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Physical Activity and Health Promotion

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Introduction

The need to stay healthy in order to cope with the demands of life has ever been recognized by man right from the primitive times. While some of our fore fathers indulged in health-protecting behaviours, others engaged in behaviours that affected their health negatively. These situations have persisted till this modern period despite the advantage of civilization and modern technology. Many people still fail to avail themselves of the opportunities of the available modern health resources but instead engage in health-compromising behaviours. The benefits of healthy cannot be overemphasized. Improvement in physical fitness, reduction in both communicable and non-communicable diseases (NCDs), enhanced quality of life and improved longevity are some of the benefits of healthy living. There is no better way to express the importance of good health than reminiscing about the ancient adage "Health is Wealth". Being free from illness and disability, and being sound in the body is worth or even more than any material possession. Therefore, the greatest wealth is health, because if you lose your health, you lose everything, including your happiness, peace of mind, career, and even your wealth. Therefore, we need to take full control and improve our health.

The concept of health promotion (HP) is well known to those in health and allied-health professions, especially the students of health education. Nevertheless, there is a need to remind ourselves the definition of this important concept. In the Ottawa charter for health promotion, the World Health Organization (WHO-1986) defined health promotion as 'the process of enabling people to increase control over and to improve their health'. This definition encompasses not only dissemination of health information, but also other social changes in the lives of people, including deliberate efforts made in reducing environmental hazards; enhancing supportive community structures; and alleviating adverse economic conditions. Health promotion emphasizes the role of individuals, groups and organizations as active agents in shaping health practices and policies to optimize both individual wellness and collective wellbeing (United States Department of Health and Human Services, 1993).

One of the modifiable risk factors known to be associated with health status is physical activity (PA) (Andersen, Bugge, Denker, Eibergs & El-Alaaman, 2011). It is well established fact that physical activity is associated with many physiological and psychological health benefits across the lifespan. These include improvement in coronary heart disease (CHD) risk factor profile (Saakslahti et al., 2004), improved emotional, cognitive and social development (Lindsey et al, 2003), to mention a few. Physical activity has been defined as 'any bodily movement produced by skeletal muscles that result in energy expenditure' (Caspersen, Powell & Christenson, 1985). Physical activity has several dimensions, that is, occupational PA, leisure time PA and domestic PA (domestic chores). Findings from both cross-sectional and intervention studies have shown that PA is a key player in the management of many chronic health conditions. Studies using objective measures of PA such as accelerometers as well as physical fitness studies document an inverse relationship between PA levels and cardiometabolic disease (CMD) risk factors (Mark & Jenssen, 2008; Ekelund, Anderssen, Froberg, Sadinha, Andersen & Brage, 2007); positive association between PA and psychosocical health (Alfermann & Stoll, 2000; Cannabate, Martinez, Rodriguez & colomer, 2018); and positive association between PA and quality of life (Peeters, Lips & Brown, 2014). Although, many studies on health promotion have dwelled mainly on its relationship with demographic factors, other determinants of HP, particularly lifestyle factors such as physical activity has received little attention.

Therefore, the purpose of this discourse was to review the current literature pertaining to the influence of PA on HP, particularly among youth. If desirable health behaviours are established early in life, better health prospect can be assured in adulthood. More specifically the paper will highlight the concept of health promotion lifestyle practices, chronic disease in youth; and influence of PA on the health promotion.

Health Promoting Lifestyle Practices

An individual's health status to a large extent depends on his/her behavior or lifestyle, that is, putting up desirable behaviour or otherwise. Health-promoting lifestyle practices (HPLP) can be viewed as efforts that people make to remain healthy, to prevent disease and disability and to enjoy better quality of life. Health-promoting lifestyle is therefore an important determinant of an individual's health status. In young people, especially

adolescents, the underlying cause of most of the health-related issues they experience can be attributed to health-compromising behaviours such as cigarette smoking, binge alcohol abuse, lack of adequate sleep, unprotected sex, and excessive use of social media (Weiss & ferrand, 2019). Any or a combination of these risky behaviours may lead to pediatric non-communicable disease (NCD) of lifestyle. The adolescent period is a transition and critical period of life during which important behaviours, including those lifestyles related to health of adults are established. It is therefore important to adopt life-long habits such as regular exercise and healthy feeding which will guarantee future health prospects. Walker, Sechrist and Pendar (1987) highlight six components of health-promoting behaviours to include: health responsibility, physical activity, nutrition, stress management, self-actualization and interpersonal relationships.

