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PHYSICAL ACTIVITY PATTERNS AND LEVELS OF ADOLESCENT LEARNERS FROM LOW AND MIDDLE SOCIO-ECONOMIC STATUS COMMUNITIES IN KWAZULU-NATAL PROVINCE

Patrick M. ZIMU, Hendrik J. VAN HEERDEN, Jeanne M. GRACE
College of Health Sciences, School of Health Sciences, University of KwaZulu-Natal, Westville Campus, Durban, Rep. of South Africa

ABSTRACT

A sedentary lifestyle and insufficient physical activity (PA) increases the risk of developing chronic non-communicable diseases (NCDs). Knowing the PA levels and patterns of adolescents from different socio-economic backgrounds is important to direct programmes at schools and in communities to prevent NCDs risk factors, which can have long-term effects on the health of the adolescents. The study aimed to investigate adolescent PA levels, patterns and influencing factors (age, gender, socio-economic status). The 353 participants (203 females, 150 males) from eight low socio-economic status (LSES) and middle socio-economic status (MSES) public secondary schools completed a Physical Activity Questionnaire for Adolescents (PAQ-A). The PA Levels (2.61±0.74) were below the international PA cut-off points of mean=2.75. Physical education (PE) showed the highest PA score (3.05±1.21) and 'during lunch breaks' the lowest (2.09±1.14). Positive correlations occurred between PA levels and SES (r=0.122; p=0.022), and PA and gender (r=0.223; p=0.0001). LSES participant's PA score was significantly lower (2.52±0.73) than those from MSES (2.70±0.74; p=0.022). As adolescents are not sufficiently active, school and community PA programmes need to be implemented in schools and communities to supplement PE in order to prevent short- and long-term health problems.

Keywords: Adolescents; Health promotion; Physical Education; Sedentary lifestyle; Schools.

INTRODUCTION

Prolonged physical inactivity leads to a sedentary lifestyle, which results in low energy expenditure and increased susceptibility to overweight, obesity and chronic Non-Communicable Diseases (NCDs) (Pahkala, 2009; Shaw & Shaw, 2014; Wushe *et al*., 2014; Christofoletti *et al*., 2016). Regular participation in physical activity (PA) of 60 minutes per day, and four hours per week of moderate to vigorous physical activity (MVPA), is directly associated with reduced NCD risk factors, such as overweight, obesity and metabolic syndrome (Katzmarzyk, 2010; Dobbins *et al*., 2013; Micklesfield *et al*., 2014).

Despite the positive association between health and regular participation in PA, survey data from local and international studies indicate that many adolescents fail to meet the

established guidelines of 60 minutes of daily participation in MVPA (Craig *et al*., 2013; Draper *et al*., 2014; Benitez-Porres *et al*., 2016; Ulbrict *et al*., 2016; Uys *et al*., 2016).

Surveillance research studies conducted on South African adolescents have consistently reported that they have ample unoccupied time, particularly after school hours, which they spend on sedentary leisure activities, such as watching TV, playing video games or sitting doing nothing (Lennox, 2007; Pahkala, 2009; Toriola & Monyeki, 2012; De Vos *et al*., 2016). However, South Africa has limited surveillance information on PA levels and patterns of adolescents from low- and middle socio-economic status backgrounds that can be used to inform appropriate health promotion programmes.

Social, cultural and individual factors influence participation in PA (Fourie *et al*., 2011) with the main social and cultural factors being socio-economic status (SES), while the individual factors include gender and age (Shaw & Shaw, 2014). The few studies that have examined the effect of SES on leisure time physical activity and sedentary behaviour have reported contrasting evidence on any association (Micklesfield *et al*., 2014).

According to Mokabane *et al*. (2014), LSES is associated with more sedentary activities, while MSES communities are associated with more MVPA. Contrary to the above findings, Muthuri *et al*. (2014) reported that LSES rural adolescents had higher physical activity levels than higher socio-economic status (HSES) urban adolescents.

There are contrasting reports in South Africa regarding gender influence on participation in physical activity. Lennox *et al*. (2008) reported that adolescent boys and girls had the same levels of physical activity, while Fourie *et al*. (2011) noted that significantly more adolescent boys than girls participates in MVPA. Wushe *et al*. (2014) reported that adolescent girls are significantly more active than boys, and spend more time in MVPA.

More recently, Van Biljon *et al*. (2018) found that males had significantly higher PA levels than females, and that younger learners tended to be more active than older learners. Muthuri *et al*. (2014) revealed significantly higher levels of physical activity in boys than girls, irrespective of age.

