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**Original Article**

# Effect of a three-month HOPSports Brain Breaks® intervention programme on the attitudes of Grade 6 learners towards physical activities and fitness in South Africa

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**Abstract**
Negative attitudes towards physical activity (PA) have been reported to have an influence on the PA levels of children and the choices they make to be physically active or not. Research indicated that children's PA levels are more prevalent to decline from the age of 12-years. The effect of a three-month HOPSports BrainBreak®interventionprogramme on children's attitudes towards PA and fitness have been investigated. Children between the ages of 11 to 12years' attitudes were assessed by means of the Attitudes towards Physical Activity Scale (APAS) questionnaire. The experimental group consisted of 75 children, (44 boys and 31 girls) with a mean age of 11.4 years (±0.54) and 39 children (12 boys and 27 girls) for the control group with a mean age of 11.71 years (± 0.49). Results indicated no significant differences between the two groups' attitudes towards PA and fitness with the pre-test. After the intervention programme there was a significant difference with a large effect size (d≥0.8), which includes the attitudes towards the benefits of PA (α = .70; d = 1.13), importance of PA (α = .65; d = 0.63), self-perception of physical fitness (α = .86; d = 0.77) and their attitudes towards support in the environment and their interest for PA (α = .83; d = 1.25). More focus should be placed on 12year old children and to create opportunities where children can be equally activebecause the decline in PA levels is more prevalent and their attitudes are more influential .
**Keywords:** Children, physical activity levels, barriers to physical activity, attitude, self-perception, Brain Breaks

## Introduction

The problem of physical inactivity does indeed exist; not only in the rest of the world (Belton, O'Brien, Meegan, Woods & Issartel, 2014; Robbins, Pfeiffer, Wesolek & Lo, 2014; Lindelof, Nielsen & Pedersen,2012; Okely, Booth & Chey,2004), but also in South Africa where it has been indicated that South African children are not sufficiently active (Monyeki, 2014). Although the Healthy Active Kids South Africa (HAKSA) report card studied the health status in children and reported that South African children's overall physical activity (PA) levels had improved from a D-grade in 2014 to a C-grade in 2016 (Uys et al., 2016a; HAKSA, 2014), it was reported that more than half of the indicators had not improved from 2014 (Uys et al., 2016a). Furthermore, Uys et al. (2016a) graded physical fitness and motor proficiency separately, and graded each with a D. Physical fitness and PA play important roles in a child's life and can be ascribed that physical fitness is an important measure of the performance of PA (Ortega, Ruiz, Castillo & Sjöström, 2008) whereas PA is an important contributor to a healthy lifestyle and leads to many benefits (Centers of Disease Control [CDC], 2015; Monyeki, 2014; Malina, 2012; Du Toit, Pienaar & Truter 2011; Walter, 2011), which have been well-documented in the literature.

Various researchers concur that children's PA levels tend to reach a peak at age 12- to 14-years, and then start to decline (Cozett, 2014;Dentro et al.,2014; Malina, 2012). Participation in PA decreases with age, where 42% of 6- to 11-year-old children meet the daily recommendation in comparison to only 24.8% of children aged 12- to 15-years. This decline is more prevalent in 13-year-old girls (19%) than boys (34%) (Cozett, 2014; Dentro et al.,2014; American College of Sport Medicine [ACSM], 2011). Several factors have been identified thatinfluence PA levels, such as: a sedentary lifestyle, not enough time, weather, lack of equipment, insufficient skills, lack of interest and safety (Martin, Ameluxen-Coleman & Heinrichs 2015;Zhang, Thomas & Weiller 2015; Finn&McInnis,2014; Hornby-Turner, Hampshire & Pollard, 2014; Monyeki,2014; Shirinde, Monyeki, Pienaar & Toriola, 2012). Accordingly, sedentary activities, which include screen-based activities and video games, have increased among children, which results in less time to be physically active (Martinetal., 2015;Finn


