3 "Be active!" Revisiting the South African food-based dietary guideline for activity

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Keywords: food-based dietary guidelines, FBDGs, physical activity participation, noncommunicable disease, South Africa, public health

Abstract

The objective of this paper was to review current evidence on physical activity for health in order to support the food-based dietary guideline (FBDG) "Be active!". Physical activity, defined as at least 30 minutes of moderate-intensity physical activity per day for adults, and 60 minutes for children and adolescents, is advised in the FBDG because of the role it plays in maintaining energy balance, improving body composition and promoting general health and well-being. The reviewed outcome measures are changes in physical activity patterns and the reported prevalence of noncommunicable diseases (NCDs) in South Africa. Despite the previous set of FBDGs, no improvements in physical activity, obesity or NCDs have been reported in South Africa. Recent literature emphasises the beneficial effects of physical activity on the reduction of risk factors associated with the prevalence of NCDs. Physical activity has a positive effect on appetite and weight control, insulin sensitivity, dyslipidaemia, hypertension, stress relief and burnout. Barriers that prevent children and adults from participating in regular physical activity have been identified, and recommendations how to overcome these have been made. It has been concluded that South Africans are not sufficiently physically active for their general health status to be improved. It is recommended that methods to promote physical activity at national, provincial, district and local level need to be developed, implemented and sustained.

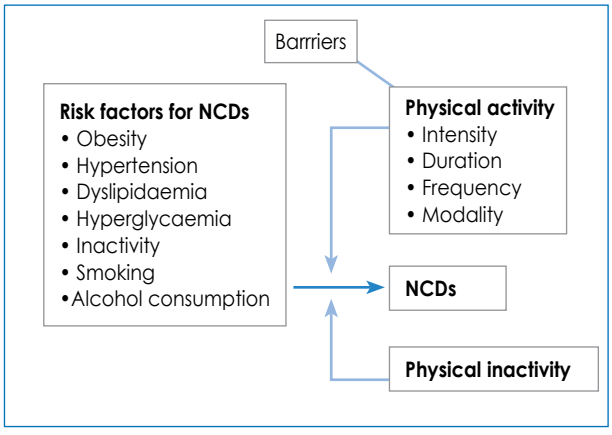
Ⓟ **Peer reviewed. (Submitted: 2013-04-08. Accepted: 2013-08-09.) © SAJCN** **S Afr J Clin Nutr 2013;26(3)(Supplement):S18-S27**

Introduction

South Africans have diverse origins, but everybody faces the challenges of addressing the burden of noncommunicable diseases (NCDs) and associated risk factors. As in other developing countries, there is potential to prevent and control NCDs, in spite of limited resources.[1] The double burden of under- and overnutrition-related disease in South Africa, and efforts to optimise the nutritional status of South Africans, motivated the development of the food-based dietary guideline (FBDG).[2,3] The FBDG "Be active!" was included, because physical activity is a determinant of energy balance, and because of the well-established link between reduced risk of mortality and morbidity that is associated with physical activity.[2-4] The recommendation for adults is 30 minutes of moderate-intensity physical activity each day of the week, which can be accumulated in bouts of at least 10 minutes during the course of the day.[4] For children and adolescents, this is 60 minutes of activity per day.[5]

The recommendations for both adults and children are still relevant, and are included in the revised set of FBDGs, based on the continuing burden of NCDs and mortality due to lifestyle diseases in the South African population.[5] Recent research results provide evidence of the beneficial effects of physical activity on psychological health and management of stress and burnout,[6] and highlight the importance of physical activity in managing overall well-being, instead of just body weight. Therefore, as concluded by Ding and Hu,[7] promoting a healthy diet and encouraging physical activity are not mutually exclusive, but equally important to maintain a healthy body weight and reduce the risk of NCDs and premature death.[7]

The purpose of this paper is to review current evidence linking physical activity and health, to support the FBDG on physical activity.



NCDs: noncommunicable diseases

Figure 1: Conceptual framework illustrating the role of physical activity and noncommunicable diseases

The interrelationship of physical activity, risk factors and NCDs are presented in Figure 1.

