



## **Team Pentathlon Promoting Physical Activity among Older Children and Adolescents<sup>1</sup>**

*Le Pentathlon en Équipe  
Promotion de l'Activité Physique chez les Enfants plus Âgés et les Adolescents*

**Denis Martel  
Université Laval**

**Jocelyn Gagnon  
Université Laval**

**Luc Nadeau  
Université Laval**

**Valérie Michaud  
Université Laval**

**Paul Godbout  
Université Laval**

This paper describes a particular school-based extra-curricular intervention named Team Pentathlon (TP), developed to promote regular physical activity (PA) among older children (10-12 years old) and adolescents. During an 8-week period, students, grouped in teams, are asked to register daily the nature and the duration of all episodes of PA voluntarily performed outside physical education classes. Depending upon the average intensity of each selected activity and its intermittent or continuous nature, a correction factor is applied to the duration, 60 corrected minutes representing one Pentathlon Hour (PH). Details are provided on the achievement awards system and on the individual and team regulation of PA throughout the intervention. Team Pentathlon focuses on the development of a specific competency, to adopt an active and healthy lifestyle, and draws from recognized learning theories such as constructivism, social constructivism and cognitivism. It can also be linked to the self-determination model as well as to recommendations from the related literature on strategies to increase children's PA. Analyses over several implementations of TP show that a majority of students were active or very active during the intervention and willing to undergo another TP.

*Cet article décrit un programme scolaire et extracurriculaire d'intervention, le Pentathlon en Équipe, créé pour promouvoir la pratique régulière d'activité*

*physique chez les enfants plus âgés (10-12 ans) et chez les adolescents. Durant une période de 8 semaines, les élèves ou étudiants, regroupés en équipes, sont invités à enregistrer quotidiennement la nature et la durée de tous les épisodes d'activité physique effectués volontairement en dehors des cours d'éducation physique. Selon l'intensité moyenne de chaque activité choisie et son caractère intermittent ou continu, un facteur de correction est appliqué à la durée, 60 minutes corrigées correspondant à une Heure Pentathlon. L'article décrit en détails un système d'attribution de prix, en fonction du degré de réussite, et le processus de régulation du volume d'activité individuel et par équipe tout au long de l'intervention. Le Pentathlon en Équipe met l'accent sur le développement d'une compétence particulière, adopter un mode de vie actif et sain, et s'appuie sur des théories d'apprentissage reconnues, telles que le constructivisme, le socioconstructivisme et le cognitivisme. On peut aussi l'associer au modèle théorique de l'auto-détermination ainsi qu'aux recommandations de la littérature concernant les stratégies pour accroître la pratique de l'activité physique chez les enfants. Des analyses effectuées sur les résultats de plusieurs mises en œuvre du Pentathlon en Équipe montrent qu'une majorité des élèves ou étudiants ont été actifs ou très actifs au cours de l'application du programme et souhaitaient vivre un autre Pentathlon.*

### **Introduction**

Among negative consequences of the sedentary lifestyle and unhealthy eating habits that plague our children and adolescents, one finds a decrease in physical fitness, an increase in obesity prevalence, and various related health problems such as atherosclerosis, hypertension, type 2 diabetes, depression, etc. (Calderon, Yucha, & Schaffer, 2005; Daniels, et al., 2005; Reinehr et al., 2005). To reverse this negative trend, the Quebec Ministry of Education has modified its physical education (PE) curriculum to include a health education perspective. One targeted competency is for children and adolescents “to adopt an active and healthy lifestyle” (MEQ, 2001, 2004). To develop this competency, students are expected (a) to analyze the impact of lifestyles on one’s health, (b) to plan a course of action in order to modify some of their life habits, (c) to implement this course of action, and (d) to make an assessment of it. PE teachers feel ill-prepared to teach this health education oriented competency (Michaud, 2002) and are looking for “courses of action” that would modify their students’ regular physical activity (PA), an important life habit. Team Pentathlon was developed to help PE teachers in the teaching of this competency as well as to offer them an interesting “course of action” to experiment in compliance with the curriculum requirement.

### **Promotion of PA: Research and Theory**

#### *Promoting Regular PA for the Young*

In an effort to promote PA in youth, researchers and practitioners have developed numerous interventions over the last 15-20 years and there have been excellent reviews on the subject in recent years (e.g., Coles & Gilbert, 2005; Jago & Baranowski, 2004; Kahn et al., 2002; Salmon, Booth, Phongsavan, Murphy, & Timperio, 2007; Trost & Loprinzi 2008; van Sluijs, McMinn, & Griffin 2007). As argued by Naylor and McKay (2009), and by Trost and Loprinzi (2008), schools are seen as an ideal setting to promote changes of

lifestyle for children and adolescents. Each school has a PE curriculum, but numerous interventions in addition to this curriculum (Beets, Beighle, Erwin, & Huberty, 2009; Jago & Baranowski, 2004; Pate & O'Neil, 2009) have been put forward in an effort to promote PA, the main argument being that the time and resources of the formal curriculum are insufficient to meet the challenge of increasing PA of children and adolescents. In most instances, these extra-curricular or after-school interventions have been offered in a structured format with some PA package offered to registered participants. This is especially the case for after-school programmes (Beets et al., 2009; Pate & O'Neil, 2009). Few interventions have let children or adolescents choose freely the type and amount of PA they wished to practice on a leisure basis.

It has been argued that lunch time and recess periods provide many opportunities for children to be physically active (Jago & Baranowski, 2004; Stellino & Sinclair, 2008). Stratton and Mullan (2005) studied the effect of painting playgrounds on children's free PA level during recess in two early primary schools (4-7 years) and two late primary schools (7-11 years). Early primary school students' cumulative play duration over three daily periods (15-minute morning recess; 1-hour lunch; 15-minute afternoon recess) increased slightly in experimental schools while it decreased by almost 12 minutes for their late primary counterparts. However, the amount of time that children spent in moderate or vigorous physical activity (MVPA) increased, on the average, from 27 to 35 minutes per day. The authors concluded that multicolour playground markings can be a low-cost method of increasing children's daily PA levels in the short term.

