Opinion Article

GENETIC AND EPIGENETIC PERSPECTIVES ON NEURODEVELOPMENTAL DISORDERS: FOUNDATION FOR GHANA ACTIVE SCHOOLS' PROGRAMME

Abstract

Aim

In this paper, we examine how ambidextrous organizational practices can be used to advance the management of basic schools in accepting behaviours that can improve the physical activities of children.

Methodology

Drawing on extant literature, we explore three key developmental systems – managerial responsiveness, healthcare variation and educational development and highlight four areas from these systems; organizational processes, infrastructure development, human resource improvements and stakeholder collaboration where policy makers can focus their efforts to improving physical activity in children.

Findings

Promoting physical activity in public basic schools in Ghana is expected to achieve five main objectives; health improvements, facilitate learning, ensure social integration, prevent neurodevelopmental disorders and prepare talents for future sporting events; but the implementation of physical activity in Ghana has inconsistencies arising from structural defects, infrastructure gap and lack of wholistic framing. In countries where physical activity in public basic schools has received higher recognition and visibility by policy makers and practitioners, there has been improvements in movement behaviours, lifestyle changes, active learning and physical activity levels of school children. The seemingly absence of structures for physical activity in public basic schools presents severe consequences, especially for healthy growth of children, proper integration of children into society, learning process and developing talents for future sporting activities in general - thus provoking policy and practice dialogues in genetics and epigenetics.

Conclusion

Practical approaches are needed to enhance physical activity for children and this requires the initiation of active schools' programme in public basic schools. Indeed, learning from best practices in other countries, and drawing from ambidextrous managerial practices these challenges could be mitigated in the years ahead.

Key words: Physical health, public basic school, managerial practices

1.0 Introduction

Movement behaviours in the 24-hour period among children and youth have set down exponential interest in public health research and practice especially in the discipline of sports medicine [1]. This is because the recommended benchmark to participate in moderate-to-vigorous physical activity (MVPA) of 60 minutes daily across the globe, has not been achieved [2]. Quite a substantial percentage of the global population

remains inactive below the recommended levels of physical activity [3].

In view of this, for example, Canada has released evidence-informed 24-hour movement guidelines for children and youth in reaction to the adverse trends in physical activity. The Australian Government also in 2008, developed the first national guidelines for physical activity and sedentary behaviours for early years [4]. Again, the United Kingdom in 2010 reviewed and updated their existing guidelines on physical activity for children to respond to emerging scientific evidence on sports medicine. All across Europe, the verge of attaining the 60 minutes MVPA among school children has increased between 70% and 76% [2]. The underlying importance of physical activity especially in children cannot be overemphasized in neurodevelopmental studies and the desire to explore measures to control non-communicable or chronic diseases is unequivocally expressed in many policy dialogues in both developed and developing countries. We explore both perspectives and consider three key developmental systems – managerial responsiveness, healthcare variation and educational development. We then highlight four areas from these systems; organizational processes, infrastructure development, human resource improvements and stakeholder collaboration where policy makers can focus their efforts to improving physical activity in children.

To discover the overlay among these systems we review literature on epigenetics and draws on experiences from selected countries - induced with a case from Ghana. We further draw insights into the application of management practices from the scientific management literature. We then suggest a more practical approach to the implementation of physical activity in basic schools in Ghana as a way for other LMICs experiencing similar challenges.

2.0 Literature Review

2.1 Genetics and Physical Activity

Indeed, lifestyles such as smoking and alcohol abuse, unhealthy diet and inactivity can lead to chronic diseases or ill health [5, 6, 7]. When these health risk behaviors lead to chronic disease, they have already prolonged dysfunctional habits in eating, drinking, breathing and moving - leading to unmaintainable ease of functioning of the individual and other genetic consequences [5]. For example, individuals who are prone to the above lifestyles do not only put themselves at risk of certain chronic diseases such as diabetes and hypertension, but can put their future offspring at risk. Physical inactivity and sedentariness contribute considerably to ill health and premature mortality [5, 8]

