

**EFFECT OF PHYSICAL ACTIVITY ON THE ACADEMIC PERFORMANCE OF NURSING STUDENTS OF THE FACULTY OF HEALTH SCIENCES, UNIVERSITY OF BUEA AND OF BIAKA UNIVERSITY INSTITUTE BUEA****\*Binwi Florence Nkemayim, Tabot Joel Parfait Ngema and Palle John Ngunde**

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**Background:** Physical activity is a crucial component of school curricula as it is suggested to increase the students' academic performance. This may be applied in the university age group, especially when considering health sciences colleges where higher stress levels are recorded. **Aim:** Assessing the effect of physical activity on the academic performance of nursing students of the FHS-UB and of BUIB. **Materials and methods:** An online questionnaire-based cross-sectional study involving 202 students from FHS-UB and BUIB was conducted to identify the level of physical activity and its effect on academic performance of the students. Systematic random sampling was done to enroll participants, the chi square test was used to detect the P-value. **Results:** Majority of enrolled participants were females (74.3%). 80.2% were engaged in physical activity while 19.8% were not. Majority of the students carried out contact sports. 92.0% and 95.0% of students who were engaged in physical activity had improved memory and confidence respectively while 93.0% perceived an improvement in level of social interactions. Students engaged in physical activity had better grade point averages compared to those who were not engaged ( $P < 0.05$ ). Students engaged in physical activity had lesser tendencies to re-sit and it was statistically significant ( $P = 0.0091$ ). 56.8% of students carried out more than one physical activity and had better grade point averages. **Conclusion:** The nursing students of the Faculty of Health Sciences University of Buea and of Biaka University Institute Buea who were involved in physical activity had improvements in their academic performance compared to those who did not meet up with the physical activity guidelines. **Recommendation:** The Government should implement the creation of sports centers in health sciences institutions to promote engagement of students in physical activity. Also health sciences Institutions/Universities/Nursing schools should implement physical activity as part of their curriculum not just in a particular semester.

**Keywords:** Physical activity, nursing students, academic performance, FHS-UB, BUIB.**INTRODUCTION**

Nursing students identify academic tasks as their greatest source of stress, and report negative health outcomes during their education including limited physical activity. [1] Stress is known to influence health through its direct physiological effect and its indirect effect through altered health behaviors and can have detrimental effects on both academic performance and health among college students. [2] Compared to other health care professional students and the general public, studies suggest that nursing students experience higher levels of academic stress and are particularly vulnerable to poor health risk. [3] There is some evidence that brings out psychiatric symptomatology and negative behaviors such as academic fraud and non-attendance are associated with student stress. The literature identifies three main groupings: academic sources of stress, clinical sources of stress and social/personal sources of stress [4]. Data suggest that most college students are not meeting physical activity guidelines, suggesting the need for prevention interventions in University students. [5] Physical activity is listed prominently as a leading health indicator in Healthy People 2020 [6] and objectives include increasing the proportion of university students who receive information on health-risk behavior on inadequate physical activity from their institution. However, engaging in regular physical activity can be a challenge for students and despite the awareness of the positive benefits associated with this behavior; knowledge alone is not associated with healthy behaviors [7].

The known advantages of physical activity are wide-ranging, from prevention of obesity-related disorders to decreased cardiovascular disease risk; to enhanced mental well-being by improving psychological mood; reducing anxiety and the risk of depression; increasing self-esteem and satisfaction with life. [8] Insufficient physical activity and stress long-term is associated with negative health risks resulting in high rates of chronic disease including cardiovascular disease and hypertension contributing to increased premature and preventable morbidity, difficulty sleeping, increased levels of depression, anxiety and attrition. [9] Research examining stress and physical activity in Ireland and Hong Kong student nurse populations of similar ages reported conflicting findings. [10, 11] The literature on physical activity in student nurses varied from 22% to 61% in those meeting national physical activity guidelines of at least 30 minutes or more of moderate-intensity physical activity 5 day/week or 20 minutes of vigorous-intensity physical activity on three days per week. [12, 13] Compared to other healthcare students, student nurses are less physically active though findings are mixed. One study reports that physiotherapy students are more physically active, smoke less, and eat fewer sweets and unhealthy snacks compared to nursing students, while others show no difference. [14, 15] In studies conducted in Brazil the researchers found a very low level of physical activity among nursing students [1, 6]. In Thailand, one third of the students did not do physical activities regularly [16]. A study in Hong Kong showed higher physical activity in male nursing students compared to female nursing students [17], while a study from the US showed full-time nursing students to be more physically active than part-time nursing students [18]. In a survey carried out in Slovenia between 2011 and 2013 among nursing students, the authors

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showed reduced physical activity compared to students in other faculties [20]. Nursing students in the UK did not meet the recommended physical activity guidelines of the WHO (World Health Organization) [19]. Nurses play an important role in maintaining people's health and therefore in raising among people awareness of the importance of a healthy lifestyle [21] and also in promoting healthy living among children in kindergartens and schools [21]. It is established that nurses who are physically active and live a healthy life encourage patients more directly and advise them on healthy lifestyles [23]. However, the implementation of physical activity by nurses is largely influenced by their working hours. Nurses having fixed working hours are more physically active in comparison to nurses who have shift work [24]. It is important to familiarize nursing students with healthy living because habits adopted when young are more often maintained throughout life [25]. Besides, it is expected that health care students also represent an example of a healthy lifestyle to be followed by others [26]. The main obstacles for nursing students to carry out physical activity are lack of free time, physical effort, lack of energy, busy work schedule, mental effort and busy learning schedule [27]. Studies also show a connection between physical and mental health. Reduced physical activity also affects the mental state and the emergence of mental disorders such as depression and anxiety [28]. Physical activity is one of the components of a healthy lifestyle and it is important that nursing students are aware of this as their task is to promote healthy living. It is important to regularly investigate the level of physical activity among nursing students and discover what the most frequent causes of physical inactivity are.

