethical review board. Next, the Ministry of Education and schools' permission to gather research data were sought. Arrangements were made with the contact persons from the junior colleges for administration of the questionnaire. A researcher conducted the data collection in quiet classroom conditions, following a standard set of instructions. Prior to data collection, students were briefed on the purpose of the questionnaire. The participants remained anonymous to protect the confidentiality of their data. They were also given the option to withdraw from the study at any point in time without negative repercussions.

Measures. *Behavioural regulations*. Students' behavioural regulation for PE was assessed using the Perceived Locus of Causality scale (PLOC; Goudas, Biddle, & Fox, 1994). Students responded to 17 items (four items for external regulation and introjected regulation and three items each for identified regulation, intrinsic motivation and amotivation) measured on scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Each item followed the stem "I take part in PE." Examples of the questions are: "because PE is fun" (intrinsic motivation); "because I want to learn sport skills" (identified regulation); "because I would feel bad about myself if I did not" (introjected regulation); "because I will get into trouble if I do not" (external regulation), and; "but I do not see why we should have PE" (amotivation). The PLOC scale has been used in various studies in PE and has been shown to have clear factor structure and high internal reliabilities with the exception of introjected regulation for which Cronbach's alpha coefficient is usually reported as slightly below 0.70 (e.g., Carr, 2006; Ntoumanis, 2001, 2005).

Perceived autonomy support in PE. The Sport Climate Questionnaire (SCQ) was modified to suit the PE context and used to measure perceived autonomy support during PE (Brickell, Chatzisarantis, & Pretty, 2006; Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003). Perceived autonomy support was measured with six items, for example, "I feel that my PE teacher provides me with choices and options". Responses to the items were recorded on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Enjoyment and effort. The enjoyment and effort subscales of the Intrinsic Motivation Inventory (IMI: McAuley, Duncan, & Tammen, 1989) were adapted to the PE context. Six items (three each for the enjoyment and effort subscales) were measured on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Examples of the questions are "I enjoy PE very much" (enjoyment) and "I put a lot of effort into PE" (effort).

Intention to be physically active outside of school. Two items were used to measure intention to exercise during leisure time (Hagger et al., 2007). The students were asked whether they planned to play sport or exercise three times a week for the next two weeks and whether they intended to play sport or exercise three times a week for the next two weeks. These measures of intention were assessed on a seven-point scale from 1 (*very unlikely*) to 7 (*very likely*).

Modified self-administered physical activity checklist (SAPAC). Students were asked to recall whether they had engaged in the activity over the last 7 days. If they did, they were then asked to recall the number of times they engaged in the activity and recall the time (in minutes per session) spent on that activity. Each activity in the list was assigned a metabolic equivalent (MET) value (Ainsworth et al., 1993; Ainsworth et

al., 2000) that characterised the amount of energy that the body expends during the activity (one MET is equivalent to 1 $kcal.kg^{-1}.hr^{-1}$).

Data analysis. Cronbach's alpha coefficients were calculated to assess the internal reliability of the subscales. Descriptive statistics were also computed. Following that, in order to identify homogeneous groups based on the characteristics they possessed, behavioural regulations were used as clustering variables. To establish the discriminating power of the clusters, perceptions of autonomy-support, enjoyment, effort, intention and PA were used as criterion variables.

Cluster analysis was conducted using the hierarchical clustering method (Hair, Anderson, Tatham, & Black, 1998). Dendrogram and agglomeration schedules were generated to provide the basis for determining the number of clusters. Ward's method with squared Euclidean distance was used to determine the number of cluster groups (Aldenderfer & Blashfield, 1984). Before cluster analysis was carried out, the clustering variables were standardised using *z* scores ($M = 0$, $SD = 1$). This allowed for comparisons to be made across the variable means. For comparisons among clusters, a *z* score value of ±.50 was used as a criterion for interpreting "high" versus "low" in each variable. In addition, one-way multivariate analysis of variance (MANOVA) was used to determine if any of the motivational variables showed significant differences among the clusters. Wilks' lambda (λ) and its associated effect size, partial eta squared (η^2) were used for the above statistical test. According to Green and Salkind (2003), a partial eta squared of .01, .06, and .14 is by convention, interpreted as small, medium, and large effect size respectively. If a MANOVA showed significant differences, follow-up tests were conducted using analysis of variance (ANOVA) and post hoc Tukey tests.

Results

Descriptive Statistics and Intercorrelations. Table 1 shows the descriptive statistics, internal consistency coefficients, and correlation matrix for the entire sample. All the subscales proved to be internally consistent with Cronbach's alpha (α) at .70 or above. Generally, students reported high scores in autonomous forms of behavioural regulation. Moderately high scores were also reported for external regulation, while scores for external regulation and amotivation were moderately low. Students perceived, on average, moderately high autonomy-support from their PE teachers and reported high enjoyment and effort in PE. Intrinsic motivation was positively correlated at a significant level with the criterion variables used in the study - perceptions of autonomy-support, enjoyment, effort, intention and PA. Similarly, significant positive correlations were found between identified regulation and the criterion variables used in the study. Significant positive correlations were found between introjected regulation and perceptions of autonomy-support and effort. On the other hand, significant negative correlations were found between external regulation and all the criterion variables while amotivation was significantly negatively correlated with the criterion variables with the exception of PA.