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& McInnis, 2014; Monyeki, 2014;Warburton, 2013). Moreover, Hornby -Turner et al.(2014) add that fear of playing outside because of the unsafe environment and busy streets was another barrier to be physically active. In addition, these researchers conclude that physical fitness, sport and motor skills contribute to children's participation in PA (Zhang et al.,2015; Niven, Fawkner, Knowles & Stephenson, 2007) and also have an effect on children's confidence in their skills (Humbert et al.,2006). Woods, Tannehill, Quinlan, Moyna and Walsh(2010) found that 10- to 12-year-old girls (15%) and boys (20%) indicated that they did not participate in sport because they did not have enough time. Additionally, being made fun of, not being included or being picked last as well as PA being fun, influence children to be physically active (Humbert et al., 2006). Other barriers such as previous PA experiences as well as their motor abilities have been reported to have an effect on children's attitudes and perceptions,and according to various researchers this could determine whether they will be physically active or not (Belton et al., 2014; Lindelof et al.,2012; Shirinde et al., 2012).

Research by Mok et al. (2015) defines attitude as a measure of behavioural change that has the ability to either encourage or discourage children. Accordingly, Merriam-Webster (Merriam-Webster, 2015) defines attitude as a way someone feels or thinks that has the ability to affect their behaviour. Perception, on the other hand, can be defined as how you learn to understand or notice things by using your senses (Perception, 2015), or according to Oxford dictionary (Perception, 2016) how things are interpreted. Previous research indicates that PA is related to self-perception, which contributes to a person's self-esteem, while attitude is how someone feels or thinks about PA (Fairclough, Boddy, Ridgers & Stratton, 2012; Niven et al., 2007). Mok et al.(2015) concur and state that the way children feel about PA will have an effect on whether or not they will be physically active. Additionally, a study by Finn and McInnis (2014) on Grade 5 and Grade 6 learners indicated that one of the reasons why PA levels decline is because children have negative perceptions towards PA.

Belton et al. (2014) and Tsang, Kohn, Chow and Singh (2013) indicated that low PA levels are associated with low perceptions of and negative attitudes towards PA. A study by Bryan and Solmon (2012) scrutinised the effect perception and attitudes have on children's motivation to participate in physical education (PE) and PA. They found that there was a noticeable decline from Grade 6 to Grade 8 learners, and this was determined by the amount of steps the children took during PE lessons. Previous research indicated that children aged 11- to 15-years are more vulnerable and are more likely to have negative perceptions (Inchley, Kirby & Currie, 2011). Lazarević, Orlić, Lazarević and Janić (2015) studied Grade 6 and Grade 7 learners' attitudes towards PE, and concluded that boys tend to have a more positive attitude than girls and that these positive attitudes have the tendency to decline as children get older. Seabra et al.(2013) and **Fairclough et al. (2012) furthermore** studied the effect gender, weight and socio-economic status (SES) have on attitudes towards PA, and concluded that overweight and obese children tend to have lower perceptions of PA and also that boys and high SES children enjoy being physically active in comparison to girls, overweight and low SES children. Moreover, Kemp and Pienaar (2010) indicate that boys have higher athletic perceptions whereas girls have higher academic and behaviour perceptions, as well as that overweight and obese children's perceptions of athletics are lower when compared to their normal weight peers.

A few studies have been published regarding the effect of attitudes towards PA, but little research has been done to study the effect of intervention programmes on attitudes towards PA in 12-year-old children. Lwin and Malik (2012) studied the effect of exergaming on the attitude towards PA of 10-year-old children and pre-adolescents aged 12-years, and concluded that children's attitudes towards PA as well as their intention to exercise improved when they were exposed to exergaming. However, the 12-year-old children's attitudes improved to a lesser extent. Recently, Lwin et al.(2016) studied the effect exergaming and health education messages have on attitudes towards PA of children and adolescents aged 8 to 17years, and indicated that the younger children were more positive when they participated in exergaming in comparison to the group who continued with normal PE lessons. The adolescents from junior high school showed no improvement in attitudes in either the competitive or non-competitive group (Lwin et al., 2016). In South Africa, Uys et al.(2016b) investigated what effect the Health Kick school-based intervention programme has on Grade 4 to Grade 6 learners, and found that the intervention programmes had no effect on children's fitness levels or attitudes; however, core strength and short-term PA participation increased.

