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# Bridging a gap in the Canadian Physical Activity Guidelines through the Development of Youth Self-Regulation

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## Abstract

Physical activity guidelines have become a regular part of the discussion in public health, education, and public policy. This paper examines an apparent oversight in the Canadian Physical Activity Guidelines: the process by which adolescents develop the self-regulation skills to maintain their level of physical activity (PA). This article examines the PULSE program, a PA-based life skills intervention that could be used to assist youth to develop this capacity. A description and preliminary mixed methods evaluation of the PULSE program is provided. Results indicate that PA levels as well as self-regulation skills increased from pre-program to post-program. Furthermore, findings demonstrate that the youth attribute their increased competence in self-regulation to the experiences they had within the program. Recommendations are presented for facilitating the development of youth self-regulation skills in relation to PA and for the adaptation of the Canadian Physical Activity Guidelines.



**Keywords:** adolescent, guidelines and recommendations, health promotion, intervention study, physical activity



## Résumé

Les lignes directrices en matière d'activité physique sont régulièrement mentionnées dans les discussions de santé publique, d'éducation et de politique publique. Ce texte offert ici examine ce qui semble être une omission dans le document Guide canadien sur la pratique d'activité physique: le processus par lequel les adolescents développent des habiletés d'auto-régulation à maintenir leur niveau de pratique d'activité physique. Le texte analyse le programme PULSE, une intervention visant le développement d'habiletés de vie touchant la pratique d'activité physique et le développement de ces habiletés d'auto-régulation chez les jeunes. Une description du programme et une évaluation utilisant une approche mixte sont présentées. Les résultats révèlent une augmentation de la pratique d'activité physique et une amelioration des habiletés d'auto-régulation entre le pré et le post programme. De plus, les résultats montrent que les jeunes attribuent cette amélioration de l'habileté d'auto-régulation aux experiences vécues dans le programme. Les recommandations mises de l'avant ont comme but de faciliter le développement de cette habileté en relation avec la pratique d'activité physique chez les jeunes et de faire des modifications au Guide canadien sur la pratique d'activité physique.



**Mots-clés:** adolescents; guide et recommendation; promotion de la santé; étude sur l'intervention; activité physique

## Introduction

In Canada, the total cost of current physical inactivity is estimated at $6.8 billion, or 3.7 percent of all health care costs (Janssen, 2012). Research has shown that Canadian "children are taller, heavier, fatter, and weaker than in 1981" (Tremblay et al., 2010, p. 17) and more recent statistics indicate that only 7% of children and youth are meeting Canada's PA guidelines of 60 minutes per day (Active Healthy Kids Canada, 2011). Given the strong link between inactivity and the risk of chronic diseases this lack of activity is considered a major concern for public health (Tremblay et al., 2010). If the current levels of inactivity hold for youth as they enter adulthood, the overall health care costs could easily surpass the current financial impact.

Physical activity (PA) guidelines have been one of many responses to begin to address this issue of global and local concern. The Canadian PA guidelines are a local manifestation of a worldwide focus on PA for health benefits and are crucial documents that form the starting point for a number of policies and interventions around achieving minimal amounts of PA across the lifespan for Canadian citizens (Active Healthy Kids Canada, 2011; Colley et al., 2011; Tremblay et al., 2011). Moreover, the Canadian PA guidelines are often cited as exemplary by the World Health Organization (WHO) in their global PA guidelines (World Health Organization, 2010). The most recent PA guidelines made available in Canada span the entire life of the individual including infants and toddlers (zero to four years old), children (aged five to eleven), adolescents (aged twelve to seventeen), adults (aged eighteen to 64), and seniors (65 and older) (Tremblay et al., 2012). This paper will focus primarily on the adolescent stage of life.

With regards to adolescence, the current guidelines addresses adolescent PA participation with recommendations for how parents can help their children become more active and choose appropriate types of PA. For example, the guidelines highlight the importance of limiting screen time for adolescents, the risks related to sedentary behaviour, the benefits of being more active, as well as suggestions for increasing PA through active living and recreational opportunities. However, the guidelines and accompanying documents lack information that describes how adolescents can transition into independent PA involvement and subsequently regulate their own level of PA. This gap in providing knowledge regarding the developmental trajectory to voluntary, autonomous PA for Canadian adolescents is worth examining further.

