2023, Volume 3 (Issue 1): 10

OPEN ACCESS

Implementation of a Triathlon Program for Primary School Students as Part of Health and Physical Education

Case Study

Stuart Evans[1]

[1]*La Trobe University, Melbourne, VIC, Australia*

Open Access

Published: October 15, 2023

Research Directs in Health Sciences: *2023, Volume 3 (Issue 1): 10*

ISSN: 2768-492X

Abstract

Introduction: The significance of triathlon is reflected in the teaching and development of motor, social and emotional skills. Because triathlon has great educational potential, this case study sought to explore whether a modified Physical Activity Enjoyment Scale (PACES) survey can be used as a suitable measure of enjoyment of physical activity in elementary school children when applied to a sports-specific task such as triathlon.

Methods: The sample consisted of 12 female elementary school students (10.3 ± 1.3 years) from an inner-city high school. A modified triathlon program was delivered for one hour per week over a four-week duration with a modified PACES survey distributed each week. Survey responses were coded and then averaged over the four-week duration with the children's responses subsequently analyzed using a Wilcoxon Signed Ranks Test to examine differences in the coded characteristic response scores of the survey. Further comparisons were made using a Student's t-test and a coefficient of variation (CV).

Results: A greater sense of pleasure and fun was reported by the participants at the conclusion of the four-week triathlon program while there was no change in the children's sense of excitement ($p < 0.5$). Characteristic responses to 'neutral' decreased with a simultaneous increase in the 'slightly enjoyed' response when viewed over the four-week duration of the program ($p < 0.001$)

Conclusions: This PACES case study was designed as a feasible, simple, and innovative approach to monitor enjoyment levels in elementary school children who participated in a triathlon program. Overall, the positive enjoyment reported from this simple, low-cost intervention could be used to inform the development of future sport-specific elementary school programs.

Key Words: Triathlon. Elementary School. Physical Activity Enjoyment Scale

Corresponding author: Dr Stuart Evans. Stuart.Evans@latrobe.edu.au

Introduction

Triathlon is multidisciplinary sport that consists of swimming, cycling, and running that is completed sequentially within the same event. The number of participants in triathlons has increased significantly over the last decade (there are more than four million triathletes globally)[1,2]. As triathlon is a multidisciplinary and endurance-based sport, a base level of physical fitness is required to complete all three activities.

Physical fitness is a multicomponent construct that is closely related to the ability to perform physical activity[3]. In children, well-being through physical activity is associated with play, particularly play in nature, with elementary school classes being a unique opportunity in advocating the benefits of physical activity. According to behavioral maintenance theories[4,5], enjoyment of physical activity is a key motivational lever for physical activity maintenance. The Australian Curriculum: Health and Physical Education (HPE) aims to develop the knowledge, understanding and skills to enable students to access, evaluate and synthesize information to take positive action to protect, for their own and others' health, wellbeing, safety, and physical activity participation across their lifespan[6]. Additionally, the HPE curriculum aims to assist students to acquire, apply and evaluate movement skills, concepts, and strategies to respond confidently, competently, and creatively in a variety of physical activity contexts and settings. Such skills and strategies can be applied to triathlon.