Although limited research has been done on the effect of HOPSports Brain Breaks® on attitudes towards PA, this web-based physical activity videoprogramme can be used as an instant resource before and after school, during break, PE lessons as well as in classrooms. This programme focuses not only on improving the PA levels but also on other key components, such as assisting children to learn and master new skills, motivation, knowledge and self-confidence (Fitness-gaming; 2015; Mok et al., 2015; Uzunoz, Chin, Mok, Edginton & Podnar, 2017). A recent study by Mok (2016) investigated the effect of HOPSports Brain Breaks® on attitudes towards PA and found that children's attitudes towards PA improved. Accordingly, Uzunoz et al. (2017) studied the effect of HOPSports Brain Breaks® on 300 Grade 3 to Grade 5 learners' attitudes towards PA and found that it had a positive effect on the experimental group's perception, attitude, motivation and academic performance.

The literature indicates that limited research has been done on the attitudes of Grade 6learners towards PA and fitness, as well as on intervention programmes to address negative attitudes. Therefore, the purpose of this study was to determine whether a HOPSports Brain Breaks® intervention programme will improve the attitudes towards physical fitness and PA of Grade 6learners.

**Methods**

*Study design*

This study comprisesaconveniencesamplewithaonce-offcross-sectionaldesign,andapre-andpost-test.

*Participants*

For the focus of this study, namely the effect of HOPSports Brain Breaks®intervention programme, 114 Grade 6 learners (boys n=56; girls n=58), aged 11 to 12 years were the target population. A convenient sample of three primary schools was identified from similar socio-economic backgrounds. The one school functioned as the experimental group (44 boys and 31 girls), while the second and third schools functioned as the control group (12 boys and 27 girls).