PURPOSE OF STUDY

It is within the broad context described above that the current study was designed to determine and monitor the PA levels and patterns of adolescents from different socio-economic status public schools. This was done to adjust existing NCD prevention and control programmes due to physical inactivity amongst this valuable yet vulnerable population of South African society. There is insufficient coordination and drive from educational and government sectors towards a concerted programme of action to improve PA levels amongst adolescents in public schools and their communities. Of concern is that in South Africa, particularly in the adolescent population, information about the levels of PA and where it occurs, as well as where future programmes should be directed, is limited and inconclusive, and not based on empirical data to guide informed decision-making towards increasing PA. The study therefore aimed to investigate PA patterns and levels of adolescents, as well as their association with age, gender and socio-economic status.

METHODOLOGY

Population and Sample

The cross-sectional study consisted of 353 adolescents aged 13-17 years who were recruited from eight public secondary schools in the eThekwini Metropolitan Municipality, KwaZulu-Natal Province. The schools were classified into LSES and MSES based on the status of the community, which was measured using the Modified Kuppuswamy status scale (Khairnar *et al*., 2017). The scale has been used in several adolescent and community-based health studies in Asian and European countries (Seb Rengma *et al*., 2016; Iqbal & Nishat, 2017).

Monthly income per capita were adjusted for South African population using the average household income ranges, as obtained from statistical data (Statistics South Africa, 2015). Two classes of approximately 40 learners were randomly selected (lottery method) from the 9th to 11th grade of each school. All the names of the learners on the class attendance register aged 13 to 17 years were eligible to participate in the survey. Of the identified 380 pupils, 27 were excluded as they did not return the consent and assent forms or were not present on the day of data collection, leaving a sample of 353 participants.

Instrument

Three categories of data were collected: demographics (socio-economic status, age and gender), overall PA levels, and patterns of PA were assessed using a validated Physical Activity Questionnaire for Adolescents (PAQ-A) (Kowalski *et al*., 2004; Voss *et al*., 2017). The PAQ-A is a seven-day recall instrument that assesses general estimates of PA levels and patterns for high school learners in Grades 9–12 (Kowalski *et al*., 2004), and provides a summary of physical activity scores derived from seven items, each scored on a 5-point Likert scale (Kowalski *et al*., 2004).

The seven items were PA during spare time and five domains (during physical education, lunch break, after school, in the evenings, on the weekend) and selecting one statement that described the participant's physical activity behaviour. The PAQ-A is not designed to provide measures of time or intensity of PA, and uses the international criterion-referenced cut-off point of 2.75 to determine whether the PA levels of the adolescent is sufficient to promote short-term and long-term health (Voss *et al*., 2013).

The questionnaire has been tested for internal consistency and reliability, with the Cronbach's alpha coefficient for internal consistency being 0.74 and the intraclass correlation coefficient for reliability being 0.71, having been used in numerous comparable studies (Bandmann, 2008; Taylor *et al*., 2013).

A pilot study was conducted as part of the current study to identify any changes that needed to be made, with some of the terms related to leisure time activities that needed to be changed to local terms, for instance football to soccer.

Data collection procedure

Parents or guardians and participants gave written informed consent and assent respectively after receiving detailed information about the aim and procedures of the study. A questionnaire was designed to obtain their demographics and overall PA levels and patterns using the PAQ-A seven items. The PAQ-A were completed anonymously by the participants, according to the instructions provided by the research assistants assigned to each classroom, where the forms were completed. The survey was conducted on the same day of the week over four consecutive weeks.

Ethical clearance

The research protocol was approved by Humanities and Social Sciences Research Ethics Committee of the University of KwaZulu-Natal, Protocol reference number HSS/1407/017D. Permission to conduct research at the schools was obtained from the KZN Department of Basic Education and the school Principals.

Analysis of data

The data was analysed using SPSS v25 software, and consisted of three components. The participant's demographic profiles are presented as number and percentage or means and standard deviations. Overall PA levels are presented as the mean of the composite scores of the seven items stratified by SES, gender and age. Those with a mean score below 2.75 were regarded as being inadequately active, while those above were considered as sufficiently physically active to prevent NCDs.

Identifying the factors associated with PA, such as socio-economic status, gender and age, were analysed using Pearson's correlation coefficient, and t-Tests for sub-sets of data. The level of statistical significance was set at $p \leq 0.05$. Physical activity levels of participants in five domains were analysed using the mean and standard deviation (SD).