Table 1

Descriptive statistics, internal consistency, and correlation coefficients matrix for all variables

	M	*SD*	α	1	2	3	4	5	6	7	8	9
Clustering Variables												
1. Intrinsic Motivation	4.44	1.31	.84									
2. Identified Regulation	4.56	1.27	.80	.82**								
3. Introjected Regulation	3.26	1.09	.70	.11*	.23**							
4. External Regulation	4.19	1.55	.87	-.54**	-.40**	.31**						
5. Amotivation	3.14	1.39	.80	-.60**	-.54**	.08	.65**					
Criterion Variables												
6. Perceived Autonomy-support	3.93	.88	.86	.45**	.39**	.14**	-.31**	-.32**				
7. Enjoyment	4.14	1.44	.93	.81**	.62**	.09	-.51**	-.59**	.48**			
8. Effort	4.43	1.18	.87	.56**	.49**	.19**	-.31**	-.42**	.36**	.63**		
9. Intention	3.50	1.41	.87	.35**	.36**	-.01	-.27**	-.28**	.22**	.31**	.30**	
10. Physical Activity	1258.24	996.48	-	.14*	.15**	-.06	-.18**	-.10	.03	.14**	.17**	.44**

Note. *p < .05; **p < .01

Figures 1 and 2 show the graphical representation of the cluster profiles according to the clustering and criterion variables, respectively[1].

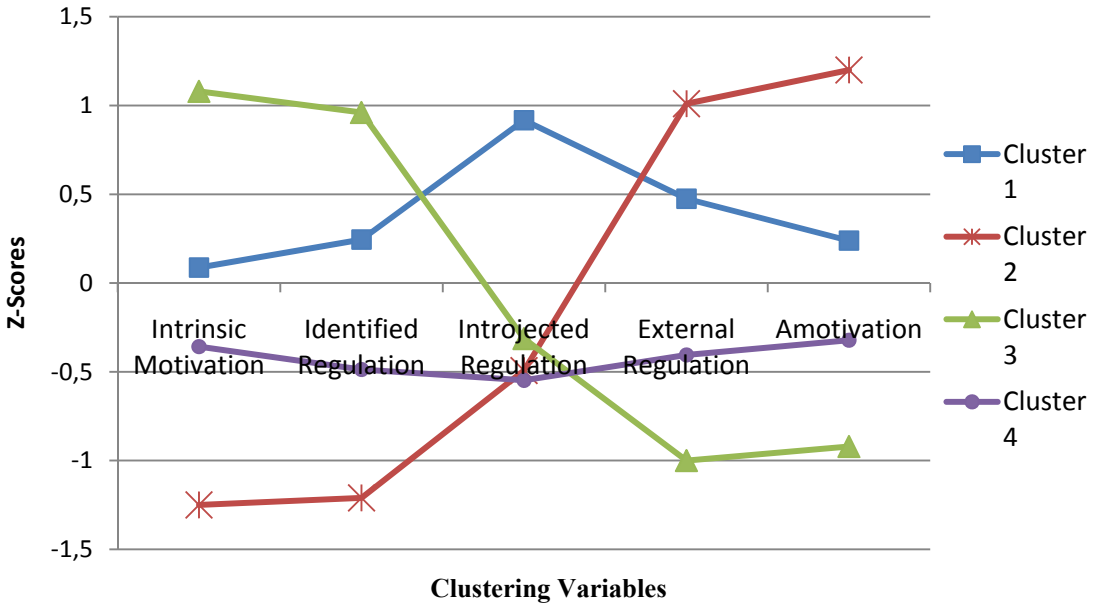

Figure 1. Cluster profiles of the clustering variables for the four-cluster solution

[1] Following recommendations by Hair, et al. (1998), *k*-means cluster analyses supported the stability of the results. More than 70% of the participants obtained the same cluster membership between the specified seed points (using centroid values from the hierarchical method) and random selection methods, hence validating the cluster analysis.

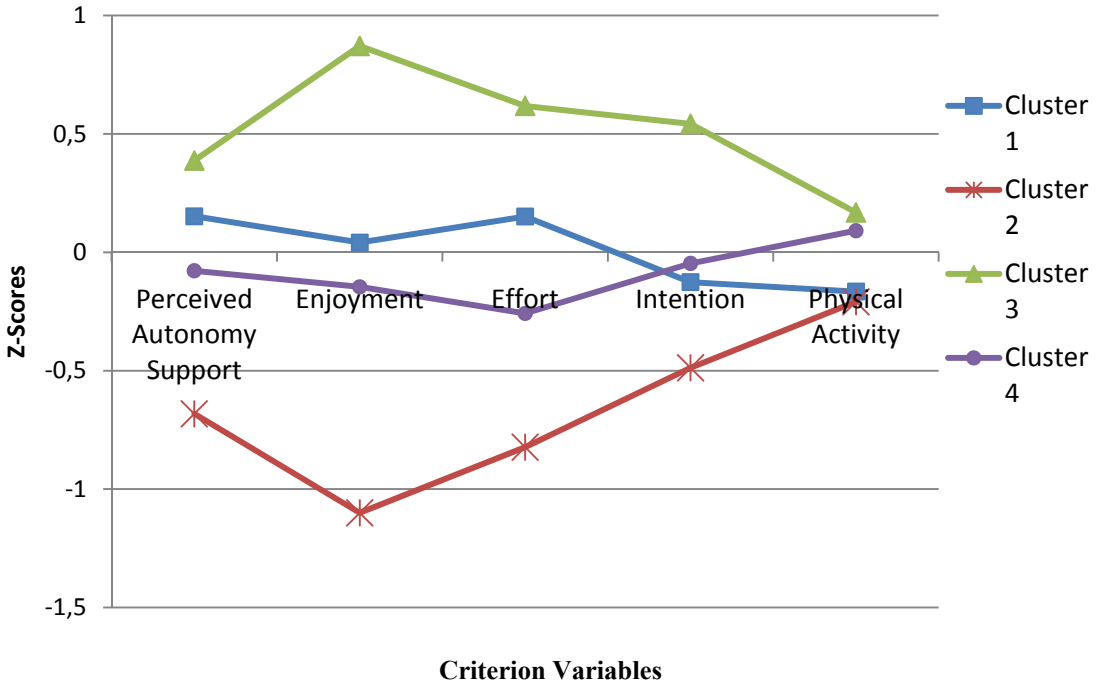

Figure 2. Cluster profiles of the criterion variables for the four-cluster solution

MANOVA results indicated that there were significant effects among the clustering variables between the four clusters, Wilks's $\lambda = .10$, $F(15, 928) = 80.45$, $p < .01$, $\eta^2 = .54$.