TRYstars is Triathlon Australia's national junior participation program for 7–12-year-olds. The TRYstars Schools program is delivered in partnership with the Australian Government and the Australian Sports Commission under the Sporting Schools initiative. TRYstars is commonly delivered in schools with a modified four session program that exposes elementary school children to the basic (fundamental) movement skills and the fundamentals of triathlon through game-based activities. Exercise and sport science research links physical activity enjoyment with physical activity adoption and maintenance, among other positive health behaviors. However, public health researchers rarely measure enjoyment or discuss its role in interventions in elementary school children. When children enjoy an activity, they commonly want to repeat it. Practicing a skill — whether swimming, cycling, or running, can help improve fundamental movement skills and build confidence. Thus, enjoyment of physical activity has a positive affective state bought about by engaging in the behavior itself[7] or as an optimal psychological state that leads one to perform an activity primarily for its own sake[8]. Therefore, children's perception of enjoyment within the physical educative experience is likely to be a significant factor in determining the level of participation. Kendzierski and DeCarlo[9] designed the Physical Activity Enjoyment Scale (PACES) as a single factor, multiple-item scale to assess enjoyment of physical activity in adults across exercise modalities. In their work, the PACES demonstrated acceptable internal consistency and test-retest reliability. Despite the emerging support for the use of the PACES in adolescents, there remains sparse evidence for its use in children younger than 12 years of age[10]. The age 6 through 12 is an important developmental time in which children develop complex cognitive skills such as the ability to use personal experiences to make decisions[11] and rely on mental cues to understand emotions[12]. To determine whether enjoyment with physical activity changes over a brief time interval, it is essential to have reliable measures that meaningfully capture these constructs. Therefore, the purpose of this case study is to explore elementary school children's enjoyment of a four-week triathlon program using a modified PACES survey.

Scientific Methods

Participants

This case study focused on the perspectives and experiences of 12 female elementary school children (10.3 ± 1.3 years, 0.9 ± 0.6 months experience in triathlon) from an inner-city high school located in Melbourne, Australia. The students self-reported their age, race/ethnicity, and any chronic conditions (e.g., asthma). The children were excluded from the study if they had any injury (acute or chronic) or illness that prevented them from participating. The children were informed that they could withdraw from the study at any time. Parents were given the option of opting their child out of the study. All students were in physically good condition and reported no injuries or pain. The children self-reported at least one extra-curricular activity that included swimming, athletics, tennis, rowing, diving, gymnastics, and dance on at least one occasion during the standard school week and each weekend. All components of research, including the TRYstars procedures, methods for obtaining parental consent, pre-exercise screening and risk mitigation were approved by the Institutional Review Board (H23027). Informed parental consent was obtained prior to the triathlon program's commencement. To be included in the program, the children must have been able to swim 25 meters in a swimming pool unaided and demonstrated cycling proficiency when cycling without the use of training wheels (e.g., stabilizers). In-line with the TRYstars triathlon program for schools, all physical activity was based on movement exploration, that is – exposure to a variety of movement sequences and the acquisition of fundamental movement skills in locomotion, balance, coordination and agility through informal play, practice, and game play scenarios via both triathlon-specific and non-triathlon activities.

Program design

The TRYstars program was delivered by one Triathlon Australia accredited deliverer (a registered coach). Here, the coach focused on fundamental movement skills, that is – balance, agility, coordination, speed, running, jumping, and water skills such as buoyancy. The school program was adapted to four one-hour game-based sessions that included

swimming, cycling, and running activities (Table 1). Additionally, two HPE teachers from the school attended all the sessions along with the principal researcher. The children completed the four programs under similar environmental conditions (17–18 °C, 45–55% relative humidity). In all sessions the children wore a loose-fitting t-shirt or singlet combined with either short or sweat (tracksuit) pants or a triathlon 'suit'. The children were intentionally sampled (via PACES) at the end of each session (i.e., four times in total).

Table 1. Outline of four-week program schedule. Where T1 represents the time where the first PACES-8 survey was distributed and T4 represents when the final PACES-8 survey was distributed.

	Focus/Activity	Survey distribution
Week 1	Swim, cycle, run, games	T1
Week 2	Swim, cycle, run, games	T2
Week 3	Swim, cycle, run, games	T3
Week 4	Mini triathlon	T4