Growing literature has exposed a significant relationship between academic performance and physical activity [29]. There has been much interest in studies on the potential benefits of physical activity for the development of cognitive abilities over the last several years, strongly recommending physical activity as an effective instrument for building psychological well-being [30]. Physical activity makes people feel good about them through decreasing depression or sadness, and rectifying and improving mood. The literature also shows that physical activity is linked with a subsequent decrease in mental problems, including depression and insanity [31]. Physical activity is now believed to be an established treatment against depression for adults [32]. Additionally, properly managed physical exercise is important for processing information, particularly in adults. As a result, the idea that a high level of physical activity is effective for increasing thoughtfulness, meditation, and, as a consequence, academic performance is attractive to the learners.

The continuous practice of physical exercise has been shown to have positive effects on various metabolic functions such as cardiovascular capacity, pulmonary ventilation, and secretion of certain hormones, platelets function and coagulation, renal function. [33, 34] But in the last decades, physical exercise has been linked to improvements in brain structures, which leads to an improvement in cognitive functions such as attention, memory, planning, inhibition [35]. There is a growing body of evidence indicating that physical activity can benefit both health and academic performance. This research brief reviews published scientific articles that examine how physical exercise may help students to maximize their academic performance. It also indicates that providing physical exercise for students is in line with schools' academic mission, and that

schools and institutions have many opportunities for helping young people to be more active.

### Statement of problem

It has been observed that many nursing students are reluctant to carry out physical activities including exercise, contact and non-contact sport. They often complain of the busy learning schedule, lack of free time, lack of motivation. This could be a risk for poor health behaviors in a short and long run. Nursing students sometimes see the time to be dedicated to physical activity as trading for their study period, as a result they see time allocation for physical activity as detrimental for their studies. Several studies have heightened that low levels of physical activity may have ripple effects on their academic performances. From observation, it has been noticed that nursing students in the Faculty of Health Sciences often complain of symptoms of ill health such as back pain, fever, headache and joint pain during clinical practices. Some confirm their main sources of ill health are stress and busy work load. Nonetheless, nurses are becoming less effective in providing patient care. They often present tired during early working hours.

### Rationale

Nursing students are amongst professional students who are highly stressed where ever in the world. This high stress is due to voluminous academics meant to create professionals, which leave little time for physical activity and recreation. As future nurses, nursing students must be physically fit for long hours of duty. Sedentary life style is becoming an important threat factor that may inflict negatively on the academic and future professional performance.

### Objectives

1. Assessing the students' knowledge on physical activity.
2. Determine the level of engagement and the type of physical activity carried out by nursing students.
3. Assessing the level of memory, confidence and social interaction, in relation to the physical activity of the students.
4. Determine the effects of physical activity on the grade point average, and re-sit and repetition of class of nursing students.

### Research questions

- R1: How do nursing students view physical activity?  
 R2: which type(s) of physical activities are being carried out by nursing students and how often do they carry out these activities?  
 R3: How does physical activity influence the level of confidence, memory, and social interaction?  
 R4: Do nursing students who are engaged in physical activity have better grade point averages than those who are not? Does physical activity have an impact in course(s) re-sit and repetition of class of nursing students?

### Background

Physical education has traditionally been considered an essential part of curricula to promote a range of benefits including general health, cognitive, development, motor skills and social behavior [36]. The philosophy "Healthy Body,

Healthy Mind” was the motive behind the inclusion of physical education along with the curriculum subjects. Physical education is the systematic education of physical activity to develop a man physically, mentally, emotionally and socially competent through an active medium. Physical activity is defined as any bodily movement produced by voluntary body muscles that require energy expenditure. The term “Physical activity” should not be confused with “exercise”. Exercise is a subclass of physical activity that is planned, structured and repetitive for a certain purpose [37]. Physical education can help the students to develop the knowledge, attitudes, motor and behavior skills, and confidence needed to adopt and maintain physically active lifestyle [38].

The outcomes of a quality physical Activity program are very important to adolescents. Bodily benefits of sports activities, like improved aerobic power, increased muscle strength, and fighting obesity [39] have been demonstrated clearly. Furthermore, athletic participants score higher grades in school and have higher educational aspirations than non-participants have [6, 40]. Participation in sports has also been related to greater satisfaction with body image [7]. Moreover, sports participation has been associated with lower scores on measures of loneliness [8] and anxiety [9, 10]. Therefore, physical education may not be considered extracurricular; it is rather a vital component in students’ academic success. Several studies suggested that increased physical activity during the school time could induce arousal and lessen boredom, which lead to increase classroom concentration and attention span. In addition to that, one study suggested that increased activity levels might be related to improve classroom behavior as well as academic performance [11]. Academic performance refers to “how students deal with their studies and how they cope with or accomplish different tasks given to them by their teachers. It is also the ability to study and remember facts and being Able to communicate your knowledge verbally or down on paper” [12]. At university level, there are many elements, which affect the participation of the students in the physical activities like; university environment, extracurricular activities, family environment, parents’ education, community, university spirit, schedule of physical education and classroom activities. Nursing education is inherently stressful and demanding with an overwhelming burden, which leaves minimal opportunity for the students to relax and recreate. Medical and health sciences student’s life is subjected to different kinds of stressors, such as the pressure of academics with success obligation, uncertain future and difficulties predicted for system involvement.

These students face social, emotional, physical and family problems, which may affect their learning ability and academic performance [13]. Direct indicators of academic achievement include grade-point averages, scores on standardized tests, and grades in specific courses. In addition to that measures of concentration, memory, and classroom behavior can provide indirect estimates [14]. The existing literature on the nature of physical activity provides a basis for this study. This study relies on previously published literature and online resources to defend the hypothesis that a relationship exists between physical activity and academic performance. This chapter will explain the conceptual, theoretical and empirical backgrounds.