Cluster 1 (n = 111) was characterised by moderate scores on all forms of behavioural regulation with the exception of introjected regulation where its scores were the highest among all the four clusters. As such, this group was labeled the "introjected group". Post hoc analyses revealed that students in this cluster group had significantly higher z scores in terms of autonomous regulations, when compared to those of clusters 2 and 4 (all $p < .01$). Introjected regulation was also significantly higher than all the other three clusters (all $p < .01$). Students in cluster 1 also reported significantly higher z scores for external regulation and amotivation as compared to those in clusters 2 and 4 (all $p < .01$).

Cluster 2 (n = 69) was labeled as the "least autonomously motivated" group. It had the highest z scores in external regulation and amotivation compared to all the other three clusters (all $p < .01$). The students in this cluster also reported significantly lower scores in autonomous motivation compared to the rest (all $p < .01$).

Cluster 3 (n = 94) was labeled as the "most autonomously motivated" group. This group of students showed low z scores in external regulation and amotivation and high scores in the autonomous forms of regulation. Post hoc results revealed that other than introjected regulation, cluster 3 significantly differed from all the other clusters in terms of the clustering variables (all $p< .01$). For introjected regulation, cluster 3 reported significantly lower scores than cluster 1 ($p < .01$).

Cluster 4 (n = 70) is another group that is characterised by moderate scores and is labeled the "moderately low motivation" group. Compared to cluster 1, the scores reported on all the clustering variables were significantly lower (all $p < .01$).

Clusters derived based on clustering variables. Using the hierarchical method, the dendogram and agglomeration schedules showed that a four-cluster solution was appropriate for the sample. The cluster means, standard deviations and *z* scores of the clustering and criterion variables are shown in Table 2.

Table 2

Comparison of cluster means, standard deviations, and z scores for the clustering and criterion variables

	Cluster 1 (n = 111)			Cluster 2 (n = 69)			Cluster 3 (n = 94)			Cluster 4 (n = 70)				
	M	***SD***	***Z***	***M***	***SD***	***z***	***M***	***SD***	***z***	***M***	***SD***	***z***	***F*(3,340)**	**η^2**
Clustering Variables														
1. Intrinsic Motivation	4.55_a	.78	.09	2.81_b	.91	-1.25	5.85_c	.68	1.08	3.97_d	.68	-.34	222.77	.66
2. Identified Regulation	4.87_a	.71	.25	3.03_b	1.00	-1.21	5.78_c	.75	.96	3.95_d	.71	-.49	180.91	.61
3. Introjected Regulation	4.27_a	.66	.92	2.72_b	.88	-.49	2.92_b	1.07	-.31	2.66_b	.69	-.55	78.61	.40
4. External Regulation	4.93_a	.93	.48	5.76_b	.96	1.01	2.64_c	1.12	-1.00	3.56_d	.98	-.41	161.15	.59
5. Amotivation	3.47_a	1.02	.24	4.80_b	1.08	1.20	1.86_c	.73	-.92	2.70_d	.83	-.32	144.11	.56
Criterion Variables														
6. Perceived Autonomy-support	4.07_a	.74	.15	3.31_b	.84	-.68	$4.30^{\#}_a$	.89	.39	$3.82^{\#}_a$	.80	-.08	20.18	.15
7. Enjoyment	4.20_a	1.04	.04	2.55_b	1.23	-1.10	5.39_c	1.04	.87	3.93_a	.96	-.15	95.51	.46
8. Effort	4.61_a	.95	.15	3.46_b	1.29	-.82	5.16_c	.93	.62	4.13_d	.92	-.26	40.23	.26
9. Intention	3.30_a	1.19	-.13	$2.86^{\#}_a$	1.55	-.49	4.21_b	1.24	.54	$3.46^{\#}_a$	1.41	-.05	17.54	.13
10. Physical Activity	$1092.58^{\#}_a$	851.46	-.17	1049.69_a	879.28	-.21	1539.47_b	1133.78	.17	$1348.84^{\#}_{ab}$	1040.23	.09	3.42	.03

Note. Means in the same row that do not share subscripts differ at $p < .05$ in the Tukey's HSD comparison.
Means in the same row with the same superscript differ at $p < .05$ in the Tukey's HSD comparison

Comparing clusters based on criterion variables. Significant effects among all the criterion variables between the four clusters were also observed, Wilks's $\lambda = .49$, $F(15, 914) = 17.85$, $p < .01$, $\eta^2 = .21$. Pursuant to the MANOVA, follow-up ANOVAs along with Tukey's Honestly Significant Difference (HSD) post-hoc analyses were conducted (see Table 2). The introjected group reported significantly higher perceived autonomy-support, effort, and enjoyment than the least autonomously motivated group (all $p < .01$), significantly lower enjoyment, effort, intention, and PA than the most autonomously motivated group (all $p < .05$), and significantly greater effort than the moderately low motivation group. In the least autonomously motivated cluster, significantly lower scores were also observed in terms of the students' perceptions of teacher autonomy-support, reported enjoyment and effort compared to the other clusters. This cluster, as compared to the most autonomously motivated cluster, showed significantly lesser intention to be active outside of school as well as, PA levels. The most autonomously motivated cluster reported significantly higher scores than all the other clusters for enjoyment, effort and intention (all $p < .01$). PA levels reported by students in this cluster were also significantly higher than those of the introjected, and least autonomously motivated clusters (all $p < .05$). There was also significantly lower effort reported by the moderately low motivation cluster as compared to the introjected cluster ($p < .01$). Interestingly, the PA levels reported by the moderately low motivation cluster were significantly higher than those reported by the introjected cluster ($p < .05$).