- Health responsibility: individuals need to maintain their physical, mental and social well being. Self management of chronic disease in order to protect health.
- Physical activity: avoidance of sedentary behaviour, engaging in regular exercise of adequate intensity, frequency and duration.
- Nutrition: eating healthy food, that is, balanced diet, including fruits and vegetables.
- Stress management: use appropriate techniques to control your level of stress in order to improve your daily functioning. Engage in relaxation techniques such as tai-chi, yoga, etc, exercise regularly, take life the way it is, appreciate events that are beyond your control.
- Self actualization: realisation and fulfillment of one's talents, capacity and potentialities. Develop positive attitude, be assertive instead of being aggressive. Appreciate yourself and try to get comfortable with others. Be appreciative.
- Interpersonal relationship: Get involved in social affiliations or associations between two or more people. Expand your network, siblings, romantic relationships, significant others.

Nowadays, NCDs are leading cause of death and disabilities worldwide. Better health promoting practices help to prevent or minimize the occurrence of NCDs. The Health promotion lifestyle profile questionnaire (Walker et al., 1987) designed to evaluate health promotion profile of individuals and groups has greatly improved our understanding of HPLP of people across lifespan globally. It is hoped that investigators will continue to use this important instrument to delve into new areas (independent variables) to extend the frontiers of knowledge in health promotion.

Chronic disease in youth

In the past, chronic diseases were considered to be health problem of the industrialized countries but today, more than 80% of deaths in the developing countries are caused by chronic diseases, and mortality rates from NCDs in these countries are four times that of developed countries (Anderson & Durstine, 2019). According to the WHO (2018), a chronic disease is an illness that is not contagious, usually of long duration, progresses slowly, and is typically a result of genetics, environment or poor lifestyle. In a summary of literature, Anderson and Durstine (2019) highlighted the mortality rate from chronic diseases indicating a steady rise between 1990 and 2016. According to them, over 57% of all global deaths in 1990 were caused by chronic disease. This increased to 63% in 2008, and 72% in 2016. What is even more disturbing is the fact that this scenario is also replicated in younger populations. One of the plausible reasons for this is the surge in the prevalence of overweight (OW) and obesity (OB) in youth (Ortega, Lavie & Blair, 2016). It is well established that OW and OB in youth are associated with increased risk of cardiometabolic disease such as type2 diabetes mellitus (T2DM), hypertension, abnormal blood lipid levels and metabolic syndrome (MS) (Musa & Williams, 2012; Thomas, Cooper, Williams, Baker & Davis, 2007; WHO, 2004,). Low cardiorespiratory fitness is another factor for the increased risk of paediatric CMD (Musa, Toriola, Goon & Jonathan, 2020; Ekelund et al., 2007).

In a recent study of a cohort of 197 youth from Kogi East, north-central Nigeria, Musa and co-workers (2020) reported a prevalence of clustered CVD (coexistence of two or more risk factors of CVD factors in the same individual) risk of 7.1% with hypoalphalipoproteinemia (22.8%) and hyperglycemia (20.8%) being the most prevalent individual components of CVD risk (Figure 1). Overall 53% of participants had one or more CVD risk abnormality. Furthermore, only fitness and abdominal fat were significantly associated with the clustered CVD risk. Body fatness was not associated with clustered CVD risk. The odd of unfit girls developing CVD risk abnormality was 3.2 times that of their fit peers, while the likelihood of unfit boys developing clustered CVD risk was 3.9 times that of their unfit counterparts. The implication of this study was that cardiovascular disease risk is manifest at this early age and low aerobic fitness is already a health issue among Nigerian adolescents. Indeed, low aerobic fitness was a more serious issue than body fatness among these Nigerian youth.

In a study involving nine year old 259 Norwegian children, Resaland, Mamen, Boreham, Anderssen and Andersen (2010), clustering of CVD risk factors was observed in 11.9% (girls=13.8%; boys=9.9%). They reported that low fitness was a strong predictor for clustering of CVD risk factors, with children in the least-fit quartile having significantly poorer CVD risk factor values than those in the other quartiles. The CVD risk factors used in the study included waist circumference, systolic blood pressure, triglycerides, ratio of cholesterol to high density lipoprotein cholesterol and homeostatic model assessment of insulin.