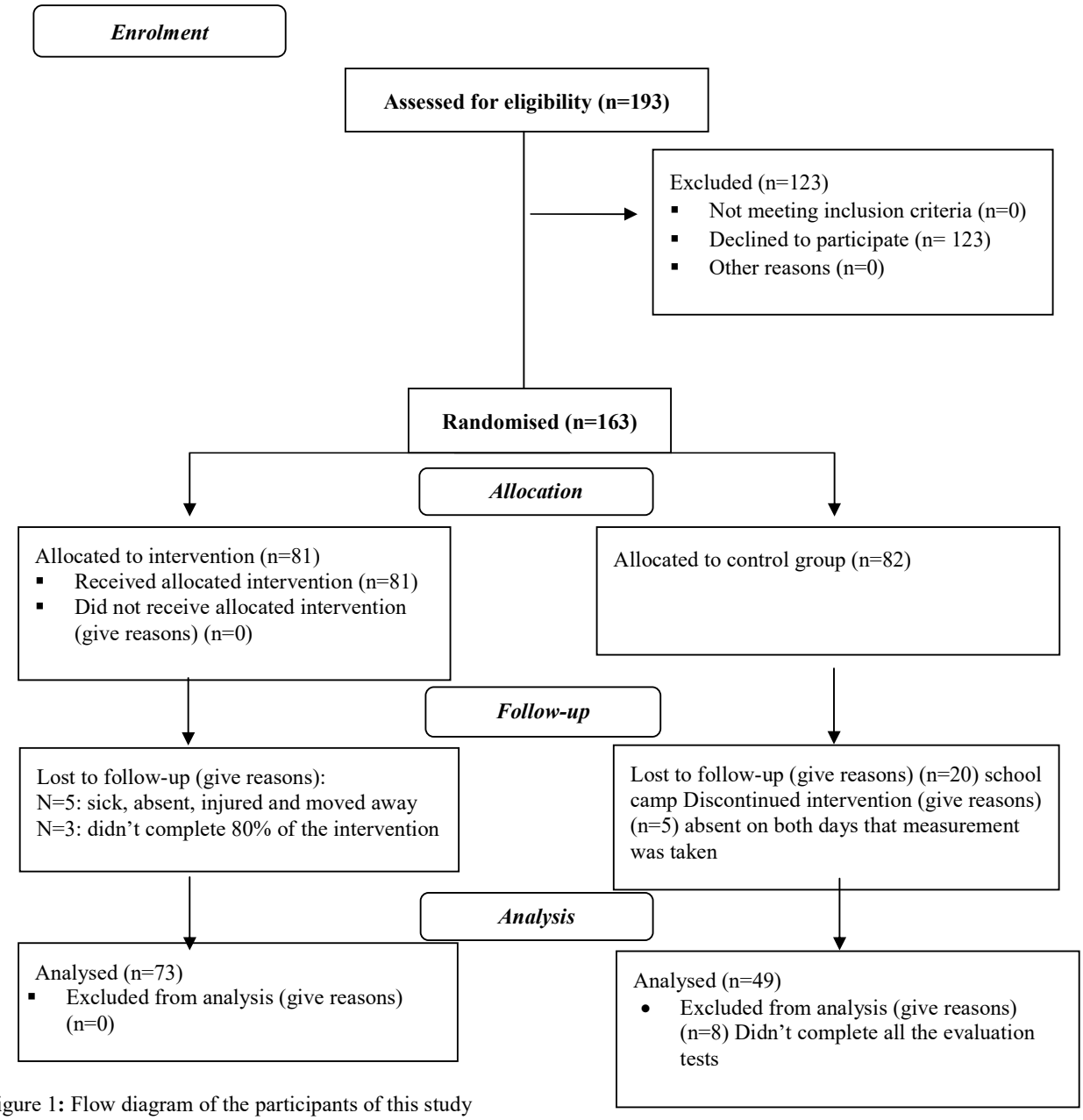


Figure 1**:** Flow diagram of the participants of this study

**Table 1.**Total participants in the control and experimental groups

| **Participants** | **Control group** | **Experimental group** |
|---|---|---|
| **Boys** | 12 | 44 |
| **Girls** | 27 | 31 |
| **Total** | **39** | **75** |

*Intervention*

A three-month HOPSports Brain Breaks ® intervention programme was done once a day for three consecutive months. The researchers worked closely with the teachers to choose the videos. The teachers received training on how to choose different videos and to present the programme. The HOPSports Brain Breaks® intervention programme was presented within the frame work for PE provided in the CAPS(DBE,2011). The programme focused, among others, on strength, speed, hand-eye and foot-eye coordination, agility and spatial awareness (BrainBreaks,2017). For this intervention programme the experimental school had access to the internet to view the online videos. The participants engaged in PA using the online video programmes, which should help to improve physical fitness and reduce inactivity. The HOPSports Brain Breaks® video programme was presented every day during school time in their classrooms for 5 to 10 minutes during the intervention programme. The online video programme has more than 250 videos from which they could choose. The content of the videos includes knowledge about health and training, nutrition, education of social skills, environmental education, dance and fitness (Brain Breaks,2017; Tumynaitėet al.,2014). The experimental school received login details and a password to use for the online video programme to present the intervention. The control groups did not have access to any of the videos. Both groups also participated in their normal PE lessons once a week during school hours.

*Procedure*

A formal meeting was arranged with the respective school principals, where the aim of this protocol and study was explained to obtain consent. Letters explaining the aim and protocol of this study were sent to all the Grade 6 learners'parents or legal guardians to obtain informed consent from the parents. All learners whose parents/legal guardians had responded favourably to the consent forms also had to provide assent before taking part in any measurements. Their participation was entirely voluntary, and they could withdraw from the study at any given point. Children whose parents gave consent were expected to complete a questionnaire before and after the intervention programme to determine their attitudes towards PA, and these were done during school time in their classrooms. The questionnaire consisted of 50 questions.The pre-test was done in March and the post-test in June.