Discussion

The purpose of this research was to uncover distinct motivational profiles based upon students' PE behavioural regulations and to examine differences between the profiles in terms of their effect on selected motivational criterion variables. Cluster analyses showed a four-cluster solution. Cluster 1 was labeled as the "introjected group", Cluster 2 as the "least autonomously motivated" group, Cluster 3 the "most autonomously motivated" group and Cluster 4 as the "moderately low motivation" group. These findings are similar to the four clusters solution found by Matsumoto and Takenaka (2004). Specifically they found a cluster with high scores on intrinsic motivation and identified regulation but low scores on external regulation and amotivation, a cluster with moderate scores across all five forms of behavioral regulation, a cluster with high scores on amotivation, external regulation and introjected regulation but low scores on identified regulation and intrinsic motivation, and a last cluster with high amotivation scores but low scores on the other four forms of behavioural regulation. Matsumoto and Takenaka examined differences in exercise behaviour change across the four clusters and this study adds to their findings by looking at how the clusters in this study differed in terms of motivational outcomes such as effort and intentions to be physically active during leisure time.

As predicted theoretically, the cluster with the least autonomous profile exhibited low levels of perceptions of autonomy-support, reported low levels of both enjoyment and effort in PE, low intention to be physically active outside of school, and low engagement in PA. Students fitting such a motivational profile have been previously observed to be associated with high levels of boredom and very low levels of enjoyment and effort (Ntoumanis, 2002). The students in this cluster are likely to "suffer from a lack of motivation and a sense of helplessness outside of the specific

situations in which extrinsic rewards are available" (Lepper & Henderlong, 2000). In other words, it is suggested that other than when their teachers are present, these students might have no motivation at all to participate in PE class. They are likely to regularly avoid getting involved in the tasks proposed, consistent with findings reported by Pelletier et al. (2001) on short- and long-term persistence in sports.

Students in the most autonomous profile revealed associations with high perceived autonomy-support, high enjoyment, high effort in PE, as well as a high intention to be physically active outside of school, and high engagement in PA. When students participate in PA for the satisfaction inherent in the activity, that is, doing it "for its own sake" (Ryan & Deci, 2000b), it is more likely that they will develop intrinsic motivation towards healthy PA habits. This underlines the importance of facilitating students' PE experience by drawing on states of intrinsic motivation, if the goal is to motivate them to continue their PA beyond the school environment.

The moderately low motivation cluster was associated with moderately low scores on each motivational variable as well as the criterion variables, with the exception of positive scores for reported PA levels. Lepper & Henderlong, (2000) suggested the possibility that intrinsic and extrinsic forms of motivation can work together in real-world settings, particularly where the level of these motivations remains moderate (Boiché, Sarrazin, Grouzet, Pelletier, & Chanal, 2008). For instance, Chantal, Guay, Dobreva-Martinova, and Vallerand (1996) explained this phenomenon in their study of elite athletes, where title and medal winners were not just highly intrinsically motivated, but also displayed high levels of extrinsic forms of behavioural regulation and amotivation when compared to the less successful elite athletes. Boiché and colleagues (2008) suggest that moderate feelings of guilt or shame, as shown by the kind of students in this cluster with moderate scores, does not necessarily have negative consequences, if at the same time the student gets a certain satisfaction from the activity (i.e., intrinsic motivation) and anticipates that the activity would help him or her to reach personal goals (i.e., identified regulation). Conversely, when these feelings are not associated with interest or personal value for the activity, the outcomes could be less positive.

What emerged as being of particular interest in the findings of our study is the motivational profile of the introjected cluster and its associated psychological and behavioural outcomes. A comparison of this introjected group with the moderately low motivation group revealed that despite having higher scores in intrinsic motivation and identified regulation than those in the latter group, and also reporting greater perceived autonomy support, and effort in PE, students in the introjected cluster had lower intentions to be physically active, and reported lower PA than students in the moderately low motivation group. Although, we would expect a profile that has higher scores for autonomous motivation, greater perceptions of autonomy support, and effort in PE, to be associated with higher intentions to be physically active, in this case we found otherwise. We propose that the most likely reason for this can be attributed to the clear significant distinction in introjection scores between the two groups.

Introjected regulation has garnered much scientific interest as a behavioural regulation holding much promise for researchers and practitioners aiming to encourage more autonomous functioning in adolescents in relation to exercise (e.g., Baumann, Khul, & Kazen, 2005; Standage, Gillison, & Treasure, 2007). Although introjected regulation is a form of motivation that comes from within, it is considered

to be a relatively controlling form of motivation in which behaviour is regulated by internal sanctions (e.g., sense of obligation, guilt, shame, or coercion) as well as pressures that are directed towards attaining rewards (e.g., ego attainment and pride) or avoiding punishment (Ryan & Deci, 2000b). Evidence indicates that this type of regulation is associated with short-term behavioural persistence, but not long term behavioural persistence (Pelletier, Fortier, Vallerand, & Briere, 2001). In other words, even though introjected individuals may continue to engage in a behaviour owing to external constraints such as burdens of self-reproach, indignity, or diminishing self (Bryan & Solmon, 2007) in the short term, adherence to the behaviour is unlikely to persist in the long term or will be erratic at best (Deci & Ryan, 2000).