Emerging literature characterizing physical activity among student nurses suggests the majority (78%) are not meeting physical activity guidelines recommended accumulation of 30

minutes or more of moderate intensity physical activity 5days/week or 20 min of vigorous-intensity physical activity on 3 days per week to promote health. Academic stress is known to influence health through its direct physiological effect and its indirect effect through altered health behaviors and can have detrimental effects on both academic performance and health among nursing students [36]. Over the last several years, society has witnessed serious consequences due to the lack of physical exercise among students. The lack of physical activity is an antecedent condition for several illnesses, such as obesity and diabetes. The literature includes contemporary views on the impact of physical activity on learning procedure among students and recent studies show that regular activity leads to better mental health [37]. Historically, it was believed that non-academic activities have a negative effect on academic performance [38]. In recent years, the relation between physical activity and academic performance have been analyzed from several viewpoints, such as evaluating the students’ participation in physical exercise with the view that these activities are related to academic performance [39,40]. These studies have reached to different contradictory findings on this issue. One group of researchers has found no relation between physical activity and academic performance [40]. Others have found positive relations between physical activity and academic performance [41]. A comparison between students who are involved in physical activity and who are not involved has been conducted by Trudeau and Shephard [30], and it resulted in positive significant relationship between physical activity and academic performance indicating that academic performance is improved with increasing physical activity. Symons found physical activity to be effective in improving inter-neuronal connections and increasing attentiveness [42]. Strong et al confirmed a positive impact of physical activities on health though it failed to find any relation with cognitive performance [43]. Lindner performed a study in Hong Kong and found a significant, but weak, correlation between academic result and physical activity participation [38]. Later, a similar study was conducted by Dwyer et al., in the context of Australian students and it found a weak correlation between academic results and physical activities [44].

### **Physical activity**

Physical activity is defined as any bodily movement, produced by skeletal muscles, that requires energy. This includes activities undertaken while working, playing, carrying out household chores, travelling and engaging in recreational pursuits. Examples of such activities are lifting, carrying, walking, cycling, climbing stairs, housework, shopping, dancing, and gardening [6]. Physical inactivity is a substantial and increasing burden on health, and mental well-being making an increase in physical activity levels a global public health challenge. There is a dose-response relationship between the level of physical activity and reduction in the major non-communicable disease risk - the more physically active, the greater the benefits to health. Current guidelines have been set at the minimum amount of activity required to prevent the main non-communicable diseases, a level unlikely to have any adverse effects on musculoskeletal health. Further health gains can be expected above these minimum requirements. Although the recommendations are likely to be perceived as achievable by the majority of the people, they are not met by most, apart from a minority of the European population.

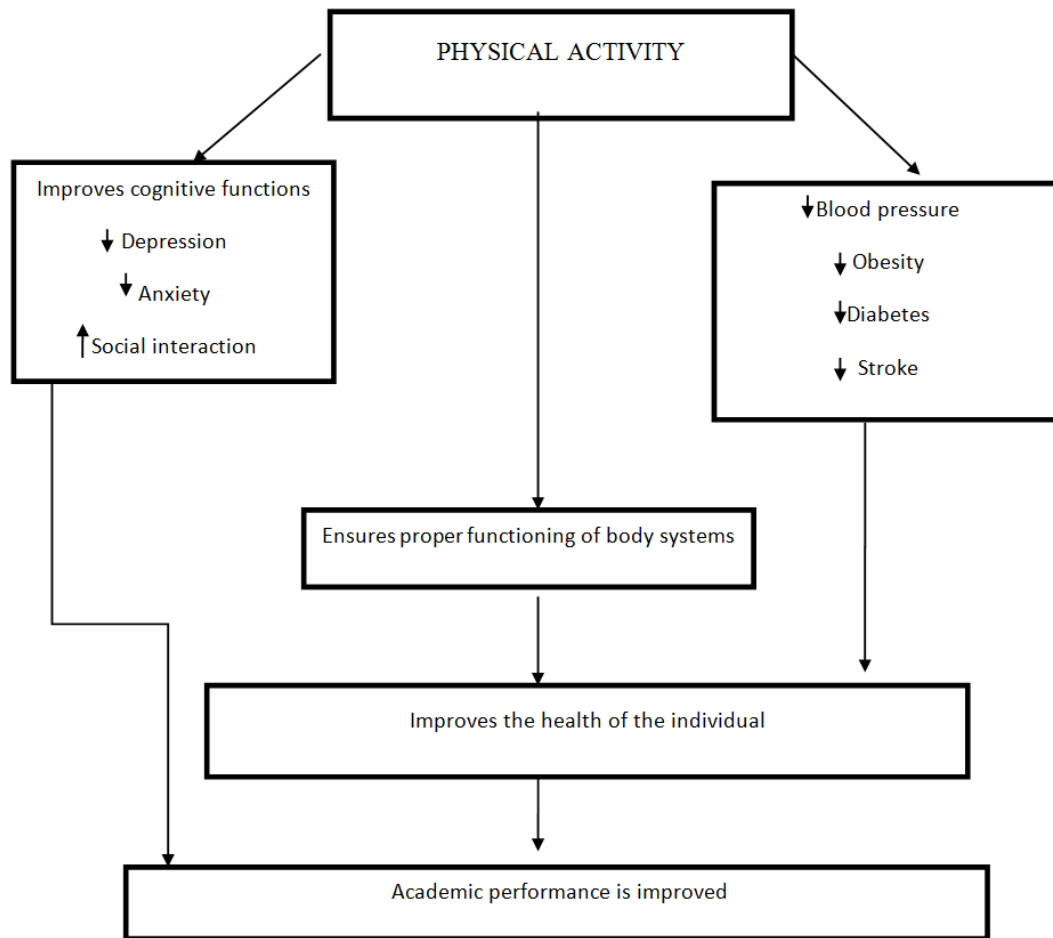


Figure 1. Conceptual Framework

Table 1. Summary of WHO Recommendations on minimum level of physical activity for health [6]

Age range	5 - 17 years	18 - 64 years	65+ years
Recommendations	60 minutes per day Vigorous intensity activity should be incorporated including those that strengthen muscle and bone at least 3 times/week	150 minutes of moderate or 75 minutes of vigorous activity throughout the week. In bouts of 10 minutes or more, muscle strengthening activity included 3 or more days/week	Same as adults 18-64, or as physically active as their abilities and conditions allow. Also to include activities which enhance balance and prevent falls 3 or more times/week

There is a clear need for change, ranging from increased awareness, education, political support, a supportive social and urban environment, and multi-stakeholder interventions for sustained changes in physical activity behavior [7].