In a study of 520 secondary school girls aged 10 to 19 years from Western Nigeria, Ojofeitimi, Olugbenga-Bello, Adekunle and Adeomi (2011) reported a higher prevalence of OW and OB among girls in private schools compared to their peers in public schools. One of the factors responsible for this result was the higher activity level and lower sedentary lifestyle observed among public school girls in comparison with their counterparts in private schools.

Sadoh, Sadoh and Onyiriuka (2016) evaluated the influence of PA and body mass index on blood pressure in 353 primary school pupils from Edo State, Nigeria. Among other findings, prevalence of hypertension in inactive children was 5.2% compared to 1.6% among active children. The implication of these results is that a strong association exists between PA and BP at an early age.

From the foregoing, it becomes clear that PA has beneficial effects on risk factors of NCDs even from early stages of life. These findings are instructive, stressing the need by public health stakeholders to make physical activity part of strategies for HP.

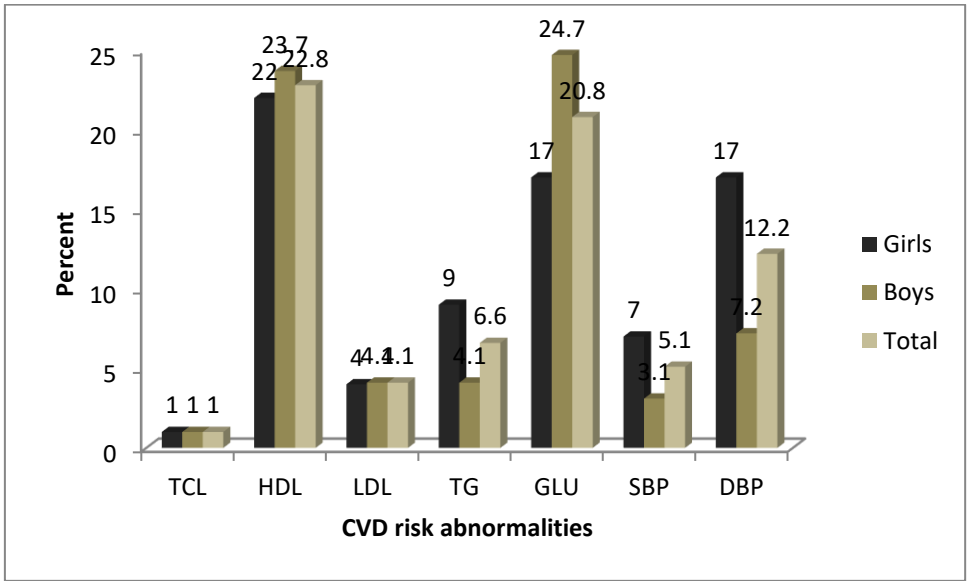

Figure 1: Prevalence of CVD risk factors by sex. Source: Musa et al. (2020)
TCL=Total cholesterol; HDL=High density lipoprotein cholesterol; LDL=Low density lipoprotein cholesterol; TG=Triglycerides; GLU=Glucose; SBP=Systolic blood pressure; DBP= Diastolic blood pressure

Influence of physical activity on health promotion

Physical activity is regarded as an important component of Health-promoting lifestyle profile (HPLP) because it positively influences the other components. The role PA plays in HP is better appreciated in the prevention and management of diseases and disabilities, especially NCDs.

Due to our health-compromising behaviours, both the young and old are affected by health problems ranging from minor ailments to serious NCDs such as the MS and cardiovascular diseases such as hypertension, T2DM, CHD and cancer. While these health problems can be treated with medication, authorities (WHO, 2010; ACSM, 2009) recommended that lifestyle modification should be the first line of approach. Most lifestyle intervention programs include behavioural, dietary, and PA components but evidence exists that regular exercise mitigates cardiometabolic risk independent of dietary intervention (Ekelund et al., 2007). Another health benefit of regular exercise which is not expected with medication-only treatment approach is the improvement in cardiorespiratory fitness (CRF).

Research has consistently demonstrated a negative association between CRF, MS and its individual components in youth (Musa, Angba & Bamidele, 2019; Musa & Williams, 2012), cardiovascular mortality as well

as all-cause mortality in men and women of all ages (lee, et al., 2010; Blair et .al, 1989). It is therefore justifiable to emphasize exercise participation with lifestyle improvement programmes designed to prevent or treat chronic disease.