Despite the premise within SDT that individuals typically have multiple and simultaneous motives for behaviour that collectively determine the overall quality of motivation (Gillison, Osborn, Standage, & Skevington, 2009; Ryan & Deci, 2007), our study has highlighted that high introjection scores are likely to be a particular cause for concern. Despite generally having a more positive profile compared to the moderately low motivation cluster (scoring higher on the autonomous forms of regulation), and actually reporting higher scores on perceptions of autonomy-support, enjoyment and effort in PE classes, the students in the introjected cluster reported lower intentions to be physically active outside of school, and also recorded lower actual PA. This suggests that even if there was positive short-term behavioural support in the form of introjected regulation, such behaviours should not be expected to translate into long-term participation. Students' intention for participation in PA would likely cease when the environment changed and external controls were removed (e.g., graduating from school).

Introjections could be likened to one's scary inner demons. In addition to being externally pressured, the individual might also pressure themselves into action by using internal contingencies such as feelings of self-esteem and pride, on the one hand, and guilt and shame, on the other (Ryan, Lynch, Vansteenkiste, & Deci, 2011). With introjections, although the behaviours are regulated by inner "voices", the value of the behaviours are not fully internalised and therefore the individual tends to feel controlled. Such control is reinforced by contingent self-esteem and ego-involvement, with implicit offers of pride and self-aggrandisement following success, and implicit threats of guilt, shame, and self-derogation following failure (Assor, Vansteenkiste, & Kaplan, 2009). Given the profiles associated with the introjected cluster, what can be inferred is that high introjection scores are powerful "voices" that are capable of drowning the positive influences of moderately high levels of intrinsic motivation and identified regulation. This has important implications for educators.

These findings show that regulating students' behavioural adherence in PE class by the use of introjections (e.g., making students feel guilty that if they did not do a certain task or achieve a certain standard that they would be letting the teacher or their classmates down) counteracts PE's aim to encourage greater leisure-time and lifelong PA. To achieve this aim, the key is to help the students to internalise their behaviours. How teachers frame an exercise activity yields implications for individual students' persistence in the activity. The learning of physical exercises can be framed in terms of the utility of attaining intrinsic goals versus extrinsic goals. Intrinsic goal framing produces deeper engagement in learning activities, better conceptual learning, and higher persistence at learning activities (Vansteenkiste & Lens, 2006). Teachers who want to promote exercise performance might do well in pointing towards the intrinsic

goal of health and physical fitness, instead of the extrinsic goal relevance of the exercise activity such as the need to pass an assessment.

On the whole, research has demonstrated the motivational benefits of more self-determined behavioural regulations in PA contexts with youth (Biddle, Soos, & Chatzisarantis, 1999a, 1999b; Wang & Biddle, 2001). In the same vein, based on the motivational profiles observed in this study, the importance of facilitating autonomous forms of motivation can be reiterated for their associations with more favourable psychological and behavioural outcomes. In Deci and Ryan's (2000a, 2000b) opinion, the environment is critical in the facilitation of intrinsic motivation. Past research conducted in education has also examined the importance of teachers in influencing the degree of satisfaction of students' basic needs and motivations, depending on the motivational climate they generate. When teachers' pedagogical practices and educational settings satisfy students' psychological nutriments of autonomy, competence and relatedness, students' state of motivation, achievement and well-being are enhanced (Alfi, Assor, & Katz, 2004; Assor, Kaplan, & Roth, 2002; Deci, Ryan, & Williams, 1996; Reeve, Jang, Carrell, Jeon, & Barch, 2004; Su, & Reeve, 2011). Along this line, teacher's autonomy-support (versus controlling) has been researched at length and shown to have significant links with students' need satisfaction and motivations (Reeve, 2002; Su, & Reeve, 2011), especially in PE (Ntoumanis, 2001; Standage, Duda, & Ntoumanis, 2003).

To create an autonomy-supportive climate, teachers could spend more time listening to their students and acknowledging their perspectives. They could also provide more support for the quality of students' performance and progress, and promote more choice, initiative and participation in decisions (Grolnick & Ryan, 1989). Reeve (2009) proposes five instructional behaviours that teachers can adopt to be more autonomy-supportive: 1) nurturing inner motivational resources; 2) providing explanatory information; 3) relying on information that is non-controlling; 4) displaying patience to allow time for self-paced learning to occur and; 5) acknowledging and accepting students' expressions of negative affect.

It is also important for teachers to have a structure that encourages self-determined forms of motivation. For students to internalise the value of PE and PA, Koestner and Losier (2002) recommended providing consistent guidelines, rules, and expectations relative to student behaviour and a meaningful rationale for the tasks and activities proposed. For PE to mitigate the decline of PA in children and youth, students need to experience their PE lessons as enjoyable and positive (Scanlan & Simons, 1992). This is corroborated by Reeve and Jang (2009), who posit that autonomy support is necessary but not sufficient in that some outcomes (e.g., responsible self-regulation, achievement) are facilitated best by the coupling of both high-autonomy support and high structure.