One study, conducted in an urban environment (the inner London boroughs of Camden and Islington), focused on increasing children's active travel to school (Rowland, DiGiuseppi, Gross, Afolabi, & Roberts, 2003). Despite expert assistance over one school year from school travel coordinators, the proportions of children walking or cycling on the journey from home to school were similar in intervention/treatment and control schools. An explanation for that result may be the fact that the proportion of parents "very" or "quite" worried about traffic danger was similar in the intervention (85%) and control groups (87%).

To our knowledge, only one study reported an intervention in which grade 4-6 students were encouraged to freely engage in PA outside PE classes at least 30 minutes per day and were asked to self-report it (Ernst & Pangrazi, 1999). Promoting Lifetime Activity for Youth (P.L.A.Y.) was a 12-week intervention that consisted of two main steps: (a) a 4-week period during which students along with their classroom teachers participated in a 15-min activity break during each school day and were eventually taught a variety of games and activities; (b) an 8-week period during which students were encouraged to spend at least 30-min daily (outside of school) in activity which could be accumulated in spurts throughout the day, to be active at least five times a week, and to record daily activity in a student handbook. The results of the study indicated that contrary to the control group, the treatment group had significantly increased PA levels during the first 4-week period and had maintained those levels during the following 8-week period. Unfortunately, the self-report instrument (the PA Questionnaire for Older Children [PAQ-C]), does not provide frequency, intensity, and duration information about PA levels (Kowalski, Crocker, & Faulkner, 1997).

### *Self-Determination Model: A Brief Overview*

Team Pentathlon is not a theory-derived intervention. Nevertheless, the intervention developers were guided by several principles, many of which are in line with numerous concepts of the self-determination model (Bryan & Solmon, 2007; Deci & Ryan, 2000) and/or recommendations from the related literature. We present here a brief overview of the theory and refer the reader to Bryan & Solmon (2007), Ryan, Patrick, Deci, and Williams (2008) or Silva et al. (2008) for a more detailed discussion.

A basic assumption of self-determination theory is that individuals are more likely to engage in behaviours when they *want* to do something, rather than feeling as though they *have to* do it. Thus, the notion of motivation is central to the theory. A continuum of levels of motivation is conceptualized, with the highest level being intrinsic motivation and the lowest level being amotivation; between those two end points are various levels of extrinsic motivation. The more an individual progresses on the continuum toward intrinsic motivation, in relation with behavioural change, the more this individual is likely to *internalize the target behaviour* and adopt it naturally.

According to self-determination theory, individuals have basic psychological needs that must be met: competence, autonomy, and relatedness. In the model, these are referred to as *nutriments*. Fulfilling the person's needs for competence, autonomy and relatedness will help the person move towards (or *nourish*) intrinsic motivation and behavioural change. In studies considering behavioural change, self-management is also referred to on several occasions. For many authors, self-management is considered as a specific component of self-determination (e.g., Konrad, Fowler, Walker, Test, & Wood, 2007) and will be considered as such later in the discussion.

### **Purpose of the Paper**

The purpose of this paper is to describe at length an intervention strategy, the Team Pentathlon (TP), developed to promote regular PA among children, between the age of 10 and 12 years old, and adolescents. This strategy is school-based and extra-curricular. The underlying principles on which Team Pentathlon is based will be discussed in relation to self-determination theory. Preliminary results illustrating the impact of this strategy on the PA level of 10 to 12 year-old children will also be presented.

### **Team Pentathlon**

#### *The Starting Point of Team Pentathlon (TP)*

As mentioned, PE teachers feel ill-prepared to teach their students how “*to adopt an active and healthy lifestyle*”. TP was developed jointly by teacher educators and PE teachers, engaged in collaborative work over many years, in an effort to come up with an intervention strategy that would increase regular PA among children and adolescents and thus contribute to the progressive development of a healthier lifestyle. Some 20 PE teachers, along with their more or less 1000 students, participated to the development of the intervention in an actual PE teaching context. During several workshops, PE teachers were invited to comment on various aspects of the intervention such as students' physical

activities, the intensity of the activities, procedures for students’ self-reports, etc. TP described hereafter is the result of this collaborative venture.

From the start, nine underlying principles guided the development of the intervention (see Figure 1). The first four focus more on student motivation while the five others are linked more closely to the development of the targeted competency. First and foremost, the notion of motivating challenge and student motivation were perceived as paramount. To keep these in mind, the developers of the intervention programme were inspired by five criteria in the elaboration of a motivating task (Florence, Brunelle, & Carlier, 1998). These criteria were *task dynamism* (meeting student need for movement and engagement), *task originality* (meeting student need for discovery), *task emotional load* (meeting student need to surpass one self, to dare), *task openness* (meeting student need for self-confidence and acceptance) and *task meeting* (meeting student need for understanding). According to Florence et al. (1998), when these criteria are applied, the end result is a motivating task positively perceived and readily accepted by students from the start. Elements related to the development of a competency were drawn mainly from the introductory material of the Quebec education programme (MEQ, 2001, 2004).

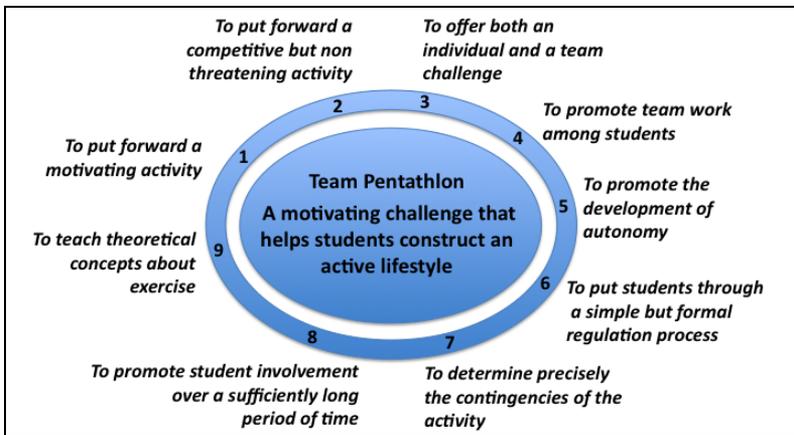


Figure 1. Nine underlying principles that guided the development of Team Pentathlon.