The health benefits of PA are numerous. Indeed it is well established that PA decreases the likelihood of developing CVD as well as suffering from its consequences. Most of the health benefits of PA are attributed to positive lifestyle (Anderson & Durstine, 2019). Regular PA prevents weight gain, hypertension, hyperglycemia, hypercholesterolemia and MS, and improves aerobic fitness, all of which are risk factors for CVD (Lakka, Laaksonen & Lakka, 2003). Increasing PA levels is therefore a public health intervention that is warranted. Details of the health benefits of PA are presented in Table 1.

Table 1: Health benefits of physical activity

Health condition	Effect of PA
Coronary heart disease	Improvement in myocardial function by improving oxygen delivery and decreasing oxygen demand.
Hypertension	Lowers resting and submaximal BP and catecholamines. This helps lower CVD risk.
T2DM	Substantial reduction in T2DM and improvement in glycemic control and insulin sensitivity.
Obesity	Prevents weight gain and improves blood lipid profiles.
Cancer mortality	Reduction by 7% to 17%.
Depression, anxiety symptoms, Dementia (Alzheimer's and Parkison's)	Substantial improvement
Memory, emotions, stress	Significant improvement
Vascular inflammation and atherosclerosis	Reduces blood concentrations of some inflammatory biomarkers such as C-reactive protein and others.

Source: A.J. Alves et al. (2016). Physical activity in primary and secondary prevention of cardiovascular disease: Overview updated.

The health benefits of PA can be better appreciated by understanding the concept of 'Exercise medicine' or 'Dose-response relationship' especially as it pertains to cardiometabolic and other chronic diseases. This concept proposes that an inverse relationship exists between PA and cardiometabolic diseases. That is, the more PA performed, the lower is the risk of CMD and its prognosis. According to Anderson and Durstine (2019), regular PA and exercise act as natural treatment for many diseases. As an example, PA improves myocardial function by increasing myocardial oxygen supply and decreasing myocardial oxygen demand. Aside from the cardiovascular system, most systems of the body benefit positively from PA and exercise (Anderson & Durstine, 2019). Paffenbarger, Hyde, Wing and Hsieh (1986) in their landmark study demonstrated that, death rates declined steadily as energy expenditure on PA increases from less than 500 kcal to 3500 kcal/week. Other investigators (Wen et al., 2011) have also shown that individuals exercising 90 min/wk have a three year longer life expectancy than inactive persons. Additional 15 minutes of exercise per day results in a further 4% risk reduction in all-cause mortality.

The WHO global recommendation on PA for health (WHO, 2010) emphasized exercise duration, frequency, mode and intensity focusing on three age groups: 5-17 years old, 18-64 years old and 65 years above (table 2). Individuals meeting these guidelines, to a great extent should be able to improve and maintain optimal health, all else being equal. Physical inactivity or sedentary behaviour is a big threat to health promotion, not only because of its adverse effect on health but also the economic consequences on the society. In a summary of review, Roychowdhury (2020) reported the global economic cost of physical inactivity to be conservatively $67.5 billion. This certainly affects other development indices as a reasonable amount of money meant for implementing other projects is diverted to addressing health problems associated with physical inactivity. Certainly, this constitutes a great deal of economic burden.

Table 2: Global recommendations of physical activity for health

Age group	Duration (min)	Intensity	Frequency	Mode
5-17y	60	MVPA	Daily	Aerobic
18-64y	150	MPA	Weekly	Aerobic
	75	MVPA	Weekly	Aerobic
≥ 65y	150	MPA	Weekly	Aerobic
	75	MVPA	Weekly	Aerobic

WHO (2010). Global recommendations on physical activity for health.
MPA = moderate physical activity; MVPA = moderate to vigorous physical activity

The importance of PA in HP research is well recognized and therefore cannot be overstressed. However, one of the greatest challenges facing the HP professional is the task of using the right protocol for measuring PA. Measurement of PA is important to both policy makers and practitioners interested in population surveillance, programme evaluation and research. Accurate and reliable measurement of PA should be considered an important aspect of HP research.

Some of the recognized methods used for measuring PA for HP as outlined by some authorities (Bauman, Phongsavan, Schoeppe & Owen, 2006) are presented in Table 3. The examples given in Table 3 represent only a few instruments for measuring PA, more are available in the literature. The self-report questionnaires require participants to recall the history of his involvement in PA over a certain time period. Although it is widely used, it is subjective and not as effective as the more direct measurement such as the objective and direct measurement of maximal oxygen uptake or the use of motion sensors. Aerobic fitness or CRF is a surrogate measure of physical activity hence the inclusion of fitness tests as measures of PA. It is recommended that as much as possible, objective measures of PA should be the first choice when conducting HP research.