*Questionnaire: Attitude towards Physical Activity Scale (APAS)*

This self-report questionnaire was developed by Moketal.(2015) based on Welk's (1999) Youth Physical Activity Promotion (YPAP) model, which is a valid and reliable questionnaire to measure primary schoolchildren's attitudes towards, perceptions of and beliefs about various aspects of engagement of PA, with the focus on PA using videogames. This questionnaire consists of seven scales. The first section comprises 10 questions, which require the participants to indicate their attitudes towards the benefits of PA. The second section comprises five questions that require the participants to indicate their attitudes towards the importance of PA. Section 3 comprises 11 questions, where the participants have to indicate the contributions of video exercise towards learning in school subjects and about health, where as Section 4 comprises four questions, where the participants have to indicate their self-efficacy in using video exercises for PA. Section 5 comprises 14 questions, where the participants have to indicate their attitudes towards support in the environment and interest for PA. Section 6 comprises eight questions, which require participants to indicate their self-perception of physical fitness. Lastly, Section 7 comprises five questions, which require the participants to indicate their personal best goal orientation in PA. The participants have to indicate by choosing only one answer for each question from a four-point Likert scale as follows :1=strongly disagree, 2=disagree, 3=agree and 4=strongly agree. This questionnaire indicates good validity and reliability, according to the Raschmodel, ranging from 0.90 to 0.98 and Cronbach's alpha ranging from 0.629 to 0.837 (Mok et al.,2015).

*Ethical consideration*

Ethical approval was obtained for this study which forms part of the Health Research Ethics Committee of the Faculty of Health Sciences of the North-West University (NWU-00003-14-A1). Permission was also obtained from the respective schools as well as the Department of Education. Informed consent was obtained from the parents/legal guardians of the Grade 6 learners before participating in the study. A discussion was held to discuss the purpose of this study, as well as to explain what was expected from each learner whose parent(s) gave consent to participate in this study. Each learner also had to give assent before they could take part in this study.

*Statistical analysis*

In order to process the data, SPSS for Windows (2016) was used. Descriptive statistics including minimum and maximum values, means(m) and standard deviation (SD) of each test variable were calculated (SPSS,2016). Secondly, to estimate the reliability for the different sections of the APAS questionnaire, the internal consistency was determined by means of Cronbach's alpha as well as the inter-item correlation between the individualised items in each section. The analysis of the inter-item correlation is provided in Table 3 as determined by the inter-item correlation range discussed by Clark and Watson (1995) and should be between 0.15 and 0.55. Lastly, independent t-testing and effect sizes were used to determine the objective of this study, whether participation in a three- month HOPSports Brain Breaks ® intervention programme will increase the physical activity levels of Grade 6 learners. The critical level of statistical significance was set at $p \leq 0.05$, and to determine practical

significance these guidelines were used:d≥0.2 (small effect), d≥0.5 (medium effect) and d≥0.8 (large effect) (Cohen, 1988).

**Results**

The descriptive characteristics of the variables between the different groups that were used in this study are displayed in Table 2. Table 2 indicates that 46 participants (61.3%) of the experimental group were 11yearsold and 27 participants (36.0%) were 12years old. In the control group, 10 participants (25.6%) indicated they were 11years old and 29 participants (74.4%) were 12years old. Overall, the experimental group had a mean age of 11.4 years (±0.54) and the control group a mean age of 11.71 years (± 0.49).

**Table 2.**Descriptive statistics of study variables.

| **Variables** | **Experimental group** | | | | **Total** | **Control group** | | | | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Age** | **10** | **11** | **12** | **13** | | **10** | **11** | **12** | **13** | |
| **N** | 1 | 46 | 27 | 1 | **75** | 0 | 10 | 29 | 0 | **39** |
| **% within group** | 1.3% | 61.3 % | 36.0% | 1.3% | **100%** | 0% | 25.6% | 74.4% | 0% | **100%** |
| **Mean and SD** | **11.4 ± 0.54** | | | | | **11.71 ± 0.49** | | | | |

Note: N = number, % = percentage, SD = Standard deviation

Table 3 indicates that the following sections of the APAS questionnaire had an acceptable internal consistency (α ≥ 0.70): attitudes towards the benefits of PA; contributions of video exercise to learning in school subjects and about health; self-efficacy in using video exercises for PA; attitudes towards support in the environment and interest in PA; self-perception of physical fitness; personal best goal orientation in PA. However, Section 2 (attitudes towards the importance of PA) indicates α ≤ 0.70 which could be due to the low number of questions in this section. Furthermore, the inter-item correlation for the following sections falls between 0.15 and 0.55, a range which indicates an average correlation: attitudes towards the benefits of PA; attitudes towards the importance of PA; attitudes towards support in the environment and interest for PA, self-perception of physical fitness; personal best goal orientation in PA, whereas Section 3 (contributions of video exercise to learning in school subjects and about health ) and Section 4 (self-efficacy in using video exercises for PA) indicated a large inter-item correlation (Clark & Watson, 1995).