Mortality and noncommunicable diseases in South Africa

Great strides have been made in collating accurate data on the cause of death in South Africa.[5] The leading cause of death has been tuberculosis (12.6%) since 1997.[5] Heart disease (4.4%), cerebrovascular disease (4.1%) and diabetes (3.3%) collectively account for 11.8% of deaths. Hypertensive diseases are ranked at number 10 (2.8%).[5] The burden of these diseases is projected to increase, which could result in an exponential increase in the burden of NCDs.[8] There is also an increased prevalence of obesity in South Africa,[9] an established risk factor for NCDs.[10] South Africa, like several other developing countries, is experiencing a unique demographic moment in which to focus on the introduction of policies that will reduce the future impact of NCDs.[11]

Approximately one third of the South African population is between the ages of five and 19 years, of which 21% are between the ages of 10 and 19.[11] Children and the youth account for a large proportion of our population, and their health and well-being will play an important role in shaping the health profile of the nation in the future.[11] Intestinal and infectious diseases were the leading cause of deaths in infants (22.4%) and children aged 1-4 years (27.3%), accounting for more than 20% of all deaths.[8] Malnutrition was the third leading cause of death for those aged 1-4 years, and the seventh leading cause for those under one year of age.[8] This is a classic example of the double burden of persisting undernutrition in the midst of the ever-increasing epidemic of obesity and NCDs.

Consequences of physical inactivity

The increase in the prevalence of overweight and obesity is concurrent with increased levels of inactivity in South Africans. It is commonly reported that physical inactivity and poor diet are associated with a wide range of NCDs, including hypertension, type 2 diabetes mellitus, coronary artery disease, strokes, cancer and osteoporosis.[12] NCDs can also be referred to as hypokinetic diseases or chronic diseases of lifestyle.[13] These diseases arise because of a lack of physical activity, which ultimately results in an increased risk of developing cardiovascular disease. They are also linked to other health risk indicators, such as obesity, hypercholesterolaemia and hypertension.[13] This, combined with other destructive habits, such as smoking, the overconsumption of alcohol and an excess intake of fatty foods and salt, increases the risk of developing NCDs.[14] More recently, the relationship between insufficient sleep and the development of cancer has also been indicated.[15]

Participation in physical activity may also have therapeutic effects that provide protection against the development of NCDs, despite the presence of primary risk factors.[16] Stringer[17] noted that moderate aerobic physical activity can augment the immune system, indicating the importance of exercise for persons with HIV/AIDS.

Long-term physical inactivity decreases self-dependence because of the reduction in muscle power, reaction time and muscle strength, particularly in older adults (> 60 years old).[16] Cardiovascular function will inevitably decrease as the effect of the specific adaptation to imposed demands principle is reversed.[16]

The increase in the prevalence of NCDs in South Africa emphasises the need to promote a healthy lifestyle through an increase in physical activity and healthy eating habits.[18] However, although most people know that inactivity is a risk factor, they lack knowledge on the implementation, execution and management of physical activity to inspire them to maintain it in daily life.[19] This inability to change behaviour is evidenced by the large number (57%) of South Africans reportedly treated with chronic prescription medication for conditions that are treatable or managed through regular physical activity[19] combined with other lifestyle factors, such as healthy eating[14], cessation of smoking[14], regular sleep[15] and appropriate use of alcohol.[14] The cost of prescription medication has a direct effect on the economic burden of NCDs in the country. The current focus on treatment of chronic diseases should be shifted to the prevention of risk factors instead. Physical activity as a noninvasive, preventative or complementary treatment to medication should be considered.[20]

Physical activity as a modifier of the risk factors of chronic diseases pertaining to lifestyle

Underweight, overweight and obesity

South Africa is becoming one of the countries with the highest prevalence of overweight and obesity, due to destructive lifestyle behaviour.[14] Obesity is the consequence of a disrupted energy balance, which is maintained in the body through the coupling of energy intake and expenditure. Energy intake is regulated through physiological mechanisms,[20-24] but these can easily be overridden by environmental, psychological, social and cultural factors.[25]