Enjoyment of physical activity in a triathlon (TRYstars) context

Adapted versions of the PACES-18 have been assessed for invariance among children and adolescents[13]. However, a modified version, PACES-8, consists of eight items and asks participants to rate how they feel at the moment that physical activity performed[14]. Thus, the PACES-8 was subsequently selected for use in this case study as it was deemed more appropriate for children. Responses to the PACES-8 were indicated on a 7-point scale and included choices such as "I find it pleasurable/I find it unpleasurable." (Table 2). Six items were reverse-coded such that higher scores on the PACES-8 indicated more enjoyment[15]. The PACES-8 survey was then specified and coded such that all items were indicators of enjoyment with error covariances set to be 0, and enjoyment scaled to the first item (i.e., "Pleasurable") on a 7-point scale (from 7 being 'Pleasurable' to 0 being "I find it unpleasurable"). After clicking "I agree" to an online consent form, the children, with assistance from their teachers, completed the first survey at time period one (T1) immediately after the first triathlon program and then for all weeks therein (T2, T3, T4). Data collection occurred from February to March 2023. The online survey remained open for one hour after the conclusion of each program to allow sufficient completion time and to ensure that responses were as true as possible.

Statistical Analysis

All data were analyzed using the Analyse-it statistical package (Leeds, United Kingdom, version 4.92). First, data were screened for out-of-range values, missing data, and distributional anomalies. As the PACES-8 measures utilize Likert-type responses (i.e., a satisfaction scale), outliers were not considered an issue. There was no evidence of demographic differences given that the children were predominantly similar. Due to the small sample size, non-parametric analysis was conducted for the four weeks of the triathlon program. A Wilcoxon Signed Ranks Test was applied to examine differences in the coded characteristic response scores of the PACES-8 survey. An effect size standardized parameter for assessing and interpreting changes in the children's responses was also used. The effect size (d) was based on the following values: small effect d = 0.20, medium effect d = 0.50 and large effect d = 0.80[16]. Finally, to assess the coded response characteristics between 'I find it pleasurable' (response 1) and 'I find it very unrefreshing' (response 7) as well as variations to the 'neutral' response (response 4), further comparisons by way of paired Student's *t*-tests and a coefficient of variation (CV) were used. The alpha level was set at 0.05.

Results

A total of 12 female primary school children took part in the study. Of these, all children completed the swimming, cycling, and running segments of the program over the four-week duration.

PACES Scale Modification

For the present case report, it was a concern that the wording of some items in the PACES-8 survey might be too advanced for the children to comprehend. Therefore, to improve the readability of the PACES-8, an English (language and literacy) teacher assisted in reviewing the PACES-8 wording. Based on the teacher's input, two modifications were deemed necessary. For the final PACES-8 version used in this study, the word 'gratifying' was replaced with 'enjoyable', and 'exhilarating' was replaced with 'exciting'. No other changes were deemed necessary.

Significant differences in response characteristics from weeks 1 to 4 in the PACES-8 survey were observed (Table 3). The first three items of the PACES-8 are phrased such that they elicit opinions of the physical activity experience itself (e.g., finding triathlon fun or pleasurable), whereas the remainder of the items are phrased such that the children may reflect upon their positive affect after participation (e.g., feeling invigorated or stimulated). A greater sense of pleasure

Table 2. Physical Activity Enjoyment Scale-8 (items 1 to 8)

Question number	Response 1	Response 2	Response 3	Response 4	Response 5	Response 6	Response 7
1	I find it pleasurable	I find it mostly pleasurable	I find it slightly pleasurable	Neutral	I find it slightly unpleasurable	I find it mostly unpleasurable	I find it unpleasurable
2	It's no fun at all	It's mostly no fun	It's slightly no fun	Neutral	It's slightly fun	It's mostly fun	It's a lot of fun
3	It's very pleasant	It's mostly pleasant	It's slightly pleasant	Neutral	It's slightly unpleasant	It's mostly unpleasant	It's very unpleasant
4	It's very invigorating	It's mostly invigorating	It's slightly invigorating	Neutral	It's slightly not invigorating	It's mostly not invigorating	It's not at all invigorating
5	It's very gratifying	It's mostly gratifying	It's slightly gratifying	Neutral	It's slightly not gratifying	It's mostly not gratifying	It's very gratifying
6	It's very exhilarating	It's mostly exhilarating	It's slightly exhilarating	Neutral	It's slightly not exhilarating	It's mostly not exhilarating	It's not at all exhilarating
7	It's not at all stimulating	It's mostly not stimulating	It's slightly not stimulating	Neutral	It's slightly stimulating	It's mostly stimulating	It's very stimulating
8	It's very refreshing	It's mostly refreshing	It's slightly refreshing	Neutral	It's slightly not refreshing	It's mostly not refreshing	It's very unrefreshing