In summary, this study has corroborated extant SDT research on the merits of autonomous motivation. However it has gone beyond this by drawing attention to how high introjection scores can potentially usurp the positive effects of students' autonomous motivation towards PE and PA. Educators need to be conscious of the way they teach and avoid fostering student's introjected regulations (e.g., use of social disapproval) towards PE. The provision of autonomy-support and structure for students, and being aware of how goals are framed in PE lessons will contribute to the development of a beneficial self-determined motivational profile in PE, generate the internalisation of the activity among students and ultimately encourage students to

engage in out-of-school PA and a physically active and healthy lifestyle. One limitation of this study was the use of self-report instruments in measuring PA. Future research could focus on using more objective measures of PA such as using activity monitoring devices. However, given the interesting finding regarding high introjection scores, future research should also focus on ascertaining the specific social factors that contribute to introjected regulation, such as avoiding social disapproval and attaining ego enhancement.

References

Ainsworth, B. E., Haskell, W. L., Leon, A. S., Jacobs, Jr. D. R., Montoye, H. J., Sallis, J. F., & Paffenbarger, Jr. R. S. (1993). Compendium of physical activities: Classification of energy costs of human physical activities. *Medicine & Science in Sports & Exercise, 25,* 71–80.

Ainsworth, B. E., Haskell, W. L., Whitt, M. C., Irwin, M. L., Swartz, A. M., Strath, S. J., O'Brien, W. L., Bassett, D. R. JR., Schmitz, K. H., Emplaincourt, P. O., Jacobs, Jr. D. R., & Leon, A. S. (2000). Compendium of physical activities: An update of activity codes and MET intensities. *Medicine & Science in Sports & Exercise, 32,* 498–516.

Aldenderfer, M. S., & Blashfield, R. K. (1984). *Cluster analysis*. Newbury Park, California: Sage.

Alfi, O., Assor, A., & Katz, I. (2004). Learning to allow temporary failure: Potential benefits, supportive practices and teacher concerns. *Journal of Education for Teaching, 30*, 27–41.

Assor, A., Kaplan, H., & Roth, G. (2002). Choice is good, but relevance is excellent: Autonomy-enhancing and suppressing teacher behaviours predicting students' engagement in schoolwork. *British Journal of Educational Psychology, 72*, 261–278.

Baumann, N., & Kuhl, J. (2005). How to resist temptation: The effects of external control versus autonomy support on self-regulatory dynamics. *Journal of Personality, 73*, 443–470.

Baumann, N., Kuhl, J., & Kazen, M. (2005). Left-hemispheric activation and self-infiltration: Testing a neuropsychological model of internalization. *Motivation and Emotion, 29*, 135–163.

Biddle, S. J. H., Gorely, T., & Stensel, P. J. (2004). Health-enhancing physical activity and sedentary behavior in children and adolescents. *Journal of Sports Sciences, 22,* 679–701.

Biddle, S. J. H., Soos, I., & Chatzisarantis, N. (1999a). Predicting physical activity intentions using a goal perspectives approach: A study of Hungarian youth. *Scandinavian Journal of Medicine and Science in Sports*, 9, 353–357.

Biddle, S. J. H., Soos, I., & Chatzisarantis, N. (1999b). Predicting physical activity intentions using goal perspectives and self-determination theory approaches. *European Psychologist*, 4, 83–89.

Biddle, S. J. H., & Wang, C. K. (2003). Motivation and self-perception profiles and links with physical activity in adolescent girls. *Journal of Adolescence*, *26*, 687–701.

Boiché, J. C. S., Sarrazin, P. G., Grouzet, F. M. E., Pelletier, L. G., & Chanal, J. P. (2008). Students' Motivational Profiles and Achievement Outcomes in Physical Education: A Self-Determination Perspective. *Journal of Educational Psychology, 100*, 688.

Brickell, T. A., Chatzisarantis, N. L. D., & Pretty, G. M. (2006). Autonomy and control: augmenting the validity of the theory of planned behaviour in predicting exercise. *Journal of Health Psychology, 11,* 51–63.

Brodersen, N. H., Steptoe, A., Boniface, D. R., & Wardle, J. (2007). Trends in physical activity and sedentary behaviour in adolescence: ethnic and socioeconomic differences. *British Journal of Sports Medicine, 41*, 140–144.

Bryan, C. L., & Solmon, M. A. (2007). Self-determination in physical education: Designing