A mismatch between energy intake and energy expenditure was recognised as early as the 1950s in sedentary individuals or those with negligible physical activity.[26] This mismatch can lead to a positive energy balance and weight gain over time. However, more active individuals seem to be able to adapt their subsequent energy intake after an exercise session to match the

exercise energy expenditure almost perfectly.[27-29] King et al concluded that exercise appears to sensitise appetite control mechanisms and foster more "sensitive" eating behaviour in moderately active individuals who are normal or overweight, as well as in those who are obese.[30-32] Individuals tend to respond differently to the effect of exercise on hunger and satiety, where some people experience increased hunger after training. This may determine whether or not one loses or maintains weight when embarking on an exercise programme. Therefore, exercise programmes and dietary intake should be individualised.[30-33]

However, exercise can play an important role in attenuating this postprandial effect if performed prior to mealtimes. Petitt and Cureton[34] found that aerobic exercise of moderate intensity (in 30-minute intervals, three times daily, or a 90-minute continuous session) performed up to 12-18 hours prior to a meal can attenuate the postprandial lipaemia response (with a moderate effect of d = -0.5) in healthy individuals. The larger the energy expenditure during the exercise, the greater the magnitude of this effect. Therefore, exercise has an important role to play as part of any modification programme that aims to prevent or reduce the risk of NCDs.[34]

Even though exercise has been shown to play an important role in appetite control, following an energy-controlled diet in combination with an exercise programme when weight loss is warranted is essential for long-term weight management.[34] However, acute and chronic activity or exercise can create a negative energy balance, which is important to consider in normal-weight individuals, i.e. athletes and manual labourers who are involved in vigorous exercise sessions or manual work. Some of these individuals fail to increase their energy intake when energy expenditure levels increase and find themselves in an energy deficit, often referred to as exercise-induced anorexia.[35] This increases the risk for conditions such as malnutrition, impaired growth and maturation (depending on the person's age), compromised reproductive function, decreased bone health and increased susceptibility to sport injuries and illnesses.[36,37] It is recommended that these individuals eat according to a plan, and do not only rely on their appetite as a cue for food intake to ensure sufficient energy and nutrient ingestion.[35-37]

Diet

The global strategy of the World Health Organization to address the rapid increase of NCDs includes the promotion of both diet and physical activity. This is especially applicable to low- to middle-income countries, such as South Africa.[38] Since these two factors both directly influence the energy availability and energy balance in the body, they should always complement each other in order to best obtain the desired outcome (weight loss, weight gain or weight maintenance) in any lifestyle intervention programme.[27-28] Various dietary strategies to prevent and treat NCDs and to facilitate weight loss have been investigated and can be reviewed in more detail elsewhere.[39] The general FBDG for weight (fat) loss is to create a daily energy deficit of between 2 100-4 200 kJ through diet and/or exercise and physical activity. Women should ingest a minimum of 4 200-5 000 kJ/day and men 5 000-6 400 kJ/day.[39] Focusing only on energy restriction as a weight loss strategy can lead to 5-10% of body weight loss, but is associated with weight regain within 4-5 years.[40]

The long-term reduction of NCD risk factors

The evidence that physical activity addresses NCD risk factors has been strengthened over the last few years.[16,19] Currently, it seems as if physical activity can be as effective as medical treatment and, in some instances, can be even more successful than medication.[19]

In metabolic syndrome-related conditions (insulin resistance, type 2 diabetes mellitus, dyslipidaemia, hypertension and obesity), 40% of persons with glucose intolerance will develop impaired glucose tolerance within 5-10 years.[41] Physical activity combined with dietary intervention in the management of these conditions has been shown to contribute to the reduction of insulin resistance.[41]

Two randomised control trials have indicated that physical activity as a lifestyle modifier decreases the risk of type 2 diabetes by 58% in persons with insulin resistance.[41-42] In both these studies, the effect of exercise combined with dietary modifications had the same effect. Therefore, exercise and diet reduced the risk of type 2 diabetes more than the 31% reduction reported when the treatment was metformin.[41]