*Basic Structure of Team Pentathlon*

Team Pentathlon is a challenge that lasts over a period of 8 consecutive weeks during which children and adolescents in teams of five, engage in PA to try to accumulate at least 160 Pentathlon Hours covering up to five categories of activity. The required 160 Pentathlon Hours should ideally include at least 15 hours of aquatics, 35 hours of team sports and games, 15 hours of endurance (aerobic) activities, 35 hours of individual sports and games or artistic activities, and 10 hours of duel sports and games. At the end of the 8-week challenge, one of five prizes is awarded to teams that have achieved specific standards.

*Pentathlon Hours.* The Pentathlon Hour (PH) unit represents a composite unit of time where the actual duration of the PA is weighted according to its

intensity. It was created by selecting, in collaboration with cooperating PE teachers, correction factors that ensure some energy cost equivalence between the various activities selected by the participants. For instance, playing soccer during 60 minutes represents 0.75 PH (correction factor = 0.75) whereas jogging during 60 minutes represents 1.00 PH (correction factor = 1.00). A list of some 48 activities is presented in Table 1 along with their respective correction factor. The four correction factors correspond roughly to the four intensity levels retained by the American College of Sports Medicine (2005): 0.25: light, 0-2.9 METs; 0.5: moderate, 3-5.9 METs; 0.75: vigorous, 6-8.9 METs; 1.00: very vigorous,  $\geq 9.0$  METs.

*Pentathlon activities.* TP activities belong to one of five categories (Table 1). Availability, popularity and security were key selection factors for inclusion into the Pentathlon; the list of activities was established in collaboration with PE teachers, based on the above mentioned criteria and on students' actual PA. Activities selected cover the three seasons corresponding to the school year (autumn, winter and spring), allowing the implementation of season-specific pentathlons. Several autumn and spring activities may also be practiced throughout the summer outside the pentathlon format. The five categories made it possible to regroup different activities based on common characteristics and also served to name the intervention, Team Pentathlon (*penta*, five).

Table 1

*Team Pentathlon Activities per Category and Respective Correction Factors*

Correction factor	Categories				
	Aquatics (15 PHs)*	Team sports and games (35 PHs)	Endurance (aerobic) activities (15 PHs)	Individual sports and games or artistic activities (35 PHs)	Duel sports and games (10 PHs)
1			Cross-country Jogging		
0.75	Inner-tube water-polo Swimming lesson Swimming training Synchronized swimming	Basketball Hockey /Ringette Kinball Soccer Tchoukball Ultimate Frisbee <sup>1</sup>	Cross-country skiing Cycling Free skating ( <i>leisure</i> ) Inline skating Mountain hiking Snowshoeing Speed skating	Dance Figure skating	Aikido Badminton Judo Karate Tae-kwon-do Tennis/mini-tennis
0.50	Free swimming	Active school recess Football Mini-volleyball		Calisthenics Gymnastics Mountain/wall climbing Skateboard Rope jumping Trampoline	
0.25		Baseball / Softball	Walking (leisure)	Diving Golf Hacky sack Ice sliding Juggling Skiing Snowboard	One-on-one basketball <sup>2</sup> Ping-pong

\*Number of PHs required for a 5-student team throughout the Pentathlon.

<sup>1</sup> Inside, on a basketball court, the Frisbee may be replaced by a rubber ring.

<sup>2</sup> Game played one player against one other around a single basket; the first to score 21 points wins.

*Pentathlon award requirements.* To obtain one of the symbolic awards, a team must meet the standards listed in Table 2, on three criteria: volume (number of PH of the team), diversity (number of categories of activities) and homogeneity (average PH / week of each member of the team for the 8 weeks). Whereas the volume and homogeneity criteria deal with the level of activity expected from students, the diversity criterion was developed so that students would be encouraged to explore, individually or as a team, various types of activities. In the perspective of developing a long-term active lifestyle (the targeted competency), TP offers students the opportunity to enlarge the basis of their PA experiences.

Table 2  
*Standards for Team Pentathlon Awards (over the 8-week challenge)*

Awards	Physical activity requirements		
	Volume <sup>a</sup>	Diversity	Homogeneity
Excellence	160 PHs / 192 PHs	5 categories	30 PHs / student
Gold	160 PHs / 192 PHs	4 categories	25 PHs / student
Silver	140 PHs / 168 PHs	3 categories	25 PHs / student
Bronze	140 PHs / 168 PHs	< 3	25 PHs / student
Honour	120 PHs / 144 PHs	< 3	20 PHs / student

<sup>a</sup>The first PH value is for a 5-student team; the 2<sup>nd</sup> value is for a 6-student team.

As an example, for a team of 5 students to obtain the Honour award every team-member must be engaged in an average of 2.5 PHs/week throughout the Pentathlon for a total of 20 PHs, (2.5 PHs X 8 weeks) and therefore meet the “homogeneity” criterion. In addition the team would have to accumulate a minimum of 120 PHs to meet the “volume” criterion. Honour would be awarded to the team if the PHs are accumulated in less than 3 categories, the “diversity” criterion.

The levels of PA used to establish the standards for these awards are based on recommendations from organizations devoted to the study and promotion of PA in the population (Nolin & Hamel, 2005; Trust for America’s Health, 2009). For instance, Nolin and Hamel (2005) recommend that to be considered active, one should perform the equivalent of walking 1 hour/day. Taking into account the correction factor indicated in Table 1 (0.25), this 1-hour walk would correspond to 0.25 PH/day and to 1.75 PH/week. This weekly value was rounded up to 2.0 PHs to establish the average lower limit of weekly PA for a student to be considered physically “active” during the Pentathlon. Thereafter, this lower limit was validated by examining the absolute time value corresponding to two PHs/week for all the activities considered in the Pentathlon (Table 1). For instance, the absolute value associated with a 2-PH/week level of activity may correspond to: four 30-minute or six 20-minute episodes of jogging per week; four 60-minute sessions of training in football per week; four 40-minute sessions of training in figure skating per week. Finally, for the lower limit of the “very active” level, the Pentathlon developers elected to increase by one PH/week the lower limit of the “active” students, thus bringing it to 3.0 PHs/week. Again, this

lower limit was validated by examining the absolute time value corresponding to three PHs/week for all the activities considered in the Pentathlon (Table 1). Considering the same activities used as examples above, the absolute value associated with a 3-PH/week level of activity may correspond to: six 30-minute or nine 20-minute episodes of jogging per week; six 60-minute sessions of training in football per week; six 40-minute sessions of training in figure skating per week. Thus based on the amount of Pentathlon Hours performed each week, students are classified as “least active” ( $< 2.0$  PHs/week), “active” ( $\geq 2.0$  and  $\leq 2.9$  PHs/week), or “very active” ( $\geq 3.0$  PHs/week).