Disparities in physical activity and sedentary behaviour have been attributed to genetic factors and in a reverse form as well. For example, the literature has identified a complicated set of environmental, genetic and phenotypic causes that connect physical activity and sedentariness to other behavioural qualities [9, 10, 11]. Again, a systematic review of 45 articles from physical activity and genetics literature revealed genome-wide significance showing an association between genetics and physical activity (12), Other studies have also reported the association between physical activity and genetics (13, 14, 15). At the sharp edge of this absurdity, creates a real need for principles of health that can integrate existing naturalistic and holistic perspectives of population health including physical activity.

2.2 Epigenetics from Physical Science Perspective

Recent systematic reviews on physical activity among children and its relationship on health suggests a positive benefit associated with desirable movement behaviours [1]. For example, literature on sports medicine shows that 62%-84% of Canadian school children and toddlers of age (1-2years) all meet physical activity guidelines [1]. This is in line with other scholars' proposition that suggests effective physical activity as an important requirement during childhood school years [2]. Daly-Smith [2] indicates that, there is the need for a whole-school approach to physical activity since meta-analysis of current approaches to physical activity have had little, if any, effect on MVPA.

While some countries continue to make significant strides in meeting the standard benchmarks for physical activity in among children, little is being done in other countries especially Low Middle - Income Countries (LMIC). The implementation of guidelines on physical activity in basic schools in some LMICs have either met management or policy resistance. In other jurisdictions such as the Philippines, there is a report card for physical activity guiding children and adolescent to have a robust evaluation of physical activity and other close behaviours such as variables and settings that are likely to influence these behaviours [16]. In spite of this, it has been shown that children and adolescents in the Philippines also do not meet the recommended provision of physical activity [16]. Furthermore, physical activity in the same jurisdiction indicated that there is an overwhelming concern for insufficient physical activity among Filipino children [17]. In all those cases, ineffective managerial and organizational practices as well as inadequate multi-stakeholder involvement have been identified as key bottlenecks [17]. In line with these developments in the Philippines, there is the need for a comprehensive plan that will ensure effective managerial practices on physical

activity in schools for Filipino children and adolescents [18].

In Hong Kong for example, the Department of Health through the Centre for Health Protection has revealed a similar situation as in the Philippines. An analysis of the 2020-2022 population health survey in Hong Kong indicated that 24.8% of the population within the age brackets of 18 and above had insufficient physical activity with females taken a lead of 26.5% while their counterpart males represent 22.8% [19] suggesting systemic weaknesses in the implementation of physical activity programs in some Asian countries. It cannot be taken for granted that the net effect of insufficient physical activity has a huge consequence on the individual's health and in children, the significant developmental and growth challenges is very alarming as underscored by many scholars and researchers.

Low physical activity levels can lead to negative health outcomes. For example, the World Health Organization has shown that in 2014 alone, over 6 million people globally were obese as a result of low physical activity. Again, obesity prevention could be related to school-based physical activity interventions [17]. This suggests that, obesity can be minimized and or prevented if appropriate interventions are implemented effectively especially at the basic school level where children undergo major developmental changes both mentally and physically. Yet, structural and managerial bottlenecks in most cases hinder the successful implementation of what otherwise could be described as modest and innovative interventions. More difficulties in school management practices regarding physical activity arise when diminished integration of physical activity in basic school curriculum increases overweight and obesity in elementary school children as well as low academic achievement in elementary school children as [20]. Indeed, this gap inspired the need to co-produce interventions in a way that would combine both bottom-up and top-down approaches to create 'system change' at the global level [20].

Notwithstanding calls, on the development of effective whole-school approach in sustaining change and behaviour movement, it is unclear what the most effective approach (es) are [16]. This may result from structural defects, infrastructure gap, lack of holistic framing, poor managerial and organizational practices, inadequate multi-stakeholder involvement, and sustainability measures during the implementation of physical activity programmes in schools [16].