### Physical activity and academic performance

One study proved that students who met the physical exercise tests, scored higher on the math and reading portion of the SAT-9 and CST. Research conducted in a classroom setting suggested that movement could aid fine-motor and academic skills development. Thus, it has implications for this study because it researched health behavior and academic performance in the classroom setting. Another found that after six hours a week of doing various forms of exercise, academics, confidence, social skills, and health improved [45]. Additionally, physical activity has been found to have a significant effect on reading achievement [46]. Academic learning time in physical education has been used as a predictor of student achievement.

All students, especially those who suffer from Attention Deficit Hyperactivity Disorder (ADHD), need exercise to help them concentrate. Consequently, exercise can aid the brain with memory and attention [47]. The Brain Gym program, created by Dennison (1985), is another example of related research that advocates a relationship between physical exercise and student's abilities in the classroom. Brain Gym is based on the theory that includes a battery of structured exercises designed to activate certain brain functions. Physical activity can impact student achievement and increase test scores. "Physical activity may be a more precise way to predict health outcomes in students than physical exercise" [48]. Exercise has been proven to improve classroom behavior as well as increase academic performance. Hall (2007) states, "when the movement part of the brain is stimulated, so is the learning part of the brain". Therefore, physical activity can be used as a way to optimize learning. Post-recess attention has been found to be greater after outdoor play periods or recess. Thus, outdoor recess breaks get the blood flowing, which

rejuvenates the brain to help them attend better on classroom tasks [48].

## **Benefits of regular physical activity**

### **Health benefits**

Regular physical activity has considerable health benefits. It builds and maintains bones, muscles, and joints [9]. The building of lean muscle ultimately reduces fat. Physical fitness prevents or reduces the risk of cardiovascular diseases. Additionally, it decreases the number of children struggling from diseases including diabetes, hypertension, elevated blood cholesterol, lowers the risk of colon cancer, and depression [11]. Exercise may also change levels of chemicals in your brain, such as serotonin, endorphins and stress hormones [8]. All in all, physical activity leads to good health. For some students, the structured physical education class that they receive at school may be the only preparation they have for an active lifestyle.

### **Systems of the human body**

Before we discuss the effects of physical activity on the human body, it is imperative that first we identify the major systems of the human body. They are the circulatory, digestive, endocrine, excretory, immune, integumentary, muscular, nervous, respiratory, and skeletal [9].

#### **Circulatory or cardiovascular system**

Physical activity not only raises good HDL cholesterol but also reduces the dreaded triglycerides. This has the ever so important effect of keeping the blood in your circulatory or cardiovascular system flowing smoothly through your arteries and your veins. In the short-term, an athlete's blood pH actually becomes more acidic, and carbon dioxide is expelled at a more rapid pace. The heart rate also increases and the blood flow to the skin increases. We have all seen an athlete's face turn red during the exertion of strenuous physical activity. The bottom line is that, in the short-term, oxygen is rushed to the working muscles, and fuel is delivered to the body tissues [9]. In the long-term, however, the athlete's heart rate actually goes down, not up. We have heard about Tour de France cyclists having resting heart rates of only 40 beats per minute, whereas the average adult may have a resting heart rate of about 80 beats per minute. Another major long-term benefit seen is that the athlete's blood pressure will be reduced. High blood pressure has been linked to a myriad of health hazards, including strokes [9]. In the long-term, the benefits are vast as regular exercise can protect against heart attacks, strokes, and diabetes. The American Diabetes Association considers exercise so crucial in protecting the heart and blood vessels that it recommends 30 minutes of moderate exercise at least five days a week. On the downside, heart attacks can occur to anyone, even a world class athlete. It is worth noting, however, that far more Americans die each year of a sedentary lifestyle than they do from a fitness lifestyle [9].

#### **Digestive system**

When to eat and how much to eat are subjects of endless debate among experts. After all, in the short-term, when one exercises, the body must send more blood to the muscles; therefore, it must compensate by taking away from the needs

of the stomach and the digestive system. This is why many experts believe eating a large meal too soon before exercise can cause stomach upset. We have all heard the advice of our parents not to swim for a half-hour after eating because cramps could result, which to this day is a source of contentious debate. Furthermore, a really fascinating study of forty Irish Rugby players found that, versus another group of non-athletes, the rugby players had more gut microbiota in their intestines, which is beneficial in helping the body's immune system [9].

#### **Endocrine system**

The endocrine system is composed of a series of glands that secrete hormones. Of special importance is the pituitary gland. In the short-term, exercise enables this gland to produce human growth hormone and secrete hormones that allow movement. Diabetes management comes into play here just as in the circulatory system. In the long-term, physical activity has a trifold effect of strengthening the ticker, lowering blood sugar levels, and improving insulin levels [9].

#### **Excretory system**

It's not the most pleasant or glamorous system to discuss, but the excretory system is responsible for the critical role of removing liquid and solid wastes from the human body. In the short-term, the rate at which the kidneys filter blood changes in relation to how hard the athlete exercises. Also, constipation may be relieved [9].