At this point the reader should be reminded that PA episodes reported by students during the 8-week Pentathlon refer only to leisure PA practiced on a voluntary basis. Household chores, working activities and activities performed during PE classes are not considered. Thus, the PA levels discussed above may be considered as conservative.

### *Implementation of the Team Pentathlon Challenge*

*Preparatory phase.* People in charge of the intervention provide training to the PE teachers, or at times to the classroom teacher, explaining how to set-up and lead the 8-week challenge, and how to use the intervention to help their students develop the competency “to adopt an active and healthy lifestyle”. After the teacher training period, teams are put together under teacher and/or student management. Then students determine individual and team objectives to be reached.

*Carrying out phase.* During the Pentathlon, students register daily, on a specific record sheet, each bout of exercise performed on the previous day. The record sheet includes, at its top, the list of potential activities and a reference number for each of them. Students specifically indicate the number of the activity performed and the duration (minutes) of the exercise session. The students’ registration of their PA may be supervised by the classroom teacher or by the PE teacher. Every other week, people in charge of the intervention recuperate the record sheets, transfer the data into a computer programme and provide the PE teachers with a summary analysis (Figure 2) of the activity performed by each student and each team with respect to the elements of the Pentathlon challenge: pentathlon minutes and hours in each category of activities, student total (per category and overall), team total (per category and overall). Students receive a summary report shortly after weeks 2, 4 and 6.

The first time they receive their team summary report (Figure 2), students are informed of the correction value associated with each activity. Thereafter, until the end of the intervention, this information on the correction value is made available either on a billboard in the gymnasium or on individual sheets at the students’ disposal. Upon receiving the first summary report after week 2, the PE teacher explains how to properly read the report. The summary report presented in Figure 2 describes results for a fictitious 5-member team after the first two weeks of the programme. Numbers presented in boxes indicate individual and team cumulative PHs since the beginning of the Pentathlon. As a team, Snowman has accumulated a volume of 30.69 PHs. On the right hand side of PH result boxes, numbers **highlighted in grey** in the first five rows indicate the volume of PHs each team-member should have accumulated at this point in time to eventually satisfy the homogeneity (individual total) criterion; the bottom row

indicates the number of PH the team, as a whole, should have accumulated at this point in time to meet the volume (team's total) requirement specified in Table 2 (at this point in time, these values represent 25% of the final required values associated with specific awards). As a team, Snowman barely reaches the Honour level but would not obtain the award since James and Paul have not reached the minimal 5.00 PHs mark required from all team-members for the Honour level. Reference numbers listed at the bottom of the Figure, in correspondence with each category of PA, indicate the volume of PHs the team should have accumulated in each category, at this point in time, in order to eventually satisfy the diversity requirements specified in Table 2 (number of categories) in conjunction with PHs requirements in each category (see Table 2). The Snowman team meets the transitory requirements (25% of final values) in three categories. Should the trend continue, this would be enough to insure the team a silver award but, unfortunately, the minimal homogeneity standard is not met and no award would be attributed unless PA increases.

Once they understand how to properly read their report, students meet in teams: (a) to analyze their results in light of the Pentathlon individual and team requirements; (b) to identify individual and collective weaknesses to be corrected; (c) to determine or revise individual and collective achievement objectives; (d) to identify individual and team strategies in order to maintain, or improve if necessary, individual and team performance; (e) to plan each member's PA for the next two weeks. This constitutes what we call the "regulation process"; it is repeated after weeks 4 and 6. During the first regulation session, besides informing students of correction values associated with various activities, PE teachers explain the Pentathlon Hour construct so they could understand that lower intensity activities carry lower correction factors. Given that information, students will be able to understand discrepancies between results presented in the summary reports (corrected hours) and results registered in recording sheets (actual minutes / hours).

 <b>UNIVERSITÉ LAVAL</b> Département d'éducation physique							<h2 style="text-align: center;">Team Pentathlon</h2> <p style="text-align: center;"> <i>School: Durham</i>  <i>In charge: Bob Goldsteem</i>  <i>Team: Snowman</i>  <i>School year: 6th grade</i> </p>				
<b>Preliminary Report #1</b>											
	Aquatics	Team sports & games	Endurance (aerobics)	Individual sports & games or artistic activities	Duel sports & games	Individual total	Excellence	Gold	Silver	Bronze	Honor
<i>Lucy Scott</i>	4,34	2,14	0,75			7,23	7,5 h	6,25 h	6,25 h	6,25 h	5,0 h
<i>James Green</i>		2,88			1,43	4,31	7,5 h	6,25 h	6,25 h	6,25 h	5,0 h
<i>Jeff Martin</i>		4,29	2,33	1,94		8,56	7,5 h	6,25 h	6,25 h	6,25 h	5,0 h
<i>Paul Green</i>	1,93				2,82	4,75	7,5 h	6,25 h	6,25 h	6,25 h	5,0 h
<i>Mike Auclair</i>		2,65			3,19	5,84	7,5 h	6,25 h	6,25 h	6,25 h	5,0 h
<b>Team's Total</b>	<b>6,27</b>	<b>11,96</b>	<b>3,08</b>	<b>1,94</b>	<b>7,44</b>	<b>30,69</b>	40 h	40 h	35 h	35 h	30 h
<b>Excellence</b>	3,75 h	8,75 h	3,75 h	8,75 h	2,5 h	<b>Over 5 categories</b>					
<b>Gold</b>	3,75 h	8,75 h	3,75 h	8,75 h	2,5 h	<b>Over 4 categories</b>					
<b>Silver</b>	3,75 h	8,75 h	3,75 h	8,75 h	2,5 h	<b>Over 3 categories</b>					
<b>Bronze</b>											
<b>Honor</b>											

Figure 2. Summary analysis of PA, after week 2 (presented after weeks 2, 4, 6 and 8).