However, in LMICs such as Ghana, this new integrated approach has not yet been applied within the school setting partly due to inability of managers in most of the schools to combine the complex issues in health, education, management and culture and to

create synergies for optimum outcome. It is on this premise that, the authors propose the initiation of Active Schools' Programme (ASP) that embraces ambidextrous managerial and organizational practices in public basic schools in Ghana - suggesting an integrated approach from three key perspectives of social developmental approaches and growth in children (management, healthcare and education). While the aspects of healthcare and education on the growth and development of children have been extensively discussed the literature is silent on the integration of the three - leading to a seemingly gap that results from management lapses in the implementation of what we can describe as *'beautiful'* guidelines on physical activity in many schools in LMICs.

3.0 The Ghana Case

Promoting physical activity in public basic schools in Ghana has a basis from national policy dimension with a framework to guide the implementation. This is expected to achieve five main objectives; health improvements, facilitate learning, ensure social integration, prevent neurodevelopmental disorders and prepare talents for future sporting events; but we argue in Ghana, the implementation of physical activity has inconsistencies arising from structural defects, infrastructure gap and lack of holistic framing. In countries where physical activity in public basic schools has received higher recognition and visibility by policy makers and practitioners, there has been improvements in the implementation of guidelines and framework in basic schools to improve movement behaviours, lifestyle changes, active learning and increased physical activity levels of school children.

In Ghana, the national policy framework requires the implementation of active physical activity in basic schools but the seemingly absence of structures for physical activity in public basic schools presents severe consequences, especially for healthy growth of children, proper integration of children into society, learning process and developing talents for future sporting activities in general - thus provoking policy and practice dialogues in epigenetics. Indeed, learning from best practices in other countries, and drawing from ambidextrous managerial practices these challenges could be mitigated in the years ahead.

Practical approaches are needed to enhance physical activity for children and this requires the initiation of active schools' programme in public basic schools. Considering the health of children and talent acquisition in sports of which both are areas of concern for Ghana, this paper proposes a strategic framework for active schools' programme focusing on practical approaches to physical activity that aims at promoting healthy life style practices in school children,

creating a continuous learning environment in schools and preparing talents for future sporting events in the country.

More recently in Ghana, there have been calls to develop whole-school approach to physical health and/ or framework on physical activity that will foster movement perspective and healthy lifestyle behaviours among school children [4]. In order to restore the decline in physical activity among school children in Ghana, new approaches that are practically appropriate, innovative and contextually feasible for children are required in public basic schools. For example, the 2018 Ghana's report card on physical activity for children and youth indicated that, the Ghana Education Service recommends at least 80 minutes per week of physical activity in schools, but this is not the case in practice. The report card further indicated that, the failure of children and youth in achieving the required recommendation pose a threat to their health and active learning [19)]. These threats affect the overall physical health (sleep, nutrition, movement behaviours, and activity levels of the school children) and academic performance.

The report indicates that, the proportion of Ghanaian children who achieve the World Health Organization (WHO) required physical activity amount is low. It further concludes that, the mandate of the Ghana Education Service (GES) on physical activity for school children that will be applicable, can be easily enforced, supervised and ensure total compliance. The report therefore recommends a strategic approach to physical activity programme which is necessary to promote healthy and better life for children. Interestingly, the Ministry of Education has developed physical education curriculum for primary schools [20)] and needs to be implemented by the Ghana Education Service through rigorous stakeholder interventions to reinvigorate active participation of physical activity among the school children.

Recently, the call for (re) building of the nation's soccer/football team, which is a major sport in Ghana, as a result of the abysmal performance at the just ended African Cup of Nations 2021 in Cameroon and the 2022 FIFA World Cup in Qatar, reiterates the need to start building talents for future sport events and that can only begin from basic schools – practical approaches to physical activity is indeed critical and best practices from elsewhere can be taken on board. Fortunately, history in this area also offers examples to learn from.