RESULTS

Participants demographics

Of the 353 participants, 172 (48.7%) were from LSES backgrounds and 181 (51.3%) were from MSES backgrounds, with 203 (57.5%) being females and 150 (42.5%) being males (Table 1). The mean age and standard deviation was 15.89±1.004.

Table 1. **DEMOGRAPHICS OF PARTICIPANTS** (n=353)

Variables		**No. (%)**
Socio-economic status:	Low	172 (48.7%)
	Middle	181 (51.3%)
Gender:	Females	203 (57.5%)
	Males	150 (42.5%)
Age (years):	13	7 (2.0%)
	14	30 (8.5%)
	15	81 (22.9%)
	16	111 (31.4%)
	17	124 (35.1%)

Overall physical activity levels

Their overall physical activity mean score was 2.61±0.74, this being significantly lower (2.52±0.73) for the LSES than the MSES (2.70±0.74; p=0.022), and lower than the recommended 2.75. Females had significantly lower PA levels (2.47±0.71) than their male counterparts (2.80±0.74; p=0.001). Age range 13-14 years had a higher, but non-significant

(p>0.05) mean PA score (2.69±0.72) compared to the 15-17 year olds (2.57±0.73; p=0.424) (Table 2).

Table 2. **OVERALL PHYSICAL ACTIVITY LEVELS**

Variable	Characteristic	Mean±SD	p-Value
Socio-economic status	LSES MSES	2.52±0.73 2.70±0.74	p=0.022*
Gender	Male Female	2.80±0.74 2.47±0.71	p=0.001*
Age	13-14 15-17	2.69±0.72 2.57±0.73	p=0.424

Overall physical activity score=2.61±0.74 *p≤0.05

Association between physical activity mean scores and demographic factors

The mean scores of PA had a strong positive correlation with gender (r=0.223; p=0.0001), less so with socio-economic status (r=0.122, p=0.022), and a negative, non-significant, weak correlation (r= -0.021; p=0.699) with age (Table 3).

Table 3. **ASSOCIATION BETWEEN PHYSICAL ACTIVITY, SES, GENDER AND AGE** (N=353)

Variables	r	p-Value
Socio-economic status & mean score of physical activity	0.122	0.0220*
Gender & mean score of physical activity	0.223	0.0001*
Age & mean score of physical activity	-0.021	0.6990

*p≤0.05 r=Correlation

Physical activity levels and patterns of five domains

Table 4. **PATTERNS AND LEVELS OF PHYSICAL ACTIVITY DOMAINS** (N=353)

Physical activity domains	Group (N=353) Mean±SD	Males (n=150) Mean±SD	Females (n=203) Mean±SD	p-Value
PA during PE	3.05±1.21	3.25±1.28	2.89±1.14	0.005*
PA during lunch breaks	2.09±1.14	2.28±1.23	1.96±1.05	0.008*
PA after school	2.84±1.30	3.06±1.29	2.68±1.28	0.007*
PA in the evenings	2.54±1.18	2.73±1.22	2.40±1.14	0.011*
PA on the weekend	2.83±1.31	3.08±1.28	2.64±1.29	0.002*

PA=Physical activity PE=Physical Education *p≤0.05

Table 4 summarises the levels and patterns of male and female PA within the five domains, all of which were significant. The highest PA mean score was reported 'during PE' classes (3.05±1.21; p=0.005), followed by 'on the weekend' (2.83±1.31; p=0.002), then by 'the evening' (2.54±1.18p; p=0.011) and lastly 'during lunch breaks' (2.09±1.14; p=0.008). In all domains, the PA levels were significantly different between males and females ($p<0.05$), with the males being more active, the differences being least in 'the evening' domain and most 'on the weekend'.

DISCUSSION

This study aimed to provided empirical data on the physical activity levels and patterns of a sample of South African adolescents from low- and middle socio-economic status communities in the eThekwini Metropolitan Municipality.

Demographics

The unequal distribution of genders in this study characterises the current dynamics of South African Schools of more females than males in a class. However, these differences were not significantly higher and were therefore unlikely to have affected the study results. With only one third of the participants being in age ranges 13 to 14 years compared to 15-17 years, it is possible that the differences may have affected the PA scores of adolescents when stratified by age.