*Assessment phase.* At the completion of the 8-week period, people in charge of the intervention deliver to the PE teachers a fourth summary report (same format as Figure 2) presenting the final cumulative individual and team results and each team's achievement with respect to the Pentathlon awards. On the basis of the average weekly number of PH performed throughout the Pentathlon, each participant is also categorized as "least active", "active", or "very active". Students use these data to reflect on the way they proceeded to achieve their results. Three weeks after the completion of the Pentathlon, students fill a questionnaire with regards to their appreciation of the Pentathlon experience, to strategies used and to their interest in going through another Pentathlon. Results of the questionnaires are used both by the research team and PE teachers to regulate their educational use of the Pentathlon.

#### *Main Pentathlon-Related Conceptual Elements Emphasized in PE Curriculum*

"The conceptual framework adopted by the Québec Education Program defines learning as an active, ongoing process of construction of knowledge." (MEQ, 2001, p. 4). TP offers students opportunities to construct their knowledge on three essential concepts as well as their understanding of PA for health: frequency, duration and intensity. This construction is done in a physical manner, by engaging in PA, then in a cognitive manner by the assessment of their bi-weekly report and by the elaboration of a plan to attain their goals, in fact all the regulation process. The MVPA concept, which integrates the three concepts of frequency, duration and intensity, is not prescribed or taught as such; it is first experienced physically and afterwards explained verbally with the help of the reports. Students become aware of the weighting factors associated with various activities and may eventually realize and better understand that more intense activities not only yield a greater volume of PH but are more beneficial to physical fitness. Beyond the notions of minimal duration of a bout of PA and minimal frequency per week, students come to understand that the absolute volume of PA performed during a given period of time is both a function of the duration and the frequency of the PA sessions. Regarding the notion of diversity, PE teachers encourage students to explore new activities in order to increase one's repertoire and better face different limiting circumstances: weather conditions, season specifics, availability of partners, availability of equipment, etc

### **Discussion**

#### *Particular Contribution of Team Pentathlon*

As mentioned at the beginning of this paper, most extra-curricular interventions to promote PA among older children and adolescents make provision for a series of structured sessions, either in the school environment or outside of school, sessions in which participants formally register. TP focuses on extra-curricular PA practiced on a *voluntary* basis with a leisure perspective. Depending upon each participant's choices and favourable circumstances, activities may be performed at school during lunch time or recesses, after-school but still in the school environment in intramural sports or clubs, in some active travel context if the environment allows it, at home or in the community with friends, parents or siblings, etc. In that respect, TP differs from most

interventions reported earlier except, to some extent, for the P.L.A.Y. intervention (Ernst & Pangrazi, 1999).

We submit however that the main unique feature of TP is the fact that it focuses on the development of a specific competency, *to adopt an active and healthy lifestyle*, and that in doing so it draws from recognized learning theories such as constructivism, social constructivism and cognitivism (MEQ, 2004). Of course, the increased volume of PA performed at the time of the Pentathlon is of great value for it confirms the participants' engagement on a short term-basis. As important however is the impact, on the long run, of the construction process, by each less active student, of a new active lifestyle or the confirmation of an active lifestyle for the ones that are already physically very active.

### *Possible Links with Self-Determination Theory and/or Related Literature*

As mentioned before, TP is not a theory-based intervention and was developed in a collaborative effort between teacher educators and PE teachers, with a series of guiding or underlying principles in mind. Once the programme operational and implemented in numerous schools, we came to realize, post-facto, that some of these underlying principles could be linked either to the self-determination model briefly presented in the first part of this article or to recommendations from the related literature. A few of these recommendations and the way TP takes them into consideration follow.

*To put forward a motivating activity.* The motivating activity takes the shape of a challenge that leads to the attribution of symbolic prizes linked to the achievement of individual and team objectives in order to satisfy students' need for challenge. It was felt that engaging voluntarily in such a challenge would enhance students' extrinsic or even intrinsic motivation, a strong determinant of regular PA (Alderman, Beighle, & Pangrazi, 2006; Bryan & Solmon, 2007).

*To put forward a competitive but non threatening activity.* A key point emerging from the literature is that "students are more likely to feel competent in physical education when their teachers emphasize self-improvement rather than social comparison" (Bryan & Solmon, 2007, p. 272). In TP, the competition element for each student comes from accumulating a given number of weekly hours of PA rather than from looking for a victory over opponents. Meeting one's agreed upon objective, competing against oneself, represents, for many students, a meaningful challenge less threatening than competing with others; TP offers students many opportunities to take up this challenge and to succeed.

*To offer both an individual and a team challenge and promote team work among students.* Meeting one's individual challenge and thus contributing to one's team success is likely to enhance students' feeling of competence and motivation (Alderman et al., 2006; Vallerand & Losier, 1999). Also, organizing students in teams and encouraging a context of mutual support among team members (and even with members of other teams) is totally in line with the notion of peer support, a strong determinant of regular PA advocated by several authors (Beets, Vogel, Forlaw, Pitetti, & Cardinal, 2006; Duncan, Duncan, & Strycker, 2005; Springer, Kelder & Hoelscher, 2006; Voorhees et al., 2005).

*To promote the development of autonomy (decision making, student's control over the learning activity, involvement, etc.).* This principle is at the very base of the development of a student competency related to one's lifestyle such as the regular PA. In this sense, TP offers many characteristics of self-

management training (Marcoux et al., 1999) and appears to promote key nutriments of self-determination theory: competence, autonomy, and relatedness (Bryan & Solmon, 2007).

*To put students through a simple but formal regulation process.* The importance of formative evaluation in any educational process has been repeatedly emphasized in the literature over the last decades. It is even more critical in a student-centred pedagogical approach such as TP which makes provision for student self-management of one's progress toward individual and team objectives and is "autonomy-supportive" (Bryan & Solmon, 2007). Besides making provision for formal student self-regulation check points, the intervention also insures that PE teachers and classroom teachers will regularly provide encouragements, in addition to feedbacks periodically given by the PE teacher when summary reports are turned in (see Figure 2).