class environments to promote active lifestyles. *Journal of Teaching in Physical Education, 26*, 260–278.
Cale, L. (2000). Physical activity promotion in secondary schools. *European Physical Education Review, 6,* 71–90.
Carr, S. (2006). An examination of multiple goals in children's physical education: motivational effects of goal profiles and the role of perceived climate in multiple goal development. *Journal of Sports Sciences, 24,* 281–297.
Chantal, Y., Guay, F., Dobreva-Martinova, T., & Vallerand, J. (1996). Motivation and elite performance: An exploratory investigation with elite Bulgarian athletes. *International Journal of Sport Psychology, 27,* 173–182.
Chatzisarantis, N. L. D., Hagger, M. S., Biddle, S. J. H., Smith, B., & Wang, C. K. (2003). A meta-analysis of perceived locus on causality in expercise, sport, and physical education contexts. *Journal of Sport and Exercise Psychology*, *25*, 284–306.
Deci, E. L., & Ryan, R. M. (1985) *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press.
Deci, E. L., & Ryan R. M. (1991). A motivational approach to self: Integration in personality. In R. Deinstbier (Ed.), *Nebraska symposium on motivation, Vol. 38: Perspectives on motivation* (pp. 237–288). Lincoln, NE: University of Nebraska Press.
Deci, E. L, & Ryan R. M. (2000). The "what" and "why" of goal pursuits: Human need and self-determination of behavior. *Psychological Injury*, *11*, 227–268.
Deci, E. L., & Ryan R. M. (2002). Handbook of self-determination research. In E. L. Deci & R. M. Ryan (Eds.), *Overview of self-determination theory: An organismic dialectical perspective,* (pp. 3–33). Rochester, NY: The University of Rochester Press.
Deci, E. L., Ryan, R. M., & Williams, G. C. (1996). Need satisfaction and the self-regulation of learning. *Learning and Individual Differences, 8*, 165–183.
Fox, K. R., & Biddle, S. J. H. (1988). The use of fitness tests. Educational and psychological considerations. *Journal of Physical Education, Recreation and Dance*, *59*, 47–53.
Furmann, A., & Kuhl, J. (1998). Maintaining a healthy diet: Effects of personality on self-reward versus self-punishment on commitment to and enactment of self-chosen and assigned goals. *Psychology and Health, 13*, 651–686.
Gillison, F., Osborn, M., Standage, M., & Skevington, S. (2009). Exploring the experience of introjected regulation for exercise across gender in adolescence. *Psychology of Sport and Exercise, 10*, 309–319.
Goudas, M., Biddle, S. J. H., & Fox, K. R. (1994). Perceived locus of causality, goal orientations, and perceived competence in school physical education classes. *British Journal of Educational Psychology, 64,* 453–463.
Green, S. B., & Salkind, N. J. (2003). *Using SPSS for windows and Macintosh: Analyzing and understanding data* (3rd ed.). Upper Saddle River, NJ: Prentice Hall.
Grolnick, W. S., & Ryan, R. M. (1989). Parent styles associated with children's self-regulation and competence in school. *Journal of Educational Psychology, 81*, 143–154.
Hagger, M. S., & Chatzisarantis, N. L. D. (2005). Perceived autonomy support in physical education and leisure-time physical activity: A cross-cultural evaluation of the trans-contextual model. *Journal of Educational Psychology, 97,* 376–390.
Hagger, M. S., & Chatzisarantis, N. L. D. (2008). Self-determination theory and the psychology of exercise. *International Review of Sport and Exercise Psychology, 1,* 79–103.
Hagger, M. S., Chatzisarantis, N. L. D., Barkoukis, V., Wang, C. K. J., Hein, V., Pihu, M., Soos, I., & Karsai, I. (2007). Cross-cultural generalizability of the theory of planned behavior among young people in a physical activity context. *Journal of Sport and Exercise Psychology, 29,* 2–20.
Hagger, M. S., Chatzisarantis, N. L. D., Culverhouse, T., & Biddle, S. J. H. (2003). The processes by which perceived autonomy support in physical education promotes leisure-

time physical activity intentions and behaviour: A trans-contextual model. *Journal of Educational Psychology, 95,* 784–795.
Hair, J. F. J., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis* (5th ed.). Englewood Cliffs, NJ: Prentice-Hall International.
Khalkhali, V. (2012). Behavioral regulations: What is physical education role in students' physically active lifestyle? *International Online Journal of Educational Sciences, 4,* 265–272.
Koestner, R., & Losier, G. F. (2002). Distinguishing three ways of being highly motivated: A closer look at introjection, identification, and intrinsic motivation. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 101–121). Rochester, NY: University of Rochester Press.
Kuhl, J., & Kazen, M. (1994). Self-discrimination and memory: State orientation and false self-ascription of assigned activities. *Journal of Personality and Social Psychology, 66*, 1103–1115.
Lepper, M. R., & Henderlong, J. (2000). Turning "play" into "work" and "work" into "play": 25 years of research on intrinsic versus extrinsic motivation. In C. Sansone & J. M. Harackiewicz (Eds.), *Intrinsic and extrinsic motivation: The search for optimal motivation and performance* (pp. 257–307). San Diego, CA: Academic Press.
Losier, G. F., Perreault, S., Koestner, R., & Vallerand, R. J. (2001). Examining individual differences in the internalization of political values: Validation of the self-determination scale of political motivation. *Journal of Research in Personality*, *35*, 41–61.
Matsumoto, H., & Takenaka, K. (2004). Motivational profiles and stages of exercise behavior change. *International Journal of Sport and Health Science, 2,* 89–96.
McAuley, E., Duncan, T. E., & Tammen, V. V. (1989). Psychometric properties of the intrinsic motivation inventory in a competitive sport setting: A confirmatory factor analysis. *Research Quarterly for Exercise & Sport, 60*, 48–58.
Ntoumanis, N. (2001). A self-determination approach to the understanding of motivation in physical education. *British Journal of Educational Psychology, 71*, 225–242.
Ntoumanis, N. (2002). Motivational clusters in a sample of British physical education classes. *Psychology of Sport and Exercise, 3*, 177–194.
Ntoumanis, N. (2005). A prospective study of participation in optional school physical education using a self-determination theory framework. *Journal of Educational Psychology, 97,* 444–453.
Pate, R. R., Small, M. L., Ross, J. G., Young, J. C., Flint, K. H., & Warren, C. W. (1995). School physical education. *Journal of School Health, 65*, 312–318.
Pelletier, L. G., Fortier, M. S., Vallerand, R. J., & Brière, N. M. (2001). Associations among perceived autonomy support, forms of self-regulation, and persistence: A prospective study. *Motivation and Emotion, 25*, 279–306.
Prusak, K. A., Treaure, D. C., Darst, P. W., & Pangrazi, R. P. (2004). The effects of choice on the motivation of adolescent girls in physical education. *Journal of Teaching in Physical Education, 23,* 19–29.
Reeve, J. (2002). Self-determination theory applied to educational settings. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of Self-Determination Research*. Rochester, NY: The University of Rochester Press.
Reeve, J. (2009). Why teachers adopt a controlling motivating style toward students and how they can become more autonomy supportive. *Educational Psychologist, 44*, 159–175.
Reeve, J., Deci, E. L., & Ryan, R. M. (2004). Self-determination theory: A dialectical framework for understanding the sociocultural influences on student motivation. In D. McInerney & S. V. Etten (Eds.), *Research on sociocultural influences on motivation and learning: Big theories revisited* (Vol. 4, pp. 31–59). Greenwich, CT: Information Age Press.
Reeve, J., & Jang, H. (2006). What teachers say and do to support students' autonomy during