Studies that have investigated the optimal dose of exercise in the treatment of insulin sensitivity have indicated that 170 minutes of aerobic exercise per week improved insulin sensitivity, regardless of exercise intensity and volume.[43] Muscle strength conditioning should be included in a prevention intervention, as high-repetition strength conditioning also improves insulin sensitivity.[44]

Long-term obesity, characterised by hyperglycaemia and abnormal glucose, fat and protein metabolism, is a risk factor for type 2 diabetes.[45] Physical activity has been well documented to increase glucose sensitivity and improve the ability of muscle to absorb glucose.[41] This means that daily exercise or physical activity benefit the regulation of insulin sensitivity in people with type 2 diabetes. According to an extensive literature review, glycaemic control was better established in adults with diabetes and dislipidaemia when there was participation in strength and conditioning exercises, together with dietary intervention.[17,43]

In order to maintain body weight, which is defined as < 3% change in current body weight,[30] results from various studies suggest that moderate to vigorous intensity physical activity of 150-250 minutes/week, with energy expenditure of 5 000-8 400 kJ/week, is adequate. This supports the suggestion of 30-45 minutes of physical activity, on most days of the week, at a moderate intensity for weight maintenance.[40, 46] In order to achieve weight loss, there is a direct relationship between the time and duration of physical activity and the amount of weight lost.[40,46] The American College of Sports Medicine's (ACSM) position on appropriate physical activity intervention strategies for weight loss and the prevention of weight regain in adults[47] is moderate physical activity of approximately 420 minutes/week to achieve weight loss of 5 - 7.5 kg. Higher doses of physical activity will result in larger weight loss.[46] The dose can be manipulated by increasing the time involved in physical activity or by increasing the intensity thereof. The manipulations between intensity and duration are influenced by the current physical activity level, the participant's risk factors and injury history, contraindications to exercise and preferences for different modalities of physical activity.[47]

Recently, the role of resistance training in the management of weight has been included in the debate.[48] The conceptual model of the potential role of resistance training in energy expenditure indicates that resistance training that results in an increase in muscle mass may accelerate up the resting metabolic rate, with a subsequent total energy expenditure increase, resulting in a decrease in body fat.[48]

As mentioned, dyslipidaemia, a group of disorders of lipoprotein metabolism, forms part of the metabolic diseases. The increased intake of fat often relates to this condition.[43,46,47] Physical training has been indicated, independent of weight loss, to benefit the lipid profile.[48-52] Current evidence indicates that high-density lipoprotein (HDL) cholesterol is increased and low-density lipoprotein (LDL) cholesterol and triglycerides decreased with more than three months of high-volume training.[51] Since lipids relate to NCD development, an improvement in the lipid profile indicates a reduced prevalence of NCDs in the future.[48-52] Hypertension is an important risk factor for stroke, acute myocardial infarction, cardiac insufficiency and sudden death.[13] A lowering of 20 mmHg in systolic blood pressure and 10 mmHg in diastolic blood pressure in patients with hypertension halves the risk of cardiovascular death.[18] Various reviews on randomised controlled trails have been performed over the last 15 years, with overlapping results.[18] The general finding from all these studies is that physical activity reduces blood pressure up to 4-10 hours after cessation of exercise.[18,53] However, this effect can last up to 24 hours.[53] The mode of physical activity is mainly aerobic activity at an intensity of 40-70% of heart rate reserve for 30-60 minutes, and should be performed on a daily basis.[53]

Besides the influence of exercise on metabolic diseases, regular individualised exercise programmes, as prescribed by qualified health professionals (biokineticists), also improve the health status and functional fitness of persons with cardiorespiratory diseases.[47]

Exercise and bone health

Regular exercise has a protective effect on bone, which is noticeable throughout the life cycle and can reduce the risk of frailty and osteoporotic fractures later in life.[54-58] Furthermore, the improved mineralisation of bone through physical activity in childhood (from as young as five years of age) can persist into young adulthood, increasing bone mineral density.[58,59]