*To promote student involvement over a sufficiently long period of time so that he or she will experience difficulties and fluctuations necessary for the development of a competency (8 to 10 weeks).* As discussed by Cale and Harris (2006), "it is most important to establish patterns of regular participation in youth that can be carried into adulthood and to evaluate programme effectiveness on short- and long-term behavioural changes" (p. 409). In order to contribute to this long-term objective, TP makes provision for several regulation check points at which time students reflect on their recent PA in light of objectives pursued, discuss with team-members a plan of action for the coming days and keep making PA part of their daily life. To be properly enacted, this process requires several weeks. However, should the Pentathlon last many more weeks, this might discourage students who are pursuing a short term objective such as a specific individual volume of activity or a specific team award mark. Repeated exposures to the intervention, over a certain number of school years and in different season formats, stand better chances to induce more permanent behavioural changes.

#### *Validity of Students' PA Self-Reports*

Having students report themselves the details of their PA seemed the logic choice from the start. What teachers needed was unobtrusive measures, practical to obtain, and specific about the type, frequency, duration, and intensity of the PA performed so that Pentathlon Hours could be computed. One could question the validity of self-report as a measure of PA. Sallis, Buono, Roby, Micale, and Nelson (1993) have concluded that 10-11 year old children can make valid self-reports of their PA although the validity of the measuring instruments increases with age. For their part, Weston, Petosa, and Pate (1997) and Trost, Ward, McGraw, and Pate (1999) have shown that a previous-day activity recall was a valid strategy to measure the PA of adolescents and fifth grade students.

PA registration format during weekends varied from one PE teacher to another. At times, teachers provided students with provisional weekend recording sheets on which they registered daily the activities performed on Fridays and Saturdays; the next Monday, they transferred these data on their formal recording sheet, besides registering their Sunday activities. Other teachers proceeded differently and had students register directly, on Monday mornings, the activities performed throughout the weekend. A study (Pate, Ross, Dowda,

Trost, & Sirard, 2003) has shown that a 3-day PA recall instrument was valid to measure the PA practice of adolescent girls (eighth and ninth grade).

Researchers have mentioned that students tend to overestimate their PA when using self-reports (McMurray et al., 2004). TP makes provision for self-report regulation at the very start of the programme and this is reinforced after the first two weeks when students receive their first PHs values summary report. Given the objective of the intervention on the long run, that is having students manage autonomously an active lifestyle, students become aware of the essential meaning of achieving symbolic award standards and of the futility of cheating with themselves since there is nothing to be gained by doing so.

### *Team Pentathlon Research Programme*

So far, almost two thousand students have experienced the Pentathlon, which has provided the research team with a wealth of data. The first studies, conducted post-facto on different samples, have examined the volume of participants' PA during the Pentathlon (Gagnon, Nadeau, & Martel, 2008; Martel, Gagnon, Michaud, Nadeau, & Godbout, 2010; Martel, Nadeau, Gagnon, Michaud, & Normandin, 2006; Nadeau, Godbout, Martel, & Gagnon, 2009), the nature of activities selected (Gagnon et al., 2008; Nadeau et al., 2009) and students' perceptions after having experienced the Pentathlon (Martel et al., 2006; Martel, Nadeau, Gagnon, Michaud, Godbout, & Gadais, 2009). The main conclusions drawn from these studies are as follows.

- (a) Based on students' self-reports, a large majority of them were active or very active during the programme (from 76% to 84%, depending on the samples).
- (b) In answer to a questionnaire after completion of the Pentathlon, a majority of students reported having done more PA during the programme, and having experienced longer bouts of PA during the programme; in addition, some 40% mentioned that they practiced new activities during the programme.
- (c) A large majority mentioned that they wished to undergo another TP.
- (d) In one study (Martel et al., 2006), 75% of students indicated that they still maintained their level of activity practice three weeks after the end of the programme.

One study (Martel et al., 2010) examined results of a sample of 38 teams (208 students, 10-11 year-old) in light of the Pentathlon achievement standards and showed (1) that 27 of the 38 teams (71%) met the minimal volume of exercise, (2) that 22 of the 38 teams (60%) met the diversity criterion of 3 categories of activities, (3) that 57 students caused their team to miss the Honour award, and (4) that despite the fact that only seven teams out of 38 reached the minimal award level or more, 79% of all 208 students were active or very active during the Pentathlon.

Finally, one recent study (Michaud, Nadeau, Martel, Gagnon & Godbout, 2011) went beyond the descriptive format and used control and experimental groups of students to study the impact of TP (PH weekly volume of activity). The authors concluded that TP, a school-based intervention, brings about a greater volume of PA among 10-11 year old children of both sexes. Although this needs to be confirmed by other studies, trends were observed to the effect that girls who were least active and boys who were active at the beginning of the

intervention appear to have been more responsive to the programme (Michaud, Nadeau, Gagnon, Martel, & Godbout, 2010).

Future Pentathlon-related studies should examine whether children, adolescents and young adults react the same way to the programme, analyse seasonal variations in Pentathlon results, examine in more details PA patterns of participants and their preferences, etc.

### Conclusion

Team Pentathlon has now been completed by 10-11 year-old elementary school children, by high school adolescents and, more recently, by CEGEP students (a combination of the final year of senior high school and the 1<sup>st</sup> year of community college). As more and more data are gathered, average results keep showing a weekly increase of the volume of PA performed by students involved. As we discussed earlier in this paper, researchers and/or practitioners have come up with a great variety of interventions designed to promote PA among our youth. This description of Team Pentathlon is offered to the readership as an additional, efficient and practical tool to be put at the disposal of PE teachers.