#### **Immune system**

Of all the human body systems, the effect of physical activity on the immune system seems to spark the most debate among experts and scientists. It is now believed that physical activity helps to strengthen the immune system. The general theory is that exercise increases the cell number and size, and even gut micro biota in your body that help fight disease. When a person exercises, the effect of enhancing the immune system lasts for several hours.

There is evidence, however, that exercising for over two hours may actually cause a short-term weakening of the immune system. On the other hand, more intense physical activity for only about 30 minutes may not weaken the system. The evidence suggests that, if a person exercises for too long and doesn't rest enough, the immune system can suffer. The secret seems to be in finding a healthy balance between exercise and rest. More study will be needed to fully understand the connection between exercise and the immune system [9].

#### **Integumentary system**

The integumentary system is just a fancy term for the system that includes the hair, nails, and skin, the latter which by the way is the body's largest organ. In the short-term, as the exercise level increases, the blood flow to the skin increases, and then the heat disappears through the pores. This has the positive effect of cooling the body. Also, sweat can be produced on the skin during this process. In the long-term, physical activity can keep the skin looking more youthful and feeling softer and more pliable [9].

## **Muscular system**

In the short-term, exercise may cause muscle soreness and muscle fatigue. Exercise temporarily breaks down muscle, but crucial rest allows muscles to rebuild and grow. In the long-term, we see how physical activity may have a dramatic, positive effect on the muscular system. The muscles may become larger and stronger or, depending on the exercise, they may develop muscle endurance. Exercises such as yoga may make the muscles more flexible. On the downside, the athlete may experience muscle pulls or even muscle tears [9].

## **Nervous system**

The nervous system is composed of the spine, the nerves, and the brain. Nascent research is finding exciting news that exercise can stimulate the entire nervous system. If you have ever wondered why you felt better after a brisk walk or an aerobics class, there is a scientific explanation for this phenomena. Exercise actually boosts chemicals, known as endorphins, in the brain that help lift your mood. We have all heard someone joke about being on an 'endorphin high', and too many, this is more than just an expression. It should be duly noted, however, that there is another camp of scientists that say the runner's high is nothing more than a myth [9]. Many scientists now believe that exercise can do more than just elevate one's mood, it can also help alleviate depression in individuals who are prone to it. If that's not enough, physical activity may actually help stave off dementia. Scientists haven't fully solved this riddle, but many theorize this is due to the increased blood flow to the brain, which somehow prevents plaque from building up in the brain, a symptom connected to dementia [9]. Exercise can have psychological benefits, as well. In the long-term, some people may become addicted to exercise in a similar way that people become addicted to drugs or alcohol or even food. On the positive side, when one looks in the mirror and likes the results, exercise can result in improved self-image, self-confidence, and self-esteem [9].

## **Respiratory system**

The average adult takes over 20,000 breaths each and every day. In the short-term, exercise increases respiratory rate which allows more oxygen to reach the lungs and the blood. In the long-term, exercise keeps the respiratory system and the lungs clear and healthy and able to acquire more oxygen. This means the lungs will operate at a more efficient level while having more lung capacity [9].

## **Skeletal system**

In the long-term, exercise can help a person lose weight and maintain that weight loss. Much less stress is put on the ankles, knees, and other joints, lessening the chance of injury. In the long-term, however, exercise can also wear down the cartilage between the knees and cause pain and discomfort. Obviously the risk of injury to the skeletal system is always there for the athlete during exercise. Sprains involve injury to ligaments and strains to tendons. There are also joint dislocations and, in the worst cases, fractures, breaks, or even death [9].

## **Exercising body and mind**

The physical benefits of exercise: improving physical condition and fighting disease have long been established, and

physicians always encourage staying physically active. Exercise is also considered vital for maintaining mental fitness, and it can reduce stress. Studies show that it is very effective at reducing fatigue, improving alertness and concentration, and at enhancing overall cognitive function. This can be especially helpful when stress has depleted your energy or ability to concentrate [10]. When stress affects the brain, with its many nerve connections, the rest of the body feels the impact as well. So it stands to reason that if your body feels better, so does your mind. Exercise and other physical activity produce endorphins; chemicals in the brain that act as natural painkillers and also improve the ability to sleep, which in turn reduces stress. Meditation, acupuncture, massage therapy, even breathing deeply can cause your body to produce endorphins. And conventional wisdom holds that a workout of low to moderate intensity makes you feel energized and healthy [10]. Scientists have found that regular participation in aerobic exercise has been shown to decrease overall levels of tension, elevate and stabilize mood, improve sleep, and improve self-esteem. Even five minutes of aerobic exercise can stimulate anti-anxiety effects [10].

## **Social and emotional benefits of physical activity**

We all know the physical benefits of regular exercise. Daily physical activity strengthens your heart muscles, helping prevent heart disease and stroke. It lowers blood pressure and helps fight obesity by reducing body fat, keeping your weight under control [11]. But beyond all the amazing physical benefits that you get from exercise and engaging in physical activity, did you know that it also affects you on a social and emotional level?

### **The emotional benefits of physical activity**

Exercise releases feel-good chemicals in your brain such as endorphins which can give your mood a boost. Endorphins are the same chemicals that help your body manage pain. And this explains why endorphins also have the power to make you feel better and why something as simple as a jog or brisk walk can instantly improve how you feel. These chemicals in your brain make you feel more positive and focused, allowing you to let go of any stress you may be feeling. You feel calmer and altogether, happier [11]. Regular physical activity also improves your self-image which increases your confidence. People who get regular cardio and complement it with strength-training are typically trying to meet their fitness goals. And as they see results of their hard work, they feel empowered and accomplished. And because regular physical activity helps keep you at a healthy weight, you're happier with your physical appearance [11].