HIV

The high incidence of HIV/AIDS in South Africa necessitates a comment on the impact of physical activity on these individuals. Recent advances in antiretroviral therapy (ART) have decreased HIV-related morbidity and mortality, but the ART-related side-effects, such as metabolic syndrome and age-related co-morbidities (frailty), have increased, and present major challenges to patients and providers.[60,61] A recent meta-analysis performed by O'Brien et al suggests that quality of life, general health, vitality and mental health increased in HIV-positive patients who participated in moderate- to high-intensity aerobic exercise, like brisk walking for one hour three times per week, compared with a control group.[60] There is also evidence that a combination of moderate endurance (cycling, walking or running) and resistance exercises (working with weights or resistance bands) three times per week, for at least six weeks, improves cardiovascular, metabolic and muscle function in older (45-58 years) populations living with HIV.[60] The results on physical exercise in HIV-infected patients, and on treatment or reduction in the development of side-effects in those on ART, are inconclusive.[60,61]

What are the health risks for inactive children?

Overweight and obesity in South African children are also on the increase.[62] The obesity rates in children in urban areas (5.5%) were recorded as being higher than the national average (4.8%).[11] Recent research on grade 1 children of a low socio-economic status in North West province reported an incidence of 16% overweight and obesity.[63] Similar results were also observed in adolescents (n = 256) from both the low- and middle-income areas of Potchefstroom.[64] The prevalence of overweight was higher in adolescent girls (28%) than in boys (11%).[64] Similarly, 7% of teenage girls and 3% of teenage boys are obese, with a body mass index > 30 kg/m^2.[64] In a recent review, these

findings were confirmed to be the norm throughout South Africa.[62] The authors concluded that prevalence is strongly dependent on age, gender and population group.[62] Therefore, all of these factors need to be considered when devising intervention programmes and policies. It is important to note that in addition to overnutrition, South African adolescents are also faced with the challenge of undernutrition. The most recent Youth Risk Behavior Survey reported that 13% of South African adolescents are malnourished and stunted for height, while 4% are wasted.[11] A national study in South African children[62] clearly demonstrated that both overweight and obese children, as well as a high prevalence of stunted and underweight children exist, and this might be influenced by socio-economic status. Kruger et al concluded from their study that differences in income, have an effect on the growth of children in South Africa.[65] This was also observed in urban areas and might be associated with migration from rural to urban areas, and earning minimal income and poor living conditions.[66]

Obese and overweight children are often less physically active than their leaner counterparts.[63] Childhood is the period in which gross motor development takes place. The presence of overweight, obesity or undernutrition inhibits participation in movement during this important developmental phase.[63] These children are also less likely to participate in sporting activities that develop various skills.[63] A lack of motor skills relates to deterioration in the academic performance of children and adolescents.[64-65]

Physical activity data for children indicate that adolescence is the stage where physical activity patterns change.[67] Adolescent girls tend to become less physically active and also acquire an increased body fat percentage compared to boys.[68,69] The onset of puberty in girls and the resulting changes in their physiques are greater than those for boys, and this may affect their lower levels of physical activity and increased body fat percentage.[62,64,69] This reduced physical activity level, together with overnutrition, increases the risk of obesity in teenage girls.[70] Other studies have also indicated that being excessively fat has a negative impact on performance tasks and thus decreases participation in physical activity by overweight individuals.[71] This becomes a cycle that can only be addressed with a conscious effort and strategic intervention.

Fifty per cent South African adolescent males and 35% of adolescent females meet the physical activity recommendation of 150 minutes per week.[11] Furthermore, national data have demonstrated that 41% of the youth in South Africa reported participating in no physical activity, despite two thirds of learners saying that physical education was part of their school timetable.[11,70] In this study, the reasons that the youth gave for insufficient physical activity included lack of interest (29%), being ill (18%), safety concerns (10%), no access to equipment (13%) and being unsure of why they were inactive (30%).[66] These results suggest that providing the motivation, education and opportunities for physical activity for adolescents is important. Decreasing the amount of time spent in front of a screen is one of the ways of reducing sedentary behavior in children and adolescents. This is particularly relevant in South Africa, where 29% of children watch more than three hours of television per day.[67] Some of this time should be spent participating in physical activity, and failing to do so will result in an increase in risk factors in this cohort at an earlier age. The consequences are that the clinical horizon of disease may appear at an earlier age, together with the onset of accompanying NCDs.[70,71]