Table 3: Instruments for measuring physical activity

Instrument	Description	Potential use
Self-report questionnaires, interviews and surveys	Involve recall of PA participation, using PA diaries and logs. Eg, Global physical activity questionnaire (GPAQ), International physical activity questionnaire (IPAQ), etc.	Used for cross-sectional population-based surveys to determine prevalence and trends in PA.
Motion sensors: Pedometer	This is an objective instrument which measures steps an individual takes in a specified period.	Assesses walking behaviour. The volume of steps taken, without regard to pace and intensity.
Accelerometer	This is a more sophisticated device used to measure motion.	In addition to the total volume of motion, it has the capacity to evaluate time and intensity of movement as well as energy expenditure.
Direct measure of fitness	Maximal oxygen consumption, Direct calorimetry	Aerobic fitness or CRF. Energy expenditure
Indirect measure of fitness	Oxygen consumption Indirect calorimetry 20M shuttle run test	Aerobic fitness Energy expenditure Aerobic fitness

Adapted from: Bauman et al. (2006). Physical activity measurement - a primer for health promotion.

Conclusions

Promoting and maintaining good health is our best buy in this millennium because of the numerous benefits, including improvement in physical fitness, reduction in disease and enhanced quality of life. The need to adopt best health-promoting life practices is inevitable, especially at the youthful age to ensure better health prospect in later life. Physical activity plays a pivotal role in health promotion due to its numerous health benefits. There should be strong advocacy for stakeholders in HP to pay special attention to PA participation as part of the strategies for health promotion across the lifespan.

References

ACSM. (2009). *ACSM's guidelines for exercise testing and prescription* (8th ed.) Philadelphia: Williams & Wilkins.

Alfermann, D. & Stoll, O. (2000). Effects of physical exercise on self concept and well-being. *International Journal of Sport Psychology, 31*, 47-65.

Alves, A.S., Viana, J.L., Cavalcante, S.L., Oliviera, N.L., Daurte, J.A., Mota, J., Oliveira, J. & Ribeiro, F. (2016). Physical activity in primary and secondary prevention of cardiovascular disease: overview updated. *World Journal of Cardiology, 8*(10) 575-583.

Andersen, L.B, Bugge A, Denker M, Eibergs, El-Alaaman, B. (2011). The association between physical activity, physical fitness and development of metabolic disorders. *International Journal of Pediatrics, 6*, 29-34.

Anderson, E. & Durstine, J.L. (2019). Physical activity, exercise, and chronic diseases: A brief review. *Sports Medicine and Health Science, 1*(2019), 3-10.

Bauman, A., Phongsavan, P., Schoeppe, S. & Owen, N. (2006). Physical activity measurement – a primer for health promotion. IUHPE – Promotion and Education, 13(@), 91-103.

Blair, S.N., Kohl, H.W., Paffenbarger, R.S., Clark, D.G. et al. (1989). Physical Fitness and All-cause mortality: a prospective study of healthy men and women. *Journal of the American Medical Association, 262*, (17), 2395 – 2340.

Canabete, D., Martinez, G., Rodriguez, D., Colomer, J. (2018). Analyzing emotions and social skills in physical education. *Sustainability, 10*, 1585.

Caspersen, C.J., Powell, K.E., & Christensen, G.M. (1985). Physical, activity, exercise and physical fitness: Definitions and distinctions for health-related research. *Clinical Endocrinology and Metabolism, 16*(4), 595-610.

Ekelund, U., Anderssen, S.A., Froberg, K., Sardinha, L.B., Andersen, L.B. & Brage, S. (2007). Independent association of physical activity and cardio respiratory fitness with metabolic risk factors in children: The European Youth Heart Study. *Diabetologia 50*, 1832-1840.

Lakka, T.A, Laaksonen, D.E., & Lakka, H.M. (2003). Sedentary lifestyle, poor cardiorespiratory fitness and the metabolic syndrome. *Medicine and Science in Sports and Exercise, 35*, 1279-1286.

Lee, D.C., Artero, E.G., Suix, et al. (2010). Mortality trends in the general population: the importance of cardiorespiratory fitness. *Journal of Psychopharmacology, 24*(4suppl.) 2735).

Lindsey, E.W., Colwell, M.J. (2003). Preschoolers' emotional competence: Links to pretend and physical play. *Child Study Journal, 33*, 39-52.

Mark, A.E. & Janssen, I.. (2008). Dose-response relation between physical activity and blood pressure in youth. *Medicine and Science in Sports and Excercise, 40*, 1007-1012.