### **The social benefits of physical activity**

When you have self-esteem and self-confidence, your social relations improve. Because you feel good about yourself and have emotional health, you don't shy away from social interactions. In fact, you may even take the first step to meeting new people and establishing new friendships [11]. People who engage in physical activity have the opportunity to meet new people all the time. You meet people running the same trail as you. You make acquaintances with the people you meet in yoga or cycling class. You might even join a team sport and make friends with all your teammates [11]. The social benefits don't just mean that you make friends

effortlessly but that you know how to handle yourself in social environments. And this is a great characteristic to have if you find yourself socializing with people often. Maybe your job puts you in front of people every day, or your work has you attending a lot of social events. Your job may even require that you to work in teams. And because of the social benefits of physical activity such as regular exercise or participating in a sport, you know how to work well with others [11].

### **Impacts on learning in classroom**

Physical activity increases students' capacity for learning. Learning through movement is vital for a successful experience in school. "Exercise, besides shaping up bones, muscles, heart and lungs also activates major growth of neurons and nerve nets in the basal ganglion, cerebellum and corpus callosum of the brain. Aerobic exercise increase the supply of blood and oxygen to the brain" [49]. Physical activity helps students concentrate and focus. Being physically active in school has positive impacts on learning in the classroom. Thanks to advances in brain research, we are now aware that most of the brain is activated during some sort of physical activity much more than when sitting behind a desk [50]. Movement expands blood vessels that allow for the delivery of oxygen, water, and glucose to the brain, which optimizes the brain's performance. Therefore, physical activity increases the blood flow, which in turn, increases cognitive functioning. One Canadian study shows how academic scores increased when a third of the school day was devoted to physical education. Another study demonstrated students participating in five hours of vigorous physical activity a week had stronger academic performance in math, English, natural sciences, and French than students with only two hours of physical activity per week. Students who participate in daily physical education have been shown to perform better academically and to have a better attitude toward school [51]. Physical activity and fitness may actually help students do better in the classroom. According to Hannaford, movement is vital on how individuals embody and express their learning, their understanding, and themselves. Movement integrates and anchors new information and experiences into the brain; therefore, it activates one's mental capacities. Movement assists brain growth and health for a lifetime, and exercise may improve the functioning of the brain [52]. Physical exercise has been shown to develop greater academic performances in students.

### **Increased energy**

Burning up energy by participating in physical exercise may pay off with increased energy in the long run. Regular exercise can increase energy levels. Physical exercise every day can provide the energy students need. Regular exercise increases energy and reduces fatigue [53]. In his book, *The Minds of Boys*, Gurian comments that "the boy, fueled by his boy energy, tends to learn by innovating in risk taking ways, wearing goggles so the dangerous game can go on. This energy involves a lot of physical movement and manipulation of physical objects". All students, boys and girls, need time during the day to be active so they can have the energy to get through the rest of the day [54].

### **Physical activity in relation to memory and thinking skills**

There are plenty of good reasons to be physically active. Big ones include reducing the odds of developing heart disease,

stroke, and diabetes. Maybe you want to lose weight, lower your blood pressure, prevent depression, or just look better. Here's another one, which helps in thinking and memory. In a study done at the University of British Columbia, researchers found that regular aerobic exercise, the kind that gets your heart and your sweat glands pumping, appears to boost the size of the hippocampus, the brain area involved in verbal memory and learning. Resistance training, balance and muscle toning exercises did not have the same results [52]. The finding comes at a critical time. Researchers say one new case of dementia is detected every four seconds globally. They estimate that by the year 2050, more than 115 million people will have dementia worldwide [52].

### **Exercise and the brain**

One of the most basic benefits of physical activity is the development of motor skills. Every child's earliest learning is based on motor development [51]. Providing students with these opportunities to learn these skills is important. It is believed that there is a relationship between motor skills, fitness, and physical activity [8]. Individuals with low motor competence are likely to have poor physical fitness when compared to those with high motor competence [53]. Exercise helps memory and thinking through both direct and indirect means. The benefits of exercise come directly from its ability to reduce insulin resistance, reduce inflammation, and stimulate the release of growth factors chemicals in the brain that affect the health of brain cells, the growth of new blood vessels in the brain, and even the abundance and survival of new brain cells [12]. Indirectly, exercise improves mood and sleep, and reduces stress and anxiety. Problems in these areas frequently cause or contribute to cognitive impairment [12]. Many studies have suggested that the parts of the brain that control thinking and memory (the prefrontal cortex and medial temporal cortex) have greater volume in people who exercise versus people who don't. "Even more exciting is the finding that engaging in a program of regular exercise of moderate intensity over six months or a year is associated with an increase in the volume of selected brain regions," says Dr. Scott McGinnis, a neurologist at Brigham and Women's Hospital and an instructor in neurology at Harvard Medical School [12].

### **Physical activity and academic performance amongst nursing students**

Physical education can help the students to develop the knowledge, attitudes, motor and behavior skills, and confidence needed to adopt and maintain physically active lifestyle [12]. The outcomes of a quality physical Activity program are very important to adolescents. Bodily benefits of sports activities, like improved aerobic power, increased muscle strength, and fighting obesity [13] have been demonstrated clearly. Furthermore, athletic participants score higher grades in school and have higher educational aspirations than non-participants have [14]. Participation in sports has also been related to greater satisfaction with body image [13]. Moreover, sports participation has been associated with lower scores on measures of loneliness [15]. Physical activity has also been associated with low scores of anxiety [16,17]. Therefore, physical education may not be considered extracurricular; it is rather a vital component in students' academic success. Several studies suggested that increased physical activity during the school time could induce arousal