Physical activity in South Africa

Physical activity was measured at population level in South Africa for the first time during the 1998 South African Demographic and Health Survey, which found that 48% of men and 63% of women were inactive (n = 10 159).[12] Therefore, increasing habitual levels of physical activity in South Africans could play a role in reducing the burden of NCDs, while simultaneously increasing quality of life.

Reasons for physical inactivity

South Africa is experiencing a migration from rural to urban areas, with people searching for better work and living conditions. This has had a dramatic impact on their dietary intake and degree of participation in physical activity.[5,10] The effect of urbanisation can be considered to be one of the major reasons for the increase in inactivity. People are now exposed to motorised commuting, more dangerous living conditions and a lack of family support systems.[72]

High crime rates and parents working long hours may be two of the reasons for sedentary behaviour and, in particular, increased television viewing time by children.[72] This has also been implicated higher rates of obesity,[68] as in other developing countries.[67] The previous reduction of physical education in the school curriculum also contributed to increased inactivity. Physical education now forms one of the learning outcomes for life orientation, where other topics are also addressed.[68] Facilities in which children can participate in sport activities are unavailable in schools in low socio-economic areas.[69,70]

Barriers to physical activity in adults include limited access to recreational facilities. Another factor is the lack of personnel to manage these facilities in order to make optimal use thereof. Many communities are widespread and do not have a community centre, as well as not being informed when initiatives are being implemented.[70]

In a study conducted by Roshan[73] on free-living adults in the Khayelitsha area, 79% of club members (n = 26) and 80% of non-members (n = 60) perceived one of the barriers to healthy living to be that healthy food is too expensive. Health problems and family commitments were also cited as perceived barriers to improving physical activity.[74] A recent presentation at the University of the Western Cape underlined the fact that the situation in Africa is quite unique and that barriers to physical activity exist at all levels of the social environment.[74] Therefore, it is important that the evaluation process should be part of initiatives and their implementation, as it will provide a measure of the physical activity in these populations in which these programmes will be implemented.

Overcoming barriers

Based on findings in various publications,[71,72,75] the following points need to be considered if barriers are to be overcome:

- Advocacy and skills training to promote the implementation of physical activity in schools.
- Accredited clinical exercise professionals to implement sustainable physical activity in public health sector settings.
- Sufficient training of community health workers to oversee these programmes.
- Building-standardised regulations and town planning to create an environment that is supportive of physical activity.
- Safe community centres for physical activity and recreation.

Implementation of the FBDG "Be active!"

What are we doing to change?

In the context of global and national trends, including the rising prevalence of obesity, inactivity and NCDs, and in response to the WHO's mandate to promote physical activity and health, "Vuka South Africa: Move for Your Health" was initiated.[71] This campaign is multisectoral, and includes the National Departments of Health, Education, and Sports and Recreation, as well as educational institutions and the private sector. Vuka South Africa formed part of the Department of Health's "Healthy Lifestyle Campaign", which has five main pillars, namely promoting physical activity, healthy nutrition and tobacco control, as well as responsible sexual behaviour and combating the abuse of alcohol.[72]

The Charter of Physical Activity, Sport, Play and Well-Being for all Children and Youth in South Africa (Youth Fitness and Wellness Charter) initiative has been underway since October 2004, and received input from over 200 individuals representing national (Departments of Health, Education, and Sport and Recreation), local and provincial government, non-government and non-profit organisations, parents, caregivers, sporting organisations, clubs, schools, the private sector, the media and other key role players. The underlying aim of the charter is to educate schools, caregivers and communities about physical activity, nutrition and wellness; provide a support base to improve and enhance existing school and community-based interventions; and highlight the role of physical activity in social and community development.[75]