**Table 3.**Inter-item correlation between the variables of the APAS questionnaire.

| **Sections of the questionnaire** | **N of items** | **Mean inter-item correlation** | **Cronbach's alpha** |
|---|---|---|---|
| 1. Attitudes towards the benefits of PA | 10 | .18** | .70# |
| 2. Attitudes towards the importance of PA | 5 | .29** | .65 |
| 3. Contributions of video exercise to learning in school subjects and about health | 11 | .60* | .94# |
| 4. Self-efficacy in using video exercises for PA | 4 | .69* | .90# |
| 5. Attitudes towards support in the environment and interest for PA | 14 | .27** | .83# |
| 6. Self-perception of physical fitness | 8 | .43** | .86# |
| 7. Personal best goal orientation in PA | 5 | .43** | .79# |

Note: # = acceptable internal consistency (α ≥ 0.70) ** = medium inter-item correlation, * = large inter-item correlation

In order to determine the differences between both groups during the pre- and post-test, an independent-sample t-test was conducted and respectively indicated in the different sections of the questionnaire (see Table 4). With regard to attitudes towards PA and the different sections of the questionnaire no statistical (p≥0.05) and practical (d≤0.2) significant difference was found between both groups before the intervention, except for Section 2(attitudes towards the importance of PA) which indicated a significant difference (d=0.40). However, the results from the post-test indicated a statistical (p≤0.001) and practical (d≥0.2) significant difference between the attitudes of the groups, which emphasises that the experimental group's attitudes towards PA improved practically significantly in comparison to the control group.

As demonstrated in Table 4, the different sections of the questionnaire indicate the following statistical (p≤0.05) and practical (d≥0.5) differences: Section 1 (attitudes towards the benefits of PA; p≤0.001 and d=1.13), Section 2 (attitudes towards the importance of PA; p≤0.001 and d=0.63), Section 4 (self-efficacy in using video exercises for PA; p≤0.001 and d=0.81), Section 5 (attitudes towards support in the environment and interest for PA; p≤0.001 and d=1.25), Section 6 (self-perception of physical fitness; p≤0.001 and d=0.77) and Section 7 (personal best goal orientation in PA; p≤0.001 and d=0.67). Section 3 (contributions of video exercise to learning in school subjects and about health p≤0.001 and d=0.30) is the only section with medium effect size (d≥0.3), which indicates there is a significant difference.

**Table 4.** Significant differences between the experimental and control group with regard to their attitudes towards PA before and after the intervention

| **Variables** | | **Pre-test** | | | | | **Post-test** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sections** | **Group** | **N** | **Mean** | **Std. Deviation** | **p-value** | **Effect sizes(*d*)** | **N** | **Mean** | **Std. Deviation** | **p-value** | **Effect sizes(*d*)** |
| Attitudes towards the benefits of PA | Experimental | 68 | 3.19 | .42 | .715 | 0.07 | 75 | 3.72 | .29 | **≤.001*** | **1.13#** |
| | Control | 39 | 3.16 | .42 | | | 39 | 3.19 | .47 | | |
| Attitudes towards the importance of PA | Experimental | 68 | 3.34 | .44 | **.051*** | **0.40##** | 75 | 3.53 | .40 | **≤.001*** | **0.63#** |
| | Control | 39 | 3.51 | .43 | | | 39 | 3.07 | .73 | | |
| Contributions of video exercise to learning in school subjects and about health | Experimental | 68 | 2.32 | .95 | .503 | 0.10 | 75 | 2.58 | .68 | .140 | **0.30##** |
| | Control | 39 | 2.42 | .55 | | | 39 | 2.38 | .70 | | |
| Self-efficacy in using video exercises for PA | Experimental | 68 | 2.63 | 1.11 | .610 | 0.08 | 75 | 3.42 | .46 | **≤.001*** | **0.81#** |
| | Control | 39 | 2.72 | .70 | | | 39 | 2.86 | .70 | | |
| Attitudes towards support in the environment and interest for PA | Experimental | 68 | 3.26 | .46 | .506 | 0.13 | 75 | 3.60 | .37 | **≤.001*** | **1.25#** |
| | Control | 39 | 3.19 | .48 | | | 39 | 3.07 | .43 | | |
| Self-perception of physical fitness | Experimental | 68 | 3.23 | .57 | .284 | **0.21###** | 75 | 3.61 | .40 | **≤.001*** | **0.77#** |
| | Control | 39 | 3.35 | .52 | | | 39 | 3.11 | .65 | | |
| Personal best goal orientation in PA | Experimental | 68 | 3.39 | .58 | .197 | **0.24###** | 68 | 3.50 | .47 | **≤.001*** | **0.67#** |
| | Control | 39 | 3.53 | .51 | | | 39 | 3.12 | .58 | | |