and lessen boredom, which lead to increase classroom concentration and attention span. In addition to that, one study suggested that increased activity levels might be related to improve classroom behavior as well as academic performance [18]. Academic performance refers to “how students deal with their studies and how they cope with or accomplish different tasks given to them by their teachers. It is also the ability to study and remember facts and being able to communicate your knowledge verbally or down on paper”[19]. At university level, there are many elements, which affect the participation of the students in the physical activities like university environment, extracurricular activities, family environment, parents’ education, community, university spirit, schedule of physical education and classroom activities. Nursing education is inherently stressful and demanding with an overwhelming burden, which leaves minimal opportunity for the students to relax and recreate. Nursing and health sciences student’s life is subjected to different kinds of stressors, such as the pressure of academics with success obligation, uncertain future and difficulties predicted for system involvement. These students face social, emotional, physical and family problems, which may affect their learning ability and academic performance [20]. Direct indicators of academic achievement include grade-point averages, scores on standardized tests, and grades in specific courses. In addition to that measures of concentration, memory, and classroom behavior can provide indirect estimates [21]. Nowadays, Most of the universities have large number of students from different countries with extremely variable cultures and backgrounds. Nursing and health sciences university students represent an important segment of our young population and constitute a good deal of the total population. The sports officers in medical universities in our region are finding many difficulties in encouraging students to participate in sports activities because of the highly demanding medical education, as noted earlier. This may be one of the subtle factors that affect the academic performance of these students and there is no study, in this region at least, to measure the involvement of nursing students in sports and to relate that to their academic performance [20].

### **Theoretical framework**

Exercise for students appears to be decreasing, which has resulted in more students becoming overweight or obese since the 1960s [51]. Also, an increased number of students are being diagnosed with Type 2 Diabetes [52]. More specifically and across all age groups, girls tend to be less physically active than boys. With the current implications of No Child Left Behind (NCLB), schools and teachers have felt accountability pressure to increase performance until all students are performing on grade level [53]. With the increased pressure, physical education classes and recess have been eliminated in some school systems. A national movement to eliminate recess began in the late 1980’s. Many school systems are choosing to follow this trend of eliminating recess and excluding physical activity. Although most states require physical education, forty percent allow exemptions from physical education requirements [34]. This is a result of being more concerned with satisfying political needs rather than educational needs. Thus, the reduction in physical activity and exercise, an increase in poor eating habits, and sedentary lifestyles are causes of the increased number of children and adults with obesity and diabetes, high blood pressure, and other health risks. Teachers need to integrate physical movement in their lesson plans. There are current efforts in integrating content

areas into physical education classes and interdisciplinary teaching. Integration, when used as a teaching method, has helped increase student learning [54]. Additionally, “physical movement, such as stretching every twenty minutes in the classroom, can help stimulate the BDNF in a student’s brain and help learning occur more easily” [55]. Integrating physical activity on a daily basis into the school day is a powerful teaching method with an abundance of benefits. There are many factors that affect learning, and physical education is one of the many factors that impacts academic achievement. In this day in age, it is necessary to integrate physical activity with other content areas to enhance learning in the physical education setting, as well as the classroom setting. Movement improves cognitive functioning, and learning is more fun. Physical activity is a different type of learning style [55]. The concepts described below offer advantages of being physically active. These factors include health benefits, reducing risks of obesity, impacting learning in the classroom, development of motor skills, active play, and increased energy. They provide conceptual basics upon which the future study is based. Behavioral determinants with repeated documentation of a positive association with physical activity include having a history of being physically active as an adult, practicing positive dietary habits and process of change.[56] Process of change refers to stages found within the context of the Transtheoretical Model. [56].

The Transtheoretical Model consists of four dimensions, that is: the stages of change, the processes of change, situational self-efficacy, and decisional balance. The stages of change represent the temporal, motivational, and consistency constructs of behavior change. These stages are pre-contemplation, contemplation, preparation, action, and maintenance. The first three stages are frequently categorized as the pre-action and the latter as the action stages.[56] The Transtheoretical Model hypothesizes that individuals can transition from the pre-action to the action stages through cognitive and behavioral processes of change. The cognitive processes of the Transtheoretical Model focus on gathering information regarding the unhealthy behavior, leading to an attitude change conducive to a positive behavior change. Perceived self-efficacy is an individual’s belief that they are capable of achieving a goal and has been increasingly associated with health behavior and its change.[56] Bandura’s Theory of Self-Efficacy[57] suggests that behavior is better predicted by people’s beliefs in their capabilities to do whatever is needed to succeed than by the behavior’s importance. The college years are highly influential in shaping adult behaviors, particularly with regard to physical activity, and other lifestyle habits. A better understanding of physical activity practices among nursing students on university campuses could potentially lead to the establishment of best practices most suitable for university populations [41].

### **METHODOLOGY**

This was a cross sectional study. Quantitative data was collected using structured questionnaire. The study was carried out from March to June 2020. The study was carried out at the Faculty of Health Sciences University of Buea. The University of Buea is one the state universities in the Republic of Cameroon. It is found in the South West Region of the country and it is in the town of Buea on the Easten flank of mount Cameroon. There are 10 faculties offering 80 bachelor degree programs with 300 permanent staffs and 200 part-time who



carter for over 12000 students [23]. Amongst these faculties is the Faculty of Health Sciences that offers a 4-years program to train nurses. The faculty is situated in a separate campus called campus B, which has three separate buildings that are used as lecture halls, laboratories and administrative offices. The school works in collaboration with the Buea Regional Hospital, Limbe Regional Hospital, Bota District hospital Limbe, Douala General Hospital, CHU Yaounde and Chantal Biya Foundation. These hospitals act as teaching hospitals, where students go for their clinical practices. The nursing program is divided into pre-clinical years that is from year 1, the clinical years that is from year 2-4 and the final year also encompasses of research and thesis defense. Faculty of Health science is known to produce the best nurses in the Republic. But that notwithstanding, the students health behaviors have a great impact in their overall performance. With all the initials, Faculty of Health sciences is therefore a suitable study area. The study area also included BIAKA University Institute situated on the gentle slopes of Mount Cameroon in Buea, precisely at Bokoko. It carter for over 1300 students and has over 120 qualified teachers. It offers an HND program (3years) and a degree program (4years). This study targeted nursing students of the Faculty of Health Sciences, University of Buea and of Biaka University Institute.