a learning activity. *Journal of Educational Psychology, 98*, 209–218.
Reeve, J., Jang, H., Carrell, D., Jeon, S., & Barch, J. (2004). Enhancing students' motivation by increasing teachers' autonomy support. *Motivation and Emotion, 28*, 147–169.
Ryan, R. M., & Deci, E. L. (2000a) Self- determination theory and the facilitation of intrinsic motivation, social development and well-being. *American Psychologist, 55*, 68–78.
Ryan, R. M., & Deci, E. L. (2000b). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*, 54–67.
Ryan, R. M., & Deci, E. L. (2007). Active human nature: self-determination theory and the promotion and maintenance of sport, exercise, and health. In M. S. Hagger & N. L. D. Chatzisarantis (Eds.), *Intrinsic motivation and self determination in exercise and sport* (pp. 1–19). Champaign, IL: Human Kinetics.
Ryan, R. M., Koestner, R., & Deci, E.L. (1991). Ego-involved persistence: When free-choice behavior is not intrinsically motivated. *Motivation and Emotion, 15*, 185–205.
Ryan, R. M., Lynch, M. F., Vansteenkiste, M., & Deci, E. L. (2011). Motivation and autonomy in counseling, psychotherapy, and behavior change: A look at theory and practice. *The Counseling Psychologists, 39,* 193–260.
Ryan, R. M., Rigby, S., & King, K. (1993). Two types of religious internalization and their relations to religious orientations and mental health. *Journal of Personality and Social Psychology*, *65*, 586–596.
Sallis, J. F., & McKenzie, T. L. (1991). Physical education's role in public health. *Research Quarterly for Exercise and Sport, 62*, 124–137.
Scanlan, T. K., & Simons, J. P. (1992). The construct of sport enjoyment. In G. C. Roberts (Ed.), *Motivation in sport and exercise* (pp. 199–215). Champaign, IL: Human Kinetic.
Sheldon, K. M., & Elliot, A.J. (1998). Not all personal goals are personal: Comparing autonomous and controlled reasons for goals as predictors of effort and attainment. *Personality and Social Psychology Bulletin, 24*, 546–557.
Shephard, R., & Trudeau, F. (2000). The legacy of physical education: Influences on adult lifestyle. *Pediatric Exercise Science*, *12*, 34–50.
Standage, M., Duda, J. L., & Ntoumanis, N. (2003). A model of contextual motivation in physical education: Using constructs from self-determination and achievement goal theories to predict physical activity intentions. *Journal of Educational Psychology, 95*, 97–110.
Standage, M., Gillison, F., & Treasure, D. C. (2007). Self-determination and motivation in physical education. In M. S. Hagger & N. L. D. Chatzisarantis (Eds.), *Intrinsic motivation and self determination in exercise and sport* (pp. 71–85). Champaign, IL: Human Kinetics.
Standage, M., & Treasure, D. C. (2002). Relationship among achievement goal orientations and multidimensional situational motivation in physical education. *British Journal of Educational Psychology*, 72, 87–103.
Su, Y. L., & Reeve, J. (2011). A meta-analysis of the effectiveness of intervention programs designed to support autonomy. *Educational Psychology Review, 23(1),* 159–188.
Troiano, R. P., Berrigan, D., Dodd, K. W., Masse, L. C., Tilert, T., & McDowell, M. (2008). Physical activity in the United States measured by accelerometer. *Medicine and Science in Sports and Exercise, 40*, 181–188.
Vansteenkiste, M., & Lens, W. (2006). Intrinsic versus extrinsic goal contents in self-determination theory: Another look at the quality of academic motivation. *Educational Psychologist, 41*, 19–31.
Vansteenkiste, M., Simons, J., Lens, W., Sheldon, K. M., & Deci, E. L. (2004). Motivating learning, performance, and persistence: The synergistic role of intrinsic goals and autonomy support. *Journal of Personality and Social Psychology, 87*, 246–260.
Vansteenkiste, M., Simons, J., Lens, W., Soenens, B., & Matos, L. (2005). Examining the impact of extrinsic versus intrinsic goal framing and internally controlling versus

autonomy-supportive communication style upon early adolescents' academic achievement. *Child Development, 76*, 483–501.
Wang, C. K. J., & Biddle, S. J. H. (2001). Young people's motivational profiles in physical activity: A cluster analysis. Journal of Sport and Exercise Psychology, 23, 1–22.
Warburton, D. E., Nicol, C. W., & Bredin, S. S. (2006). Health benefits of physical activity: the evidence. *Canadian Medical Association Journal, 174*, 801–809.
Watts, K., Jones, T. W., Davis, E. A., & Green, D. (2005). Exercise training in obese children and adolescents. *Sports Medicine, 35*, 375–392.
Zhang, T. (2009). Relations among school students' self–determined motivation, perceived enjoyment, effort, and physical activity behaviors. Perceptual and Motor Skills, 109, 783–790.