In addition, a school-based physical activity programme, Healthnutz, has been implemented in schools in the Western Cape and Gauteng provinces. Healthnutz is aimed at learners in the foundation phase and was first implemented in 1997.[72] Teachers are trained by the Community Health Intervention Programme (CHIP), after which they have a period of co-implementation with the CHIP staff.[72] Once the teachers feel confident in leading the twice-weekly exercise sessions, they take ownership of their school's Healthnutz programme. The implementation and success of the Healthnutz programme in the Limpopo province was investigated by Draper et al. The initial programme in this province included 1 500 learners from three primary schools. Qualitative methods were used to collect data from the teachers and programme leaders of the Healthnutz programme (n = 45).[72] Teachers reported that the programme was another way of increasing weekly physical education and impacted both teachers and learners positively.[72] The quantitative data that were collected from the same group of participants showed fitness parameters, such as the sit-and-reach test for flexibility, sit-ups and the "shuttle run", improved significantly in the intervention schools, but remained unchanged in the control schools.[11] This research study also reported that learners enjoyed the nutrition lessons which formed a component of the Healthnutz programme.[11] Thus, these examples suggest that school-based interventions are promising and are able to improve the health and fitness of learners. However, similar programmes should be expanded to other areas of the country, including rural areas, to be effective on a national level.

Despite these initiatives, some researchers still felt that control over the increase in NCDs and health-risk factors was not given sufficient priority in low socio-economic status populations.[27] Very few articles have been published on the efficacy of the implementation of these programmes or other initiatives to promote and increase physical activity. However, Roshan[70] described the promotion of a healthy lifestyle through a health club using the FBDG specifically. Members of the club were reportedly more aware of a healthy lifestyle and made healthier choices about diet and exercise. The question arises: Is this enough, and is the mass population being targeted effectively?

Current FBDGs: are they enough?

As indicated throughout this paper, it is important to ensure that energy intake and expenditure are kept in balance. Besides nutrient intake, regular physical activity plays a major role in the maintenance of healthy body weight by increasing energy expenditure. According to the ACSM, this expenditure should equal 8 400 kJ/week in adults, in order to ensure health advantages.[47]

National data obtained from the South African Demographic and Health Survey for South Africans in 2003 indicate that inactivity is reported by 49% of persons in the Western Cape area.[13] Women describe the highest levels of inactivity and the prevalence of inactivity increases with age. Similar results were found in the North West province, with more than 50% of respondents reporting inactivity.[12] This was based on the criteria of persons performing at least 150 minutes of activity per week. A limitation of these large surveys is that questionnaires are the main tools used to collect physical activity data and they are, therefore, based on self-reported measures. A study in a smaller sample of women (n = 171), in a rural setting that collected physical activity objectively, found that the rural women reached the set criteria of 150 minutes of activity per week.[76] Those working in the forestry industry engaged in five times higher levels of activity than their urban counterparts.[76]

This might, in part, be influenced by the definition of physical activity, and is also based on the required intensity levels. Furthermore, perceptions of what constitutes physical activity might differ. For example, occupation-related physical activity might be perceived as work and not physical activity. However, what is clear is that despite the barriers, NCDs are on the increase and the current physical activity levels of South Africans are not modifying the risk factors that relate to NCDs. South Africa is a unique country with its own challenges. Therefore, we suggest that the current guideline for South Africans should be increased to those levels suggested for weight loss, for example, at least 40-60 minutes of moderate-intensity physical activity on most days of the week, and possibly accumulated in bouts of at least 10 minutes of activity.[75] These suggestions concur with the guidelines of the WHO,[74] which suggest that adults need 150 minutes of moderate-intensity aerobic activity per week. Moderate-intensity aerobic physical activity should be increased to 300 minutes per week, of which at least 75 minutes should be vigorous intense aerobic physical activity to promote weight loss, and that will have additional health benefits. This vigorous intense aerobic physical activity may also be accumulated over the day in bouts of at least 10 minutes.