*N* = indicates the number of children, $p \leq 0.05$* = significant difference, # = large effect size ($d \geq 0.8$), ## = medium effect ($d \geq 0.5$) and ### = small effect ($d \geq 0.2$)

**Discussion**

This study aimed to determine whether a HOPSports Brain Breaks® intervention programme would improve Grade 6learners' attitudes towards physical fitness and PA.

The findings of this study indicated that prior to the intervention programme there was no difference in the attitudes of the control group and experimental groups towards PA and fitness, with the exception of Section 2 where there were small differences between the two groups' attitudes towards the importance of PA. After completion of the HOPSports Brain Breaks® intervention programme, the experimental group's results generally indicated a statistical and practical significant difference in their attitudes towards PA and fitness in three particular sections, namely attitudes towards the benefits of PA (Section 1), self-efficacy in using video exercises for PA (Section 4) and attitudes towards environmental support and interest in PA (Section 5), which shows a dramatic improvement in their attitudes. A moderate improvement between the two groups after the intervention programme was reported for attitudes towards the importance of PA (Section 2), self-perception of physical fitness (Section 6) and personal best goal orientation in PA (Section 7). Although no similar research could be found on Grade 6learners, the results are in accordance with a study done by Mok (2016) on 2 751 learners from Grade 3 to Grade 5 that represented seven different countries, which include: Turkey, Serbia, Croatia, Romania, Poland, Lithuania and South Africa. Additionally, the sections with the strongest effect size were Section 4 (self-efficacy in using video exercises for PA) followed by Section 1 (attitudes towards the benefits of PA) and Section 2 (attitudes towards the importance of PA). A study by Uzunoz et al. (2017) found similar results from 300 Grade 3 to Grade 5 learners from Turkey, which indicated significant improvements in self-efficacy in using

videos (Section 4), personal best (Section 7), importance of PA (Section 2), self-confidence on physical fitness as well as motivation and enjoyment of PA.

Pertaining to Section 3 (contributions of video exercise to learning in school subjects and about health) of this study, only a small effect size was reported, which could be ascribed to the fact that the control group did not watch the HOPSports Brain Breaks® videos, and for that reason, their attitudes did not improve in this section. Moreover, the control group indicated no statistically significant differences in the post-test. These results correlate with a study by Eather (2014) who found similar results on 48 children (aged 10 to 12years) from Australia. These researchers studied the efficacy of an eight-week "fit-4-fun" school-based physical fitness intervention programme on the health-related fitness of these children. The intervention programme comprised three components: 1) curriculum programme where the children participated in health and PE lessons one day per week for 60 minutes (to improve children's knowledge and skills with regard to health-related fitness), 2) family partnerships where the children had to participate in activities at home with their families four times a week for 20 minutes (children select from a variety of activities which improve muscular and cardiorespiratory fitness and flexibility), and lastly the school environment (children participate in optional fun activities, fitness challenges and games during lunch or recess), whereas the control group was expected to participate in their normal health and PE lessons one day per week for 60 minutes. The results of the study reported increased levels of health-related fitness skills, whereas children's attitudes towards physical fitness did not change over time, due to the short period of the programme. However, the programme did have a positive effect on the children's self-efficacy and their motivation to engage in PA in the future (Eather, 2014). More recent research by Uys et al. (2016b) on 3 126 children (Grade 4 to Grade 6) from Western Cape, South Africa, aimed to determine the effect of a daily health promotion programme, which targeted healthy eating, PA and attitudes of primary school children. The results concur with research by Eather (2014) and indicated that the Health Kick school-based intervention programme reported no difference in attitude towards PA over a three-year period due to the low intensity of the programme. However, it indicated that there was an increase in short-term PA participation as well as core strength.