Please rate how you feel at the moment about the physical activity you have been doing.

and fun were reported by the children at the conclusion of the triathlon program while there was no change in the participants' sense of excitement ($p < 0.5$).

Table 3. Mean ± SD change in the Physical Activity Enjoyment Scale-8 (items 1 to 8) (PACES-8) at T_1 and T_4. *Significant at 0.05

Item No.	Item	First measurement occasion: week 1		Fourth measurement occasion: week 4		Total
		(T_1)		(T4)		
		Mean	SD	Mean	SD	*P*
	PACES-8					
1	Pleasurable	2.6	1.5	4.0	0.1	$p = 0.02$*
2	Fun	3.2	1.4	4.0	2.0	$p = 0.01$*
3	Pleasant	4.0	1.4	5.0	1.4	$p = 0.19$
4	Invigorating	2.0	0.1	5.0	1.4	$p = 0.37$
5	Gratifying (enjoyable)	1.5	0.7	2.3	2.8	$p = 0.03$*
6	Exhilarating (exciting)	2.6	0.5	3.6	0.6	$p = 0.81$
7	Stimulating	3.0	2.1	3.6	1.0	$p = 0.51$
8	Refreshing	3.3	3.3	3.66	1.5	$p = 0.98$

Results suggest that the children believed the triathlon program to be more 'pleasurable' compared to 'finding it very unrefreshing' when the mean responses were analyzed from weeks 1 to 4. Additionally, the measure of variability, that is the coefficient of variation, between the children's characteristic responses to 'pleasurable' and 'unfreshing' decreased by week 4.

Table 4. Response comparison between 'I find it pleasurable' and 'I find it very unrefreshing' in the PACES during weeks 1 through 4. SE = Standard Error; CV = coefficient of variation. * Significant at $p < 0.05$

Mean change in response: unrefreshing to pleasurable			Mean change in response: unrefreshing to pleasurable			Cohen's *d*	*p*
Weeks 1-2			Weeks 3-4			Total	
(T_1)			(T_2)				
Mean	SE	CV	Mean	SE	CV		
2.98	0.19	18.2	3.68	0.23	16.2	0.61 (medium effect)	0.03*

Finally, results from the characteristic responses to PACES-8 by the children's 'neutral' (response 4) and 'slightly' (response 3) answers showed minimal changes after two weeks of the triathlon program. However, from week 3 of the triathlon program, responses to 'neutral' significantly decreased with a simultaneous increase in 'slightly' (Figure 1).