Researchers acknowledge that adolescence represents a phase of growing independence and that this is reflected in the influences on adolescent PA participation. Rhodes, Naylor and McKay (2010) suggest that pre-adolescent youth are beginning to spend more leisure time with their peers rather than with caregivers. They concluded that targeting PA through caregivers and parents appears to be a promising PA intervention practice for Canadian children *aged four to ten* only. In addition, in Tremblay and colleagues (2007) commentary on earlier versions of PA guidelines which excluded 15-19 year olds at that point, they discussed the increasing independence of adolescents and the impact that may have on PA levels.

Self-regulation has been defined as the "processes that learners use to activate and maintain cognitions, emotions, and behaviors to attain personal goals" (Zimmerman & Kitsantas, 2014, p.145). Research with adult populations shows that self-regulation of PA involvement is the most important factor required for successful PA maintenance for adults (Rhodes & Pfaeffli, 2010), and that self-regulation is the strongest contributor to PA behavior (Anderson, Wojcik, Winett, & Williams, 2006; Hallam & Petosa, 2004). Researchers have also demonstrated that adults often lack the self-regulatory skills to implement their *own* PA plans (Rhodes & Pfaeffli, 2010), therefore it is unlikely that adolescents have these important skills either. Moreover it is likely that many

parents and caregivers do not have the capacity to teach their children these necessary skills. However, within the Canadian guidelines for PA, adults (ages eighteen and above), are expected to be able to self-regulate involvement in PA. For example, the section for adolescents is written using statements that offer recommendations for parents in coaching their children to become active, while the section for adults is written using action-oriented language encouraging adults to take initiative themselves (Canadian Society for Exercise Physiology, 2010). These recommendations assume that adults have the ability to plan, execute, and revise PA according to their personal goals, preferences, environments, needs, and limitations. However, the guidelines do not address the transition from structured, adult-guided activities in adolescence to more independent activities in adulthood.

In sum, although the Canadian PA guidelines are rigorous and based on the best available evidence in PA research, in their current state they are not formulated to encourage, enhance, or gradually build self-regulation skills in adolescents. Since PA guidelines are a prototypical "upstream" public health resource, this gap may inadvertently lead to public health policies and PA interventions that do not support the development of self-regulation skills to help adolescents to develop independence with regards to PA. A recently developed community-based PA and life skills program for at-risk youth called PULSE is an example of how after-school interventions can begin to address adolescent PA by explicitly focusing on the development of self-regulation skills. After school has been identified as an optimal time for youth PA engagement by the ParticipACTION Report Card on Physical Activity for Children and Youth (ParticipACTION, 2015). In the PULSE program, youth are provided developmentally appropriate opportunities to become physically active within a mastery climate in order to learn the skills necessary to independently self-regulate their PA involvement. This is accomplished through a gradual shift from supported, guided PA to independently choosing the type, duration, and frequency of their exercise after resetting and re-evaluating their goals. The purpose of this article is to provide a description of the PULSE program and to provide results of a mixed methods evaluation that examined pre-post changes in PA levels and self-regulation as well as participant's perceptions of their experiences developing self-regulation skills during the program.

## The PULSE Program – A Detailed Description

The PULSE program was designed to provide a developmentally appropriate understanding of resistance and aerobic training and incorporates the teaching of life skills. More specifically, the PULSE program was developed based on the combination of two positive youth development program frameworks, the Life Development Intervention (LDI) (Danish & D'Augelli, 1980; Hodge, Danish, Horne, & Kiselica, 1999) and the Teaching Personal and Social Responsibility (TPSR) model (Hellison, 2003). The LDI focuses on teaching life skills to help individuals navigate life challenges. In the PULSE program, an explicit emphasis was placed on teaching life skills related to self-regulation such as goal setting, seeking social support, problem-solving, overcoming barriers and managing emotions. The TPSR model focuses on helping youth develop five levels of responsibility (self-control, effort, self-coaching, leadership, transference) and uses a specific program structure to achieve this goal.