In agreement with our study, Christodoulos, Douda, Polykratis and Tokmakidis (2006) studied 79 Grade 6learners from Greece who were subjected to a health education intervention programme, which included PA and health components during normal physical education classes twice a week for 45 minutes. The results indicated that these children's attitudes and intention to be physically active improved significantly after the intervention programme. Concurrent with our study's result, similar results were found by a study done by Emeljanovas et al. (2014) on 181 children in Grade 1 to 4 from Kaunas, Linthuania, where it was expected from the experimental group to participate in HOPSports Brain Breaks® programme daily for five to nine minutes over a period of three months. The results indicated that the experimental group's perception of and attitudes towards PA improved over the three-month period in comparison to the control group who reported lower scores. Uzunoz et al. (2017) further indicated that after the four-month HOPSports Brain Breaks® programme, the experimental group's attitudes towards, perceptions of and motivation to be physically active improved significantly. Herewith, a study conducted by Van Biljon and Longhurst (2010) found similar results on 30 participants (aged 9 to 12years) from Zululand, South Africa who were divided into three different groups. The experimental group participated in a six-week exergaming programme (participants had access to play Nintendo WII™ Fit and WII™ sports), control group A participated in normal television games and control group B continued with normal daily activities. The results of their study indicated that the exergaming programme had a positive effect on the experimental group's attitudes towards PA, whereas the two control groups indicated no effect.

In this current study, a possible explanation for the improvement in the experimental group's attitudes could be that after these children had watched the videos, they made the connection between the importance and the benefits of PA and how it could help them. Another possible reason could be that while children participated in the video exercises, their motor skills improved, and this led to achieve more success in other PA and sport and therefore improved their attitudes towards PA and fitness. Furthermore, the scale that indicated the highest improvement (attitudes towards support in the environment and interest forPA) could be ascribable that the HOPSports Brain Breaks® videos expose children to a variety of different experiences, exercises; health-related themes and sports, which could have stimulated their interest in PA. In addition, the fun element that is incorporated in the HOPSports Brain Breaks® videos could contribute to motivate children to be more physically active and facilitate the children to improve their lifestyle, which in turn could lead to improved attitudes towards PA and fitness.

**Recommendations and limitations**

Our study provides valuable results with regard to the effect that HOPSports Brain Breaks® has on children's attitudes towards PA and fitness, however, this study did have some limitations. The limitations that mayhave had an effect on the results of this study could be that some teachers placed a higher priority on the intervention programme than others, as well as that the sample size was too small.

Further studies are recommended to conduct similar research to prove the positive effect of HOPSports Brain Breaks® on children's attitudes and how it could improve PA and fitness levels. Moreover, more studies

should focus on Grade 6 and Grade 7 learners' PA and intervention programmes to address inactivity and improve their attitudes towards PA and physical fitness, as it has been indicated that PA levels decrease from this age and their attitudes are more likely to be negative when compared with younger children. Another recommendation for further research is to study the effects of alternative methods such as, playground equipment, action song videos or music in cases where there is no internet.

**Conclusion**

In conclusion, no other studies could be found that studied the effect of HOPSports Brain Breaks® intervention programme on the attitude towards PA in Grade 6learners in the South African context. However, this study indicated that children's attitudes towards PA and fitness improved significantly, which may have an effect on their PA levels. Furthermore, these children learn more about the benefits and importance of PA, how to improve their own goals and personal best, and how their peers feel about being physically active. HOPSports Brain Breaks® is a cost-effective, safe and fun programme where every child has the opportunity to be active no matter which level of motor skills, and where they do not have to wait their turn to participate.

Research on HOPSports Brain Breaks® should not be seen as another intervention programme to address the problem with regard to PA levels, but rather as a new way to incorporate technology to improve children's attitudes towards PA and fitness and increase PA levels. Opportunities should be created where every child can be physically active and enjoy being active, especially Grade 6learners where the decline is more prevalent.

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