Clearly, physical activity is not a new concept in public basic schools in Ghana, but the neglect and low visibility it is receiving in recent times, demand an alternative that highlights distinctions in culture, policy and practice, strategy and management. We find this in active schools' programme concept being implemented in other countries and propose ambidextrous organizational principles to be adopted by public basic schools in the

implementation of the ASP to address the current management lapses.

4.0 Ambidextrous Managerial Practices

Ambidextrous as a concept attained a widespread recognition in management circles when O' Reilly and Tushman published an article on ambidextrous practices in Harvard Business Review in 2004. The concept traces its features to the ancient Roman god Janus - with two sets of eyes where one pair concentrate on past events while the other set focuses on future events [9(24)]. It signifies managerial practices where managers can always look back and bring to bear the old best practices that have been neglected whereas special attention is on the future - in this case managers of public basic schools can look back to the old physical activity concept in elementary schools now dysfunctional, while at the same time staring ahead in preparations for future innovations to improve existing practices. Ambidextrous practices have proven to be effective in similar cases to improve performance, facilitate organizational change process, and encourage innovations leading to strategic flexibility and operational efficiency [20; 1; 2; 4; 19;]. We suggest a way for managers of public basic schools in Ghana drawing from ambidextrous management practices to incorporate those management principles into the existing active school's programme to ensure efficiency in the management of the programme.

5.0 Discussions

5.1 Active Schools' Programme (ASP)

The authors define active schools programme to mean; a wholistic approach to physical activity in basic public schools that encompasses managerial creativity and innovations as well as operational effectiveness. This brings to the fore improvements in; managerial practices and structures, human resource improvements, stakeholder participation and sporting infrastructure similar to existing practices in the United Kingdom, Canada and USA. In the Ghana context we propose the following structures:

5.2 Physical Activity Unit

There is the need to establish a unit for physical activity in public basic schools. This unit will coordinate all the activities of the active schools' programme.

5.3 Human Resources

In terms of personnel, the authors propose the urgent need to train and groom physical education experts, regenerative health experts, counselling psychology experts, and sport and exercise science experts who will form the core of the needed capacity to implement the active schools' programme.

5.3 Recreational and Wellbeing Facility

All public basic schools must have recreational and wellbeing centres. These centres should have basic equipment such as abdominal crunch, hip adductor/abductor, rotary hip, leg extension, triceps press, and woodway treadmill. Activities in these centres should be supervised by the exercise scientist, regenerative health personnel and the physical education expert.

5.5 Sporting infrastructure

The creation of sporting infrastructure within the spheres of the basic schools will encourage and motivate pupils to participate in physical activities. Sporting Infrastructure such as volley ball court, table tennis, field hockey pitch, basketball court, mini football pitch, martial arts, taekwondo, trampoline, etc will complement the implementation of the active schools' programme. However, an empirical study is needed to provide legitimacy to the proposals in this commentary.

The propose framework is represented in figure 1.0

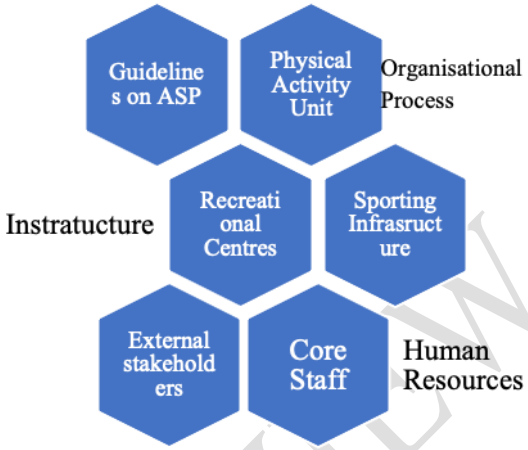

Figure 1.0: Active Schools' Programme Framework. This programme proposes a minimum of four (4) hours of physical activity, twice a week within the academic calendar. It is expected that, when this programme is implemented, it will influence human capital, physical health; good sleep, good diet, movement behaviours, and attitudinal behaviours among school children.