The PULSE program was a community program that targeted at-risk youth and was implemented in local community fitness centres during the after school period. The program began with a guided PA experience and is followed by the provision of memberships for the youth to the

community facility so that the youth could continue to participate in PA more independently. The program was led by four leaders that included the lead author who has completed and obtained certification in personal training, a Masters student in Human Kinetics, and two fourth-year university students in Human Kinetics fulfilling their internship requirements. Overall, the program was broken into three phases and implemented over the course of five months.

The first phase of the program consisted of two-hour, bi-weekly program sessions that lasted for the course of two months (16 sessions in total). The first 5-10 minutes of each session consisted of relational time where the leaders talk with the youth about what is going on in their daily lives. Following relational time was the awareness talk. The awareness talk addressed the five different TPSR levels outlined above and the additional life skills of goal setting, problem solving, seeking social support, overcoming roadblocks, emotional regulation and relaxation. The rationale for including additional life skills was to ensure that the youth were taught a variety of practices that would help the youth learn self-regulation skills. The awareness talk was followed by the PA plan whereby participants engaged in a variety of resistance and aerobic activities. The PA component of the program specifically followed the national recommendations with twice weekly resistance training sessions with an emphasis on progression to independent practice of resistance and aerobic training on a regular basis as well as recommendations from authors specifically focusing on training adolescents to be physically active (Kraemer & Fleck, 2005; Tremblay et al., 2010). Finally, a debrief meeting was held at the conclusion of each session wherein the leaders facilitated a discussion regarding the progress made and any challenges faced during that session.

The second phase of PULSE consisted of meeting once per week for a period of six weeks (six sessions). For this phase the youth were given memberships to the community fitness facility so that they could attend independently from that point onwards. The purpose of these sessions was to help youth become more independent with regards to their PA participation and for them to practice self-regulation of their own level of PA. Therefore, the leaders were present but did not teach any specific skills. The leaders primarily helped the youth adapt and/or set new priorities and goals for their ongoing PA plans.

The third phase of the program consisted of an additional six weeks of one session per week (six sessions) during which the participants were encouraged to continue their PA plans independently using their memberships. During this phase the leaders would sporadically check in with the youth to encourage them to plan for on-going independent PA involvement. Below, we describe a preliminary evaluation and the results related to levels of PA, the development of self-regulation to maintain PA participation and perceived ability to maintain levels of PA independently.

## Method

This research was a part of a larger study that examined process and outcome issues regarding the PULSE program. Specifically, this study applies a mixed methods approach using a concurrent implementation design with equal priority to both quantitative and qualitative methods (Hanson, Creswell, Clark, Petska, & Creswell, 2005).

### Participants and Procedure

The PULSE program was implemented at two high schools with targeted recruitment of at-risk youth facilitated by school support staff. Recruitment was conducted by placing pamphlets

and posters at the school as well as through school visits made by the lead researcher to promote the program to potential participants. The participants in this study included 16 youth from two low-income or at-risk schools (ages 13-18, 77% boys, 23% girls) who completed the PULSE program and agreed to take part in quantitative and qualitative data collection following completion of the program. The participants completed self-report measures of PA levels and self-regulation prior to program implementation and again two months later following the intensive portion of the program. In addition, the participants participated in qualitative interviews following completion of phase two of the program. All procedures were approved by the University's Research Ethics Board and informed consent was provided by each participant.

**Measures**

***Physical activity levels.*** The Godin Leisure Physical Activity Questionnaire is a self-report measure of PA. This questionnaire is widely utilized with well-established norms and scoring calculations (Godin, 2011; Sallis, Buono, Roby, Micale, & Nelson, 1993). Youth entering the program completed this measure of PA by estimating their amount of light, moderate, and vigorous PA for a typical week. As mentioned above, youth completed this measure at both pre- and post-intensive phase of the program.

***Self-regulation.*** The Selection, Optimization, and Compensation (SOC) measure examines intentional self-regulation with documented use with adolescents (Baltes & Smith, 2004; Gestsdottir, Bowers, von Eye, Napolitano, & Lerner, 2010; Lerner, Freund, De Stefanis, & Habermas, 2001). The SOC scale consists of three subscales: Elective Selection, Optimization, and Compensation. Elective Selection examines the ability to set goals as well as select goals when there may be fewer choices. Optimization measures how individuals maximize progress by measuring relative distance from the goal. Finally, compensation identifies how individuals overcome barriers within a goal area through the scaling back of efforts invested in competing goals. A total of 18 forced-choice items comprise the three subscales. Example items include "When I decide upon a goal I stick with it/ I can change a goal at any time" (Elective Selection), "I think about exactly how I can best realize my plans. / I don't think long about how to realize my plans, I just try it" (Optimization), "When things don't work the way they used to, I look for other ways to achieve them. / When things don't go as well as they used to, I accept it" (Compensation). The youth read the two choices for each item and chose the statement that best represented their behaviour in all areas of their lives. The measure was administered at the beginning of the program and again at the end of the intensive phase of the program.