Overall physical activity (PA) levels

This research found that adolescents from low- and middle socio-economic status communities are not sufficiently active. Their average PA score of 2.61 is below the PAQ-A global criterion referenced cut-off points of 2.75, which is considered sufficiently physically active for adolescents to ensure both short- and long-term health benefits (Benitez-Porres *et al*., 2016; Voss *et al*., 2017).

Association between PA mean scores and demographic factors

The demographic data was analysed to establish any association between socio-economic status, gender, age and PA.

Socio-economic status and PA

Adolescents from a LSES background had significantly lower PA levels than their MSES counterparts (p=0.022). These results are contrary to a systematic review conducted by Muthuri *et al*. (2014), which concluded that LSES adolescents have higher PA levels than higher socio-economic status adolescents. The results of the current study reaffirms the findings of Mokabane *et al*. (2014) that LSES is associated with more sedentary activities, and MSES communities are associated with more moderate to vigorous physical activities (MVPA). Lack of access to built and man-made play environments, proximity of the facilities and availability of structured programmes may have prevented MVPA participation in LSES communities. In relation to the PAQ-A cut off point of 2.75, the PA levels of both the low- and middle socio-economic status adolescents do not meet the MVPA guidelines of 60 minutes daily and four hours weekly participation (Armstrong & World Health Organization, 2007).

Gender and PA

Males were significantly more physically active than females (p=0.001), these results being consistent with PAQ-A research results of Voss *et al*. (2013) and Benitez-Porres et al., (2016). It was also similar to the results of South African studies by Toriola and Monyeki (2012), Dobbins *et al*. (2013), McVeigh and Meiring (2014) and Muthuri *et al*. (2014) who concluded that boys were significantly more physically active than girls. However, both male and female groups' PA levels in this study were below the recommended PAQ-A cut-off point norms for gender (2.69 for females) and (2.91 for males). This reaffirming the results of McVeigh *et al*. (2004) and Muthuri *et al*. (2014), who indicated that the overall average of PA for both genders fall below the daily recommended levels of 60 minutes of moderate to vigorous physical activity.

Age differences and PA

There was no significant difference in PA mean scores of the different age groups (p=0.424). Age range 13-14 years had a higher, but non-significant mean physical activity score compared to the 15-17 year olds' mean PA score (p=0.424). Physical activity levels declined as the age of both male and female participants increased. The findings are consistent with those of Voss *et al*., (2013) and Micklesfield *et al*. (2014), who reported that sedentary activities and PA were higher among older than younger adolescents.

Physical activity of five domains

High levels of PA occurred during the PE domain (mean=3.05), these results being similar to those of Voss *et al*. (2013) who reported that the mean score (4.01) for PA was the highest in this domain. The domain where adolescents are less physically active or hardly engage in any physical activity is the 'lunch break' domain (mean=2.09), with 'after school', 'in the evening' and 'on the weekend' domains reporting moderate levels of PA. High levels of PA during PE classes reinforces the view that well-designed PE offers an excellent opportunity to help youth achieve health-related PA guidelines (Voss *et al*., 2013). However, the Institute of Medicine (Kohl & Cook, 2013) warned that 60 minutes per day of physical activity that is health-enhancing, is nearly impossible to achieve through physical education at school. Financial pressures and time constraints in the school environment result in insufficient time allocated for PA.

CONCLUSION

Adolescents from LSES and MSES backgrounds in the eThekwini Metropolitan Municipality are not meeting the recommended levels of PA to ensure health improvement. There is a need for more structured school- and community-based programmes to encourage young people to be more active and to motivate parents to encourage their children to participate in habitual PA. Lunch time and after school domains offer convenient times for the promotion of health through PA programmes, as youth are more sedentary during these times. Physical activity interventions must supplement PE physical activity to achieve the recommended level of 60 minutes daily four times a week. Behaviour-changed interventions are also essential to promote the adoption of habitual physical activity and to adhere to physical activity interventions that can prevent the prevalence of non-communicable disease risk factors in the short- and long-terms.

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REFERENCES

ARMSTRONG, T. & WORLD HEALTH ORGANIZATION (2007). A guide for population-based approaches to increasing levels of physical activity implementation of the WHO global strategy on diet, physical activity and health. Hyperlink: [http://www.who.int/dietphysicalactivity/PA-promotionguide-2007.pdf]. Retrieved on 24 July 2017.

BANDMANN, E. (2008). Physical activity questionnaires: A critical review of methods used in validity and reproducibility studies. *Health (San Francisco)*, 2005–2008. Hyperlink: [https://doi.org/10.1016/S0140-6736(11)60393-0]. Retrieved on 20 March 2018.