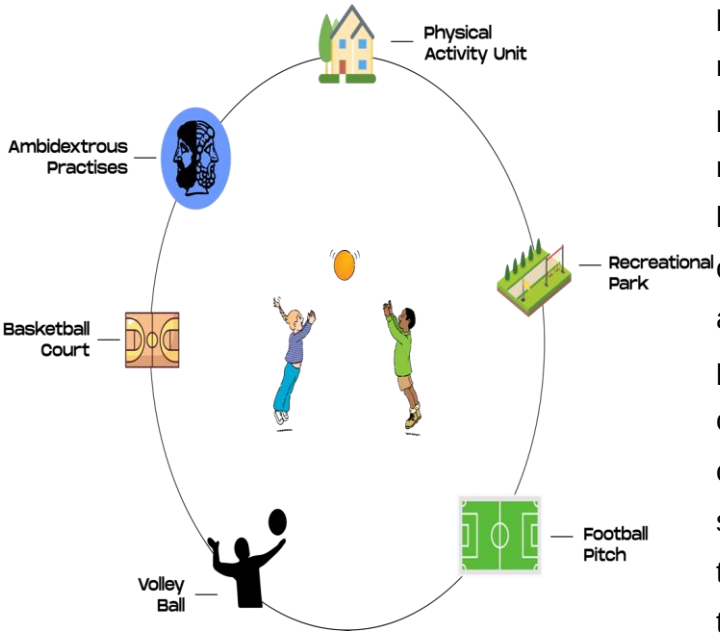

Figure 2. Active Schools' Framework

6.0 Conclusion

In this paper we have shown how ambidextrous organizational practices can be used to advance the course in management practices for accepting behaviours that can improve the physical activities of children in basic public schools. Promoting physical activity in public basic schools in Ghana is expected to achieve five main objectives; health improvements, facilitate learning, ensure social integration, prevent neurodevelopmental disorders and prepare talents for future sporting events; but the implementation of physical activity has inconsistencies arising from structural defects, infrastructure gap and lack of wholistic framing.

In countries where physical activity in public basic schools has received higher recognition and visibility by policy makers and practitioners, there has been improvements in movement behaviours, lifestyle changes, active learning and increased physical activity levels of school children. In Ghana, the seemingly absence of structures for physical activity in public basic schools presents severe consequences, especially for healthy growth of children, proper integration of children into society, learning process and developing talents for future sporting activities in general - thus provoking policy and practice dialogues in epigenetics. Indeed, learning from best practices in other countries, and drawing from ambidextrous managerial practices these challenges could be mitigated in the years ahead. Practical approaches are needed to enhance physical activity for children and this requires the initiation of active schools' programme in public basic schools.

Considering the health of children and talent acquisition in sports of which both are areas of concern for Ghana, this paper proposes a strategic framework for active schools' programme focusing on practical approaches to physical activity that aims at promoting healthy life style practices in school children, creating a continuous learning environment in schools and preparing talents for future sporting events in the country.

Reflecting on the limited capacity in public basic schools to promote physical

activity and physical education among the school children we recommend the need to revert to the traditional health and active learning policies in basic schools. This paper proposes an Active Schools' Programme for implementation in the public basic schools. Thus, the attention of policy makers most especially the Ministry of Health, Ministry of Youth and Sports, Ghana Education Service, Parent Teacher Associations, Ghana National Association of Graduate Teachers need to (re) enforce physical education and physical activity programmes in the basic schools of the Public Institutions. Childhood obesity onset is on the rise and Ghana is not an exception, thus the need for ambidextrous practices taken into consideration children's health, level of physical activity, active learning and the overall human capital development of children. A continual neglect of physical activity and physical education programmes at the public basic schools, may lead to difficulty in talent identification, growth and development, which in the long run, can create barriers in the nation's effort to scout for talents into sporting events in the country. Hence, the proposition for active schools' programme in the public basic schools would be useful for such new talents into the nation's sport and social integration.

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