***Qualitative interviews.*** As mentioned above, individual semi-structured interviews were conducted with the program participants. The interview guide included questions regarding the participants' overall experience in the program and their plans for maintaining their PA levels independently. All interviews took place at the school or community fitness and recreation centre, were recorded and transcribed. The duration of interviews varied between 12 and 39 minutes.

**Data Analysis**

The data was analysed using SPSS 20.0. First, descriptive statistics (M, SD) were calculated. We then examined if there were any differences at baseline between the youth from the two different program sites (schools). There were no differences on pre-scores for any of the measures. As a result we combined the data from both groups into one dataset for the final analyses. A dependent t-test was conducted to examine differences from pre-program to post intensive phase

of the program for PA. Three dependent t-tests examined differences for the each of the subscales of the SOC measure of self-regulation. Finally, we conducted a multiple linear regression to examine whether changes in self-regulation predicted PA levels at the post-intensive phase of the program while controlling for the PA levels at the beginning of the program (step 1 of the regression equation included the pre PA levels while the second step of the model included the total score from the SOC).

We applied a deductive-inductive approach to analyse the qualitative data using a thematic analysis (Braun & Clark, 2006). The deductive analysis was informed by Zimmerman's conceptualization of self-regulation (e.g., self-monitoring, goal setting). The recordings were transcribed and reviewed in order to become familiar with the data. This was followed by two rounds of coding to identify meaningful and interesting elements within the data. The codes were then organized into themes based on relatedness of concepts. The initial themes were reviewed and edited in order to develop more coherent categories and classifications between levels of themes and sub-themes. Once the final themes were identified, they were assigned titles and definitions to reflect the content of each theme. An independent auditor who was a graduate student familiar with qualitative data analysis reviewed the results of the content analysis to ensure the trustworthiness of the data (Neuman & Robson, 2012). Within the writing stage, supporting quotes were organized under each relevant theme to demonstrate the meaning and context of each theme. Each of the participants were issued a code to protect anonymity and maintain confidentiality. Codes were assigned based on order of transcription and school attended (A or B).

In applying Dellinger and Leech's (2007) Validation Framework for mixed methods research, this study exemplifies several criteria of validity. In terms of the foundational element, the literature review adequately summarizes relevant research and aligns it with issues related to the Canadian PA guidelines and the PULSE program. In terms of traditional quantitative criteria, reliability estimates were calculated regarding the two quantitative measures. The qualitative elements of quality meet some of Tracy's (2010) "big tent" criteria, including worthy topic and significant contribution. Recognizing the gravity of health consequences related to inactivity, practical research that contributes to the development of actionable recommendations for public health meets the criteria of a worthy topic. Furthermore, the criteria of significant contribution is met since this paper directly links the current findings with the Canadian PA guidelines, thus increasing the potential for uptake and potential influence on population health behaviours. In terms of the mixed methods-related criteria emphasized by Dellinger and Leech, the requirement of weakness minimization legitimation is met. This criterion refers to "the extent to which the weakness from one approach can be compensated by the strengths from the other approach" (Onwuegbuzie & Johnson, 2006, p. 58) and is achieved by the expansion on the complexity of the quantitative self-regulation findings within the qualitative narrative.

## Results

Descriptive statistics showed that PA levels increased from pre- to post-intensive phase of the program (See Table 1). The results of the t-test for PA showed a non-significant effect. However, due to the small sample size, observed power was calculated and was very low (.06) and therefore Cohen's d was calculated. The results revealed a small to moderate effect size (.29) for the change in PA levels from pre- to post-intensive phase of the program.