### References

- Alderman, B. L., Beighle, A., & R. P. Pangrazi. (2006). Enhancing motivation in physical education: Promoting intrinsic motivation, enhancing perceived physical competence and creating a mastery-oriented environment will increase student's enjoyment of physical activity. *Journal of Physical Education, Recreation & Dance*, 77(2), 41-45, 51.
- American College of Sports Medicine (ACSM). 2005. *ACSM's resource manual for guidelines for exercise testing and prescription*. Baltimore, MD: Lippincott Williams & Wilkins.
- Beets, M. W., Beighle, A., Erwin, H. E., & Huberty, J. L. (2009). After-school program impact on physical activity and fitness - A meta-analysis. *American Journal of Preventive Medicine*, 36, 527-537.
- Beets, M. W., Vogel, R., Forlaw, L., Pitetti, K. H., & Cardinal, B. J. (2006). Social support and youth physical fitness activity: The role of provider and type. *American Journal of Health and Behavior*, 30, 278-789.
- 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.
- Calderon K. S., Yucha, C. B., & Schaffer, S. D. (2005). Obesity-related cardiovascular risk factors: Intervention recommendations to decrease adolescent obesity. *Journal of Pediatric Nursing*, 20, 3-14.
- Cale, L., & Harris, J. (2006). School-based physical activity interventions: Effectiveness, trends, issues, implications and recommendations for practice. *Sport, Education and Society*, 11, 401-420.
- Coles, M., & Gilbert, W. (2005). *Best practices in the prevention and treatment of childhood obesity*. Central California Center for Health and Human Services (CCCHHS), California State University, Fresno. Retrieved from [http://www.csufresno.edu/ccchhs/documents/CCROPP\\_best\\_pract\\_obesity\\_prev\\_tmt.pdf](http://www.csufresno.edu/ccchhs/documents/CCROPP_best_pract_obesity_prev_tmt.pdf)
- Daniels, S.R., Arnett, D. K., Eckel, R. H., Gidding, S. S., Hayman, L. L., Kumanyika, S., Williams, C. L. (2005). Overweight in children and

- adolescents: Pathophysiology, consequences, prevention, and treatment. *Circulation*, 111, 1999–2012.
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11, 227-268.
- Duncan, S. C., Duncan, T. E., & Strycker, L. A. (2005). Sources and types of social support in youth physical activity. *Health Psychology*, 24, 3-10.
- Ernst, M. P., & Pangrazi, R. (1999). Effects of a physical activity program on children’s activity levels and attraction to physical activity. *Pediatric Exercise Science*, 11, 393-405.
- Florence, J., Brunelle, J., & Carlier, G. (1998). *Enseigner l’éducation physique au secondaire: Motiver, aider à apprendre, vivre une relation éducative* [Teaching physical education in high school: Motivating, helping student learning, living an educational relationship]. Bruxelles: De Boeck Université.
- Gagnon, J., Nadeau, L. & Martel, D. (2008, May). Analyse de la pratique d’activités physiques d’élèves engagés dans un Pentathlon en équipe [Analysis of students’ physical activity practice in Team Pentathlon]. Poster session presented at the 2008 meeting of the Association pour la recherche sur l’intervention en sport (ARIS). Rodez, France.
- Jago, R., & Baranowski, T. (2004). Non-curricular approaches for increasing physical activity in youth: A review. *Preventive Medicine*, 39, 157-163.
- Kahn, E. B., Ramsey, L. T., Brownson, R. C., Heath, G. W., Howze, E. H., Powell, K. E., ... Corso, P., & the Task Force on Community Preventive Services. (2002). The effectiveness of interventions to increase physical activity. *American Journal of Preventive Medicine*, 22(4S), 73-107.
- Konrad, M., Fowler, C. H., Walker, A. R., Test, D. W., & Wood, W. M. (2007). Effects of self-determination interventions on the academic skills of students with learning disabilities. *Learning Disability Quarterly*, 30, 89-113.
- Kowalski, K. C., Crocker, P. R. E., & Faulkner, R. A. (1997). Validation of the Physical Activity Questionnaire for Older Children. *Pediatric Exercise Science*, 9, 174-186.
- Marcoux, M.-F., Sallis, J. F., McKenzie, T. L., Marshal, S., Armstrong, C. A., & Goggin, K. J. (1999). Process evaluation of a physical activity self-management program for children: SPARK. *Psychology and Health*, 14, 659-677.
- Martel, D., Gagnon, J., Michaud, V., Nadeau, L., & Godbout, P. (2010, October). Team Pentathlon: Team results in light of achievement standards. Poster session presented at the 2010 meeting of the International Association for Physical Education in Higher Education (AIESEP). La Corona, Spain.
- Martel, D., Nadeau, L., Gagnon, J., Michaud, V., & Normandin, J.-M. (2006). Le Pentathlon en équipe : un programme efficace pour amener les élèves à être plus actifs [Team Pentathlon: An efficient program to render students more physically active]. In N. Wallian, M-P Poggi, & M. Musard (Eds.), *Co-Construire des savoirs : les métiers de l’intervention dans les APSA* (DVD – Articles expertisés, pp. 1-14). France, Presses Universitaires de Franche-Comté.