Musa, D.I., Toriola, A.L., Goon, D.T., & Jonathan, S.U. (2020). Association of fitness and fatness with clustered cardiovascular disease risk factors in Nigerian adolescents. *International Journal of Environmental Research and Public Health, 17*, 5861.

Musa, D.I, Angba, T. & Bamidele, B.B. (2019). Cardio respiratory fitness in relation to adiposity in 9-17 year-old Nigerian youth. *Gazzetta Medica Italiana, 178*(9), 603-610.

Musa, D.I. & Williams, C.A. (2012). Cardiorespiratory fitness, fatness and blood pressure associations in Nigerian youth. *Medicine and Science in Sports and Exercise, 44*, 1978-1985.

Ojofetimi, E.O., Olugbenga-Bello, A.l., Adekanle, D.A. & Adeomi, A.A. (2011). Pattern and determinants of obesity among adolescents females in private and public schools in olorunda local Government Area of Osun State, Nigeria: a comparative study. *Journal of Public Health in Africa, 2*, e//doi:104081/jphia.2011.e//

Ortega, F.B., Lavie, C.J. & Blair, S. (2016). Obesity and cardiovascular disease. *Circulation Research, 118*(11), 1752-1770.

Paffenbarger, R.S., Hyde, R,T,, Wing, A.L. & Hsieh, C.C. (1986). Physcal activity, all-cause mortality, and longetivity of college alumni. *New England Journal of Medicine, 314*, 605-613.

Peeters, G., Lips, P., Brown, W.J. (2014). Changes in physical functioning over 6 years in older women: Effects of sitting times and physical activity. *European Journal of Aging, 11*, 205-212.

Resaland, G.K., Mamen, A., Boreham, C., Anderssen S.A., & Andersen, L.B. (2010). Cardiovascular risk factor clustering and its association with fitness in nine-year old rural Norwegian children. *Scandanavian Journal of Medicine and Science in Sports, 20*, e112-e120.

Roychowdry, D. (2020). Using physical activity to enhance health outcomes across the lifespan. *Journal of functional Morphology and kinesiology, 2020* (5), 2.

Saakslahti, A., Numminen, P., Varstala, V., Helenius, H., Tammi, A., Viikari, J., Valimaki, l. (2004). Physical activity as a preventive measure for coronary heart disease risk factors in early childhood. *Scandanavian Journal of Medicine and Science in Sports, 14*, 143-149.

Sadoh, W.E, Sadoh, A.E. & Onyiriaka, A.N. (2016). Physical activity, body mass index and pressure in school pupils attending private schools. *African Health Sciences, 16*(4), 947-953.

Thomas, N.E., Cooper, S.M., Williams, S.P., Baker, G.S., & Davies, B. (2007). Relationship of fitness, fatness and coronary heart disease risk factors in 12 to 13 year olds. *Pediatric Exercise Science, 19*, 83-101.

United States Department of Health and Human Services - National Center for Health Statistics (1993). National health interview survey, 1991: Health promotion and disease prevention supplement. Ann-Arbor (MI): Inter-University Consortium for Political and Social Research.

Walker, S.N., Sechrist, K.R. & Pender, N.J. (1987). The health promoting lifestyle profile: development and psychometric characteristics. *Nursing Research, 36* (2), 76-81.

Weiss, H.A. & Ferrand, R.A. (2019). Improving adolescent health: an evidence-based call to action. *Lancet, 393*, March 16, 2019.

Wen, C.P., Waij, P.,Tsai, M.K., Yang, Y.C., Cheng, T.Y., Lee, M.C., Chen, H.T., Tsao, C.k., Tsai, S.P. & Wu, X. (2011). Minimum amount of physical activity for reduced mortality and extended life expectancy: a prospective cohort study. *Lancet, 378*, 244-1253.

WHO (1986). The Ottawa Charter for Health Promotion: First International conference on health promotion Ottawa, 17-21 November, 1986. Available at: http://www.who.int/healthpromotion/milestone...ottawa/en

WHO (2010). WHO Global Recommendations on Physical Activity for Health. Geneva: WHO.

WHO. (2004). Global strategy on diet, physical activity and health: childhood overweight and obesity. Geneva: WHO.

WHO. (2018). Non-communicable diseases. Available at: http://www.who.int/en/news-room/fact-sheets/detail/noncommunicable-disease. Accessed October 4, 2018.