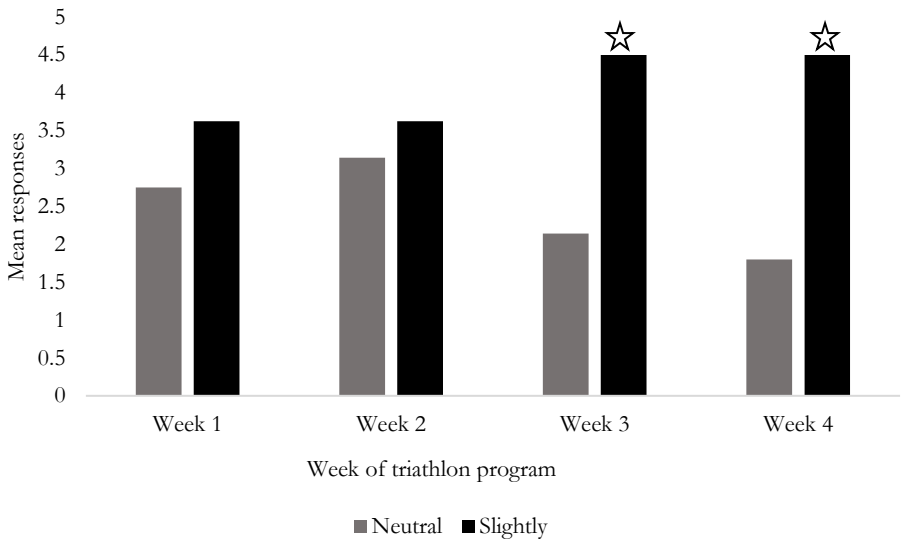

Figure 1. Distribution of responses for neutral (response 4) to slightly (response 3) of PACES-8. ☆Significant at $p < 0.05$

Discussion

The purpose of this study was to explore elementary school students' enjoyment of a triathlon program using a modified Physical Activity Enjoyment Scale (PACES) survey. In the current study, an elementary sports-specific triathlon program of 4-week duration was used to measure enjoyment in female primary school children (aged <13 years). Past research has explicitly highlighted the need for the development of a new approach to the measurement of enjoyment within the physical activity literature[17]. To address this need, the PACES-8 measurement instrument was purposefully used with a small sample of elementary school children. The results of the present case report suggest that the PACES-8 demonstrated promising consistency as a measure to assess enjoyment related to a triathlon program in female elementary school children. The results revealed two major themes. The first theme, "I find it pleasurable" and "I find it fun" increased from the commencement of the triathlon program to its conclusion. The implication here is that both pleasure and fun increased the longer the program occurred. Though impossible to test in the present study, these results might suggest that the children increased confidence and self-belief in their ability to execute the movement skills needed. Improved foundational movement skill competence is thought to accompany increased physical activity[18]. Thus, we speculate that week 4 had greater overall 'pleasurable' responses due to the children's sense of self-efficacy of having completed a mini triathlon. This would practically explain the greater responses of 'exhilarating (exciting)' and 'stimulating' that were seen.

The second theme was the change of responses to 'neutral' to those responses prefixed with 'slightly', as the children seemingly based their answers upon activity familiarity. For example, as the swim, cycle, run and game playing activities became more familiar, the children's overall enjoyment increased. This difference might have ramifications for how sporting programs are initially introduced to children, but future work is needed to explore this possibility.

Designing and implementing a physical education program should ensure that it enables students to achieve the goals of becoming knowledgeable exercisers and skillful movers who value and adopt a physically active, healthy lifestyle. Though the PACES-8 demonstrated acceptable response properties in the present sample of elementary grade children there are several limitations to the present study which need to be noted. First, the sample size and the inclusion of female only children means that results from this study cannot be applied to mixed group of elementary school children. Second, although the present data was collected at four time points, longer longitudinal studies are warranted to explore the benefits of using a PACES-8 approach in young children. Additional administration would have allowed the examination of test-retest skill analysis in swimming, cycling, and running, which is missing from the present study. Finally, this case report was exploratory, and to the best of our knowledge, was the first attempt to investigate triathlon as a unique learning environment for elementary school children using the PACES-8 approach. Therefore, this report has both strengths and limitations, and therefore caution is advised when comparing the results with another research. Future studies are warranted to determine if the present findings are sample specific or indicative of a differential response pattern for other genders.

Conclusions

This PACES-8 case study was a feasible, simple, and innovative approach to monitor enjoyment levels in elementary school children who participated in a triathlon program. An increase in responses to "pleasurable" were found over the four-week program while a decrease in "neutral' responses by the children were observed. The positive enjoyment reported from this simple, low-cost intervention could be used to inform the development of future sport-specific elementary school programs.