BENITEZ-PORRES, J.; RAMON ALVERO-CRUZ, J.; SARDINHA, L.; LOPEZ-FERNANDEZ, I. & CARNERO, E. (2016). Cut-off values for classifying active children and adolescents using the Physical Activity Questionnaire: PAQ-C and PAQ-A. *Nutricion Hospitalaria*, 33(5): 1036-1044.

CHRISTOFOLETTI, M.; DEL DUCA, G.F.; GRIPA, L.T. & DE ASSIS, M.A.A. (2016). Comportamento Sedentário No Lazer E Sua Associação Com Atividade Física No Contexto Escolar De Crianças No Sul Do Brasil (*trans.*: Sedentary behavior during leisure and its association with physical activity in the school context of children in southern Brazil). *Journal of Physical Education*, 27(1): 1-10.

CRAIG, E.; BLAND, R. & REILLY, J. (2013). Objectively measured physical activity levels of children and adolescents in rural South Africa: High volume of physical activity at low intensity. *Applied Physiology, Nutrition, and Metabolism (Physiologie Appliquée, Nutrition et Métabolisme)*, 38(1): 81-84.

DE VOS, J.C.W.; DU TOIT, D. & COETZEE, D. (2016). The types and levels of physical activity and sedentary behaviour of Senior Phase learners in Potchefstroom. *Health SA Gesondheid*, 21(September): 372-380.

DOBBINS, M.; HUSSON, H.; DECORBY, K. & RL, L. (2013). *School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6 to 18*. Cochrane Database of Systematic Reviews. Hoboken, NJ: John Wiley. Online. Hyperlink: [https://doi.org/10.1002/14651858.CD007651.pub2.www.cochranelibrary.com]. Retrieved on 24 July 2017.

DRAPER, C.; BASSET, S.; DE VILLIERS, A.; LAMBERT, E.V. & HAKSA WRITING GROUP (2014). Results from South Africa's 2014 Report Card on Physical Activity for Children and Youth. *Journal of Physical Activity and Health*, 11(Supplement): S98-S104.

FOURIE, J.; SLABBERT, E. & SAAYMAN, M. (2011). The leisure and sport participation patterns of high school learners in Potchefstroom. *South African Journal for Research in Sport, Physical Education and Recreation*, 33(1): 65-80.

IQBAL, T. & NISHAT, A. (2017). Effect of socio-economic status on coping behaviour of female adolescents. *International Journal of Indian Psychology*, 4(2): 151-157, No. 96.

KATZMARZYK, P.T. (2010). Physical activity, sedentary behavior, and health: Paradigm paralysis or paradigm shift? *Diabetes*, 59(11): 2717-2725.

KHAIRNAR, M.R., WADGAVE, U. & SHIMPI, P.V. (2017). Kuppuswamy's Socio-Economic Status Scale: A revision of occupation and income criteria for 2016. *Indian Journal of Pediatrics*, 84(1): 3-6.

KOHL, H.W. & COOK, H.D. (Eds.) (2013). *Educating the student body: Taking physical activity and physical education to school*. (Committee on Physical Activity and Physical Education in the school environment, Food and Nutrition Board, Institute of Medicine). Washington, DC: National Academies Press.

KOWALSKI, K.C.; CROCKER, P.R.E. & DONEN, R.M. (2004). *The Physical Activity Questionnaire for Older Children (PAQ-C) and Adolescents (PAQ-A) Manual*. Saskatoon, SK, Canada: College of Kinesiology, University of Saskatchewan.

LENNOX, A. (2007). A health promotional physical activity programme for adolescents in a semi-urban community: PLAY-study. Unpublished Doctoral dissertation. Potchefstroom, South Africa: North-West University.

LENNOX, A.; PIENAAR, A.E. & WILDERS, C. (2008). Physical fitness and the physical activity status of 15-year-old adolescents in a semi-urban community. *South African Journal for Research in Sport, Physical Education and Recreation*, 30(1): 59-73.

MCVEIGH, J.A.; NORRIS, S.A. & DE WET, T. (2004). The relationship between socio-economic status and physical activity patterns in South African children. *Acta Paediatrica*, 93(7): 982-988.

MCVEIGH, J.A. & MEIRING, R. (2014). Physical activity and sedentary behavior in an ethnically diverse group of South African school children. *Journal of Sports Science and Medicine*, 13(2): 371-378.