Table 1
*Descriptive Statistics for Physical Activity, Fitness, and Self-Regulation*

| Measure | Pre | | Post | |
|---|---|---|---|---|
| | M | SD | M | SD |
| Godin-Shephard Physical Activity | 48.52 | 19.73 | 54.09 | 19.19 |
| Self-Regulation | | | | |
| Elective Selection | 3.63 | 1.30 | 3.69 | 1.60 |
| Optimization | 4.79 | 1.27 | 4.54 | 1.56 |
| Compensation | 3.84 | 1.34 | 4.66 | 0.90 |

The descriptive statistics for the measure of self-regulation indicated that the Elective Selection subscale and the Compensation subscale both increased from pre to post-intensive phase of the program while Optimization slightly decreased (See Table 1). The dependent t-tests showed that only Compensation showed a significant increase from pre to post program ($t(12) = -2.171$, $p = .05$) with a large effect size (0.62). The results of the dependent t-test for Elective Selection was not significant but again the observed power for the analyses was also very low (0.07). Cohen's d showed that there was a moderate effect size for Elective Selection (0.33). The optimization also showed non-significance.

The results of the linear regression demonstrated that self-regulation accounted for a large portion of variance in PA levels at the post-intensive phase of the program. Although the model did not show significance due to insufficient power, the overall model indicated a large effect size ($R = .822$). It was found that scores on self-regulation accounted for 67% of the variance of post-intensive phase PA levels after controlling for pre-program PA levels.

In support of the quantitative findings the qualitative results indicated that the PULSE program helped the youth participate in physical activity more independently and helped them learn the skills needed to self-regulate their level of PA involvement. The findings from the overall study resulted in five major themes. In this article, we describe two of these themes that elaborate on program processes. The first theme describes how the youth found the program fun and motivating. The second theme relates to the process of how the program helped the youth maintain focus. Analyses for gender were not part of the current analysis as they did not inform the research questions. With regards to independent PA, the youth often expressed how, as a result of participating in the program, they felt prepared to do planned PA by themselves. As one youth shared: "Now I feel like I can go to the gym alone, without any help or anything. Now I can do my own thing without getting hurt" (P11). Another youth expressed having the same experience "It was good, like right now, if I went to the gym without this program I would have no idea what some of the machines do or how to use them. This gave me the knowledge to do it properly" (P4). Similarly, another youth stated "I definitely am capable of going and working out by myself. Just keeping focused on what I have to do" (P3).

One youth explained how it was the progression of the PULSE program that really enabled the participants to become more independent:

> Well a couple of months before the PULSE program began I just started, motivated by my dad a little bit to workout. So occasionally I'd work out with my dad, but it wasn't to the point of everyday or whatever I wanted, I'd have to try on my own. So I really didn't have the knowledge of working out, but just this time with you guys we'd start off working out together, and then we'd kind of gradually shift off to working out on our own, and now we have the memberships. I think now we're capable of working out on our own, and just gradually we got a lot more knowledge, took a lot out of the program. (P2)

Furthermore, the youth discussed how they learned the skills of problem solving with time management, goal setting, keeping a PA journal and how these tools all helped them to self-regulate their level of PA involvement. "It helped, because in the month of December when I stopped going, I just worked out at home, I did about 30 minutes of exercise on a nightly basis" (P1). In the same way. Another youth shared the following regarding tracking progress:

> I go to the gym at least four times a week with my brothers. I just love being in the gym and I love being active. So that's why I'll keep going all the time…it (PULSE) helped me because now, lately I write my own program I bring like the way you guys taught us to use the sheet and write the weights and then go through each week and see if I can add weight. So I use a lot of the stuff that you guys taught us at the PULSE program. (P6)

Finally, another youth elaborated on learning how to set goals and how this has helped him be more consistent and purposeful in his PA:

> More knowledge on what I have to do. Like, before I work out 'cuz I know it's right to work out and now I will have a reason to work out. Now I set my goal and I have to try to reach it every month or every week, so that's the knowledge I take from your program. Before there was no purpose, I just work out because I know it was right to do but now when I come out of the program I know that it is right to do and I know why I'm working out. (P16)

## Discussion

The Canadian PA guidelines are the most widely viewed, utilized, referenced, and implemented public health messages for PA in Canada, and should be developed and evaluated as such, with rigour, close evaluation, and revision based on emerging consensus. Current supplements such as "Tips to Get Active" do include recommendations directed to adolescents, even suggesting that adolescents set PA goals with friends and family. However, without appropriate guidance and resources directed to parents, teachers, and community youth workers that outline appropriate methods to assist youth in developing self-regulation skills related to PA, there is a possibility that the current guidelines will not help youth transition to become independently active adults.