The additional benefits of regular physical activity include physiological adaptations of the vascular system, an increase in bone mineral density, a reduction in depression and a significant improvement in insulin sensitivity in persons with diabetes.[6,40,41] Although regular physical activity plays a major role in the maintenance of body weight and the prevention of obesity, various studies have indicated that as little as 2-3% weight loss has resulted in improvements in NCD risk factors.[15,42] However, the National Heart, Lung and Blood Institute guidelines recommend 10% weight loss for a beneficial effect on cardiovascular disease risk factors.[73] These benefits include decreased blood pressure,[53] improved lipid profiles[52,51] and improved glucose tolerance.[45]

In order to reap the benefits of regular physical activity supplementary to weight management, the same principles of exercise should be applied, namely frequency, intensity and time and type of exercise. The implication is that not only should the frequency of physical activity be addressed, but also the intensity, time and type of activity.[75]

Children

The ACSM recommends that children aged 5-11 years and youth aged 12 -17 years[73] should engage in at least 60 minutes of moderate- to vigorous-intensity physical activity per day. Similar to adults, this physical activity can be accumulated in bouts of 10 minutes or more at a time. The one hour of activity is in addition to the incidental activity that children accumulate during the day.[77] It can be achieved by participation in sports (school based and non-school based), games, part of natural play and active transportation.[78] Another means of meeting the guideline's recommendation is to try to include family-based activities that promote physical activity.

This suggestion is supported by Tremblay et al who reported that activities should be diverse and include those that children enjoy, and which promote physical development.[78] Activities that strengthen the muscles and bones of children should be performed three times a week.[78] It is important to note that strength training in this age group should be limited to body weight exercises, such as push-ups and lunges.

Infants who are younger than one year of age should engage in floor play several times per day, which might include "tummy time" and crawling.[79] Similarly, toddlers and preschoolers should accumulate 180 minutes of activity per day.[79] These three hours can be of any intensity and comprise short bouts of activity.[76] Physical activity should form part of toddlers' daily lives and include the games that they play.[79] These guidelines are for "apparently healthy" children. The parents of children with illness, injuries or disabilities should consult a physician prior to embarking on a physical activity programme.[76]

Additional guidelines on managing sedentary behaviour in children and the youth include limiting screen time to a maximum of two hours per day.[76] Similarly, caregivers should minimise the time that infants, toddlers and preschoolers are inactive.[76,77] Time in the pram or car seat should not exceed one hour at a time.[78] Children who are younger than two years of age should not watch any television, while those who are older than that should limit screen time to no more than two hours per day.

There appears to be a dose-related response, whereby the more time spent on physical activity and the less time on sedentary activities, the greater the benefits in terms of the prevention of childhood obesity and the establishment of habits that promote physical activity.[73] If children do not meet the current 60 minute/day guideline, they should start with a small amount of activity and gradually increase it until the recommended level is reached.[73]

Conclusion

From the available evidence, it is clear that being active is an important intervention for the promotion of health and in addressing NCDs in South Africa. Research should start to focus on strategies that increase the knowledge of physical activity in the population, supported with interventions to overcome barriers to activity. The advantages of being physically active, as well as knowledge of how to be active with regard to duration, intensity, frequency and modalities of physical activity, should also be addressed. Various programmes have been implemented to try and promote physical activity, but we think that it is time to educate, rather than propagate. In addition, exercise specialists, such as biokineticists, should be consulted to prescribe physical activity. A national physical activity policy must be developed for all age groups and should be one of the highest priorities when treating and preventing disease. This policy should be implemented in the public health sector using trained professionals.

Research on best practice and evidence for implementing programmes should form an integral part of initiatives and programmes that aim to promote physical activity. South Africa remains a unique setting, with unique requirements. Therefore, methods of measuring physical activity should be sensitised and standardised. Furthermore, the effectiveness of both existing and new programmes should be evaluated, with the aim of disseminating the results to the South African population. Including physical activity as an FBDG is a first step in making people more aware of the importance of being physically active in order to obtain the health benefits. In the near future, it will be necessary to work together with other allied health professionals to increase physical activity levels in South Africans.

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