Acknowledgements

The author declares that no competing interest exists. The author would also like to thank the participants along with the teachers and coach who kindly volunteered to be part of the study. The author would also like to express appreciation to Ms. L Marshall for providing editing, formatting, and examination of the paper as well as the data contained in this study.

References

1. Case R, Branch, J. Event marketing: An examination of selected demographic and psychographic data of participants competing in the World's foremost off-road triathlon event. *Int Sports J*. 2018;5(1).
2. Lepers R, Knechtle B, Stapley, P. Trends in triathlon performance: effects of sex and age. *Sports Med.* 2013; DOI:10.1007/s40279-013-0067-4.
3. Vukasevic V, Mitrovic M, Zivanovic N, Masanovic B. Comparative study of motor ability between basketball players from second leagues in Montenegro and Serbia. *J Anthropol Sport Phys Edu*. 2019; 3. DOI: 10.26773/jaspe.190103.
4. Kwasnicka D, Dombrowski S, White M, Sniehotta F. Theoretical explanations for maintenance of behaviour change: A systematic review of behaviour theories. *Health Psy Rev.* 2016;10(3).
5. Nigg C, Borrelli B, Maddock J, Dishman R. A theory of physical activity maintenance. *App Psych*. 2008; 7(4).
6. Victorian Curriculum & Assessment Authority. Accessed August 2 2023. https://victoriancurriculum.vcaa.vic.edu.au/health-and-physical-education/introduction
7. Wankel L. The importance of enjoyment to adherence and psychological benefits from physical activity. *Int J Sport Psych.* 1993;24.
8. Kimiecik J, Harris A. What is enjoyment? A conceptual/definitional analysis with implications for sport and exercise psychology. *J Sport Ex Psych*. 1996;18.
9. Kendzierski D, DeCarlo K. Physical activity enjoyment scale: two validation studies. *J Sport Ex Psych*. 1991;13(1).
10. Moore J, Yin Z, Hanes J, Duda J, Gutin B, Barbeau Paule. Measuring enjoyment of physical activity in children: validation of the physical activity enjoyment scale. 2009; J App Sport Psych,21(1). DOI: 10.1080/10413200802593612
11. Stone W, Lemanek, K. Developmental issues in children's self-reports. In: Harter S, La Greca A, eds. Through the eyes of a child. Allyn & Boston; 1990.
12. De Civita M, Regier D, Alamgir AH, Anis AH, FitzGerald MJ, Marra CA. Evaluating health-related quality-of-life studies in pediatric populations: some conceptual, methodological and developmental considerations and recent applications. *Pharmaco Economics.* 2005;23(7).
13. Dunton G, Tscherne J, Rodriguez D. Factorial validity and gender invariance of the physical activity enjoyment scale (PACES) in older adolescents. *Res Quart Ex Sport.* 2009; 80(1). DOI:10.1080/02701367.2009.10599543
14. Mullen S, Olson E, Phillips S, Szabo N, Wójcicki, T, Mailey E, Gothe N, Fanning J, Kramer A, McAuley E. Measuring e1njoyment of physical activity in older adults: Invariance of the physical activity enjoyment scale (paces) across groups and time. *Int J Beh Nutrition Phy Act*. 2011;8. DOI:10.1186/1479-5868-8-103
15. Huffman M, Christ S, Ferraro F, Klenosky B, Marceau K, Amireault S. Questions to measure enjoyment of and satisfaction with physical activity: are they appropriate for use in an older population? *Innov Aging.* 2021;4(5). DOI: 10.1093/geroni/igab041.
16. Cohen J. Statistical power analysis for the behavioral sciences. Academic Press; 1992.
17. Chmielewski M, Sala M, Tang R, Baldwin A. (2016). Examining the construct validity of affective judgments of physical activity measures. *Psych Assess*. 2016; 28(9).
18. Stodden D, Goodway J, Langendorfer J, Roberton M, Rudisill E, Garcia C, Garcia L. A developmental perspective on the role of motor skill competence in physical activity: An emergent relationship. *Quest;* 2008; 60(2).