The PULSE program represents only one of many potential alternative interventions that can enhance self-regulatory skills needed for youth to maintain participation in PA. PA levels increased and showed a small to moderate effect size. In the analyses on the SOC measure of self-regulation, there was a significant increase in compensation and the effect size for elective selection was moderate. The changes in self-regulation accounted for a large portion of variance

in post-intensive phase PA levels even after controlling for pre-program PA levels. Furthermore, the qualitative results showed that the youth perceived the PULSE program as helping them develop the necessary skills to engage in PA independently and to self-regulate their PA. Similar programming can be developed where youth are given opportunities to participate in alternative forms of PA that *they* show interest in and can be supported through a process of increasing independence with the help of coaches, caregivers, community program leaders and teachers. This may include (but is not limited to) sport participation and competition, dance, outdoor PA activities like hiking, canoeing and active commuting. Programs can be tailored to local interests, geographical limitations, and to serve youth who are at higher risk of negative health and developmental outcomes. Future school-based programming should include the support of qualified health and physical educators to ensure alignment and continuity from both the curriculum and the existing opportunities for PA within particular schools or geographic areas. Programming can also improve upon the PULSE model by building more explicit links with the current PA curriculum and by furthering the curriculum through the design and delivery of extracurricular PA programs.

We also believe that even relatively minimal revisions to current PA guidelines may help to convey that adolescents are in a period of transition towards independence and provide ideas for developing self-regulation skills. We recommend the following changes to the current guidelines targeting youth. (1) Develop adjuncts to the guidelines that help youth understand how they can set PA goals, begin to plan PA into their schedules, optimize their progress towards goals, revise their goals, seek social support, and plan for inevitable barriers and relapses; (2) Extend work with partners in sport, physical education, and community recreation to ensure that youth are given the opportunity to be active and to be able to self-regulate as it relates to their chosen sport or activities; (3) Target adolescents through secondary schools, universities, colleges, and workplaces so that resources that promote the development of self-regulation for PA are widespread and easily accessible for adolescents; (4) Place a stronger emphasis on the fact that adolescence is a transitional time and that parents and caregivers can encourage or work with adolescents to "Pick a time. Pick a place. Make a plan, and move more!" (Canadian Society for Exercise Physiology, 2010, p.9); and (5) Emphasize that adolescents can take the initiative themselves, or that they can seek the help of their friends, teachers, coaches, and family members to help them work towards their PA goals.

In reviewing the findings from the PULSE program research, we realized that one of the implications of the work included the potential for revisions to the PA guidelines for adolescents. However, this study is limited in that we did not directly survey or interview youth regarding the PA guidelines themselves. Future research should directly examine youth perceptions about the utility of the adolescent PA guidelines in relation to the ultimate goal of the guidelines, to help them be active independently with the assistance of supportive adults. Future research should also examine gender differences in terms of change in PA levels and self-regulation and perception regarding their experiences and implications for the PA guidelines.

Since the researchers who implemented the program were also responsible for administering the surveys and interviews, this study may have been affected by participant biases (social desirability, expectancy). Finally, the current findings were derived from a small sample size as the research was designed to pilot the PULSE program model that was based on similar work in the promotion of adolescent PA (Barker & Forneris, 2011).

## Conclusion

In closing, the Canadian PA guidelines and worldwide efforts for standardized recommendations for healthy levels of PA are crucial, but the potential for adolescents to take responsibility for their own PA levels may warrant a revision of the current Canadian guidelines and additional efforts. Given the proper resources, adolescents may be able to self-regulate their level of PA involvement more effectively. In the absence of formal programming, tailored resources for adolescents, caregivers, community leaders and teachers are necessary and desirable adjuncts to the current resources. These recommendations may be an appropriate first step in helping youth become independently active and for the self-regulation of their level of PA as they approach and enter adulthood. Their ongoing involvement in PA may also contribute to the physical and mental health of our nation and future generations.

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