- Martel, D., Nadeau, L., Gagnon, J., Michaud, V., Godbout, P., & Gadais, T. (2009, September). *How students perceive a school-based intervention program (Team Pentathlon) designed to increase their regular practice of physical activity*. Poster session presented at the AIESEP Seminar Symposium, Pensacola, FL.
- McMurray, R. G., Ring, K. B., Treuth, M. S., Welk, G. J., Pate, R. R., Schmitz, K. H., ... Sallis, J. F. (2004). Comparison of two approaches to structured physical activity surveys for adolescents. *Medicine and Science in Sports and Exercise*, 36, 2135-2143.
- Michaud, V. (2002). *L'intégration de l'éducation à la santé dans les programmes d'éducation physique du primaire et du secondaire* [Integrating health education into physical education programs at the elementary and secondary school levels]. Unpublished doctoral dissertation, Université Laval, Quebec City, Canada.
- Michaud, V., Nadeau, L., Gagnon, J., Martel, D., & Godbout, P. (2010, October). Effect of Team Pentathlon on the physical activity of 10-11 year old children of both sexes considering their initial level of practice. Poster session presented at the 2010 meeting of the International Association for Physical Education in Higher Education (AIESEP). La Corona, Spain.
- Michaud, V., Nadeau, L., Martel, D., Gagnon, J., & Godbout, P. (2011). The effect of Team Pentathlon on 10-11 year old children's engagement in physical activity. Manuscript submitted for publication.
- Ministère de l'Éducation du Québec (MEQ). (2001). *Québec education program- Preschool education & elementary education*. Québec: Gouvernement du Québec. Retrieved from [http://www.mels.gouv.qc.ca/dfgj/dp/programme\\_de\\_formation/primaire/pdf/educprg2001/educprg2001-010.pdf](http://www.mels.gouv.qc.ca/dfgj/dp/programme_de_formation/primaire/pdf/educprg2001/educprg2001-010.pdf)
- Ministère de l'Éducation du Québec (MEQ). (2004). *Québec education program – Secondary school education, Cycle one*. Québec: Gouvernement du Québec. Retrieved from [http://www.mels.gouv.qc.ca/DGFJ/dp/programme\\_de\\_formation/secondaire/pdf/qep2004/chapter1.pdf](http://www.mels.gouv.qc.ca/DGFJ/dp/programme_de_formation/secondaire/pdf/qep2004/chapter1.pdf)
- Nadeau, L., Godbout, P., Martel, D., & Gagnon, J. (2009, September). *Students' participation to Team Pentathlon: A description of their physical activity practice*. Poster session presented at the 2009 meeting of the International Association for Physical Education in Higher Education (AIESEP). Pensacola, Florida.
- Naylor, P.-J., & McKay, H. A. (2009). Prevention in the first place: Schools a setting for action on physical inactivity. *British Journal of Sports Medicine*, 43, 10-13.
- Nolin, B. et Hamel, D. (2005). Les Québécois bougent plus mais pas encore assez. In M. Vienne & A. Robitaille (Eds.), *L'annuaire du Québec 2006* (pp. 296-311). Montréal: Fides.
- Pate, R. R., & O'Neill, J. R. (2009). After-school interventions to increase physical activity among youth. *British Journal of Sports Medicine*, 43, 14-18.
- Pate, R. R., Ross, R., Dowda, M., Trost, S. G., & Sirard, J. (2003). Validation of a 3-day physical activity recall instrument in female youth. *Pediatric Exercise Science*, 15, 257-265.

- Reinehr, T., Andler, W., Denzer, C., Siegried, W., Maye, H., & Wabitsch, M. (2005). Cardiovascular risk factors in overweight German children and adolescents: Relation to gender, age and degree of overweight. *Nutrition, Metabolism & Cardiovascular Diseases*, *15*, 181-187.
- Rowland, D., DiGiuseppi, C., Gross, M., Afolabi, E., & Roberts, I. (2003). Randomised controlled trial of site specific advice on school travel patterns. *Archives of Disease in Childhood*, *88*, 8-11.
- Ryan, R. M., Patrick, H., Deci, E. L., & Williams, G. C. (2008). Facilitating health behaviour change and its maintenance: Interventions based on Self-Determination Theory. *The European Health Psychologist*, *10*, 2-5.
- Sallis, J. F., Buono, M. J., Roby, J. J., Micalo, F. G., & Nelson J. A. (1993). Seven-day recall and other physical activity self-reports in children and adolescents. *Medicine and Science in Sports and Exercise*, *25*, 99-108.
- Salmon, J., Booth, M. L., Phongsavan, P., Murphy, N., & Timperio, A. (2007). Promoting physical activity among children and adolescents. *Epidemiologic Reviews*, *29*, 144-159.
- Silva, M. N., Markland, D., Minderico, C. S., Vieira, P. N., Castro, M. M., S.R. Coutinho, S. R., ... Teixeira, J. (2008). A randomized controlled trial to evaluate self-determination theory for exercise adherence and weight control: Rationale and intervention description. *BMC Public Health*, *8*, 234 (13 pages).
- Springer, A. E., Kelder, S. H., & Hoelscher, D. M. (2006). Social support and physical activity among 6<sup>th</sup> grade female early adolescents: A cross-sectional study. *International Journal of Behavioral Nutrition and Physical Activity*, *3*, 8 (10 pages).
- Stellino, M. B., & Sinclair, C. (2008). Intrinsically motivated, free-time physical activity – Considerations for recess. *Journal of Physical Education, Recreation and Dance* *79*(4), 37-40.
- Stratton, G., & Mullan, E. (2005). The effect of multicolor playground markings on children's physical activity level during recess. *Preventive Medicine*, *41*, 828-833.
- Trost, S. G., & Loprinzi, P. D. (2008). Exercise – Promoting healthy lifestyles in children and adolescents. *Journal of Clinical Lipidology*, *2*, 162-168.
- Trost S. G., Ward, D. S., McGraw, B., & Pate, R. R. (1999). Validity of the previous day physical activity recall (PDPAR) in fifth-grade children. *Pediatric Exercise Science*, *11*, 341-348.
- Trust for America's Health (2009). *F as in Fat: How obesity policies are failing in America. Issue Report*. Washington DC: Robert Wood Johnson Foundation.
- Vallerand, R. J., & Losier, G. F. (1999). An integrative analysis of intrinsic and extrinsic motivation in sport. *Journal of Applied Sport Psychology*, *11*, 142-169.
- van Sluijs, E. M. F., McMinn, A. M., & Griffin, S. J. (2007). Effectiveness of interventions to promote physical activity in children and adolescents: Systematic review of controlled trials. *British Medical Journal*, *335*, 703 (13 pages). Retrieved from [www.bmj.com/cgi/content/full/bmj.39320.843947.BE.v1](http://www.bmj.com/cgi/content/full/bmj.39320.843947.BE.v1)
- Voorhees, C. C., Murray, D., Welk, G., Birnbaum, A., Ribisl, K. M., Johnson, C. C., Jobe, J. B. (2005). The role of peer social network factors and physical

activity in adolescent girls. *American Journal of Health Behavior*, 29, 183-190.

Weston, A. T., Petosa, R., & Pate, R. R. (1997). Validation of an instrument for measurement of physical activity in youth. *Medicine & Science in Sports & Exercise*, 29, 138-143.

---

<sup>1</sup> Research supported by the Social Sciences and Humanities Research Council of Canada (862-2007-0004)