MICKLESFIELD, L.K.; PEDRO, T.M.; KAHN, K.; KINSMAN, J.; PETTIFOR, J.M.; TOLLMAN, S. & NORRIS, S.A. (2014). Physical activity and sedentary behavior among adolescents in rural South Africa: Levels, patterns and correlates. *BMC Public Health*, 14(40): 1-10.

MOKABANE, N.N.; MASHAO, M.M.; VAN STADEN, M.; POTGIETER, M. & POTGIETER, A. (2014). Low levels of physical activity in female adolescents cause overweight and obesity: Are our schools failing our children? *South African Medical Journal* 104(10): 665-667.

MUTHURI, S.K.; WACHIRA, L.J.M.; LEBLANC, A.G.; FRANCIS, C.E.; SAMPSON, M.; ONYWERA, V.O. & TREMBLAY, M.S. (2014). Temporal trends and correlates of physical activity, sedentary behaviour, and physical fitness among school-aged children in Sub-Saharan Africa: A systematic review. *International Journal of Environmental Research and Public Health* 11(3): 3327-3359.

PAHKALA, K. (2009). Physical Activity in adolescence: With special reference to cardiovascular health. Turku, Finland: Research Centre of Applied and Preventive Cardiovascular Medicine, the Paavo Nurmi Centre and the Department of Pediatrics, University of Turku.

SEB RENGMA, M.; KAUSHIK, B. & NITISH, M. (2016). Socio-economic and demographic correlates of stunting among adolescents of Assam, North-East India. *Anthropological Review*, 79(4), 409-425.

SHAW, B.S. & SHAW, I. (2014). Determinants of physical activity in children and adolescents : Implications for the increasing prevalence of childhood obesity. *African Journal for Physical, Health Education, Recreation and Dance*, *2*(Supplement 2), 91-101.

STATISTICS SOUTH AFRICA (2015). Living conditions of households in South Africa: An analysis of household expenditure and income data. Living Conditions Survey. Hyperlink: [https://doi.org/10.1016/0026-0495(75)90060-8]. Retrieved on 20 January 2018.

TAYLOR, N.; LAWTON, R. & CONNER, M. (2013). Development and initial validation of the determinants of physical activity questionnaire. *International Journal of Behavioral Nutrition and Physical Activity*, 10(Article 74): 1-11.

TORIOLA, O.M. & MONYEKI, M.A. (2012). Health-related fitness, body composition and physical activity status among adolescent learners: The PAHL study. *African Journal for Physical Health Education, Recreation and Dance*, 18(1841): 795-811.

ULBRICT, L.; MODESTO, J.D.; STADNICK, A.M.W. & BUNGUM, T.J. (2014). Body composition, physical activity and active transportation in adolescents of metropolitan region of Curitiba, Brazil. *International Journal of Science Culture and Sport*, 2(2): 20-29.

UYS, M.; BASSETT, S.; DRAPER, C.E.; MICKLESFIELD, L.; MONYEKI, A.; DE VILLIERS, A. & LAMBERT, E.V. & HAKSA WRITING GROUP (2016). Results from South Africa's 2016

Report Card on Physical Activity for Children and Youth. *Journal of Physical Activity and Health*, 13(Supplement 2): S265-S273.

VAN BILJON, A.; MCKUNE, A.J.; DUBOSE, K.D.; KOLANISI, U. & SEMPLE, S.J. (2018). Physical activity levels in urban-based South African learners: A cross-sectional study of 7 348 participants. *South African Medical Journal*, 108(2): 126-131.

VOSS, C.; DEAN, P.H.; GARDNER, R.F.; DUNCOMBE, S.L. & HARRIS, K.C. (2017). Validity and reliability of the Physical Activity Questionnaire for Children (PAQ-C) and Adolescents (PAQ-A) in individuals with congenital heart disease. *PLoS ONE*, 12(4): 1-15.

VOSS, C.; OGUNLEYE, A.A. & SANDERCOCK, G.R.H. (2013). Physical Activity Questionnaire for children and adolescents: English norms and cut-off points. *Pediatrics International*, 55(4): 498-507.

WUSHE, S.N.; MOSS, S.J. & MONYEKI, M.A. (2014). Objectively determined habitual physical activity in South African adolescents: The PAHL study. *BMC Public Health*, 14(471): 1-8.

Corresponding author: Mr. P Zimu; **Email:** zimup@ukzn.ac.za

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