#### Inclusion criteria

1. Nursing students in Faculty of Health Sciences-UB and of BUIB.
2. Those who gave their consent.
3. Nursing students from year 2 to 4.

#### Exclusion criteria

1. Medicine students, Medical Laboratory Scientists, Biomedical Science Students and Midwifery students.
2. Those who failed to give consent.
3. Nursing students of year 1.

- The sample size required was calculated according to a formula developed by Cochran (1963) as described by Israel Glenn 7th April (2010).

$$n = \frac{z^2pq}{d^2}$$

$n = 1.96^2(0.5)(0.5)/0.05^2 = 384.16$  approximately 384 participants. (prevalence is taken as 50% since no study was found done in Cameroon nor Africa with a calculated prevalence)

Where  $p$ =prevalence ie 50%  $z$ =standard normal value (1.96)  
 $d$ =acceptable error at 95% C.I (0.05)

Systematic random sampling was used to enroll participants. The questionnaire was constructed with reference to similar previous studies and according to the recommendation of World Health Organization (WHO) [3, 15] the questions were modified to fit the local conditions for our students. Finally, administrative and academic faculty validated the questionnaire. The structured online questionnaire was administered to the students' inbox and class whatsapp groups with guidance on how to key in the information needed. The questionnaire was structured using "Google forms". The questionnaire encompasses a section for consent. Only those who gave their consent were able to continue with the

answering of the questionnaire. Raw data was stored in the form of questionnaires (ODK form). The incomplete entries were excluded then the data were collected in a worksheet. The responses were keyed in an Excel sheet and backed up in the investigators email and disk. The data were keyed into a Personal computer and the document given a password to avoid access to the data. Quantitative data was entered into a pre-designed IBM SPSS versoin 25.0 spreadsheet database which has in-built consistency and validation checks were used to enter the data. Data range and validation checks were performed in order to identify invalid codes. Data were made of scale and categorical variables (e.g. marital status, sex, age,) and they were explored using frequency tables. Chi-Square test of equality of proportion was used to compare proportions for significant difference and to measure association between categorical variables. Microsoft Office Excel Version 10.0 was used to plot charts while statistical tables were designed in Microsoft Office Word Version 10.0. Data were presented using frequency tables and charts. All statistics were presented at the 95% Confidence Level (CL), Alpha =0.05

## RESULTS

### Socio-demographic data

#### The study was carried out amongst nursing students in the University of Buea and nursing students of Biaka University Institute

The ages were distributed as follows: a majority (55.9%) of the respondents were between 21-29 years, followed by 40.1% who were between 16 to 20 years, then with 4.0% of the respondents who were more than 30 years of age. The mean/average age for the study was 20.95 years (21years). Females constituted a majority (74.3%) of the study with males being the minority (25.7%) of the respondent. A majority (43.6%) of the respondents were from the second year, and 33.7% from the third year, and a minority of 21.8% from the fourth year. A majority (69.3%) of the respondents were single, followed by 26.2% who were dating. A minority (4.5%) of the students are married.

Table 2. Socio-demographic parameters of the study population

Institution	Frequency	Percent (%)
Fhs-ub	101	50
Biub	101	50
Total	202	100
<b>Age</b>	<b>Frequency</b>	<b>Percent</b>
>30	8	4.0
16-20	81	40.1
21-29	113	55.9
Total	202	100.0
<b>Gender</b>	<b>Frequency</b>	<b>Percent</b>
Female	150	74.3
Male	52	25.7
Total	202	100.0
<b>Grade Level</b>	<b>Frequency</b>	<b>Percent</b>
Second year	88	43.6
Third year	68	33.7
Fourth year	46	21.8
Total	202	100.0
<b>Marital status</b>	<b>Frequency</b>	<b>Percent</b>
Dating	53	26.2
Married	9	4.5
Single	140	69.3
Total	202	100.0

### Student perception on physical exercises

A majority (79.7%) of the respondents perceived physical activities to include running, jogging, football, and singing followed by 15.3% who perceived physical activities to include running, jogging, and football. Another proportion (4.5% and 0.5% respectively) considers physical activities to include jogging and running. A majority (80.2%) of the respondents affirmed to be engaged in physical activities while a minority (19.8%) of the respondents do not involve themselves in physical activities.

**Table 3. Distribution of the perception of what physical exercises entails (Physical Activity/Engagement)**

Physical activity	Number	Percentage
Running, jogging, football & singing	161	79.7%
Running, jogging & football	31	15.3%
Jogging	9	4.5%
Running	1	0.5%
Total	202	100%

Engagement physical activity			
Institution	Yes	No	Total
FHS-UB	78 (38.6%)	23 (11.4%)	101(50%)
BUIB	84 (41.6%)	17 (8.4%)	101(50%)
TOTAL	162 (80.2%)	40 (19.8%)	202 (100%)

### Reasons for non-engagement in physical activities

As observed in the table below, a majority (11.9%) of the respondents do not engage in physical activity solely because of the bulk of work in medical school, followed by 2.5% who had no interest in sports, while others (1.5%) do not do physical activity because of medical conditions that inhibit physical activity.

### Physical activities

Three major physical activities observed in the study. These included; exercises (jogging, running and others such as push-

ups and rope jumping), Contact sports (football, lone tennis and handball) and non-contact sport (singing and dancing). Also some students were involved in sedentary activities. From the table below, it can be observed that majority of the respondents were involved in football. 14.81% were involved in sedentary sports, followed by 12.34% and 12.96% who were involved in singing and dancing respectively.

### Type of physical activities

The types of P.A includes: exercises, contact sport, non-contact sport, sedentary sport. From the graph below, among those who were engaged in physical activity it is observed that majority (34.0%) of the respondents were involved contact sports, followed by 25.9% who were involved in exercise, then 25.3% of the respondent were involved in non-contact sports, and a minority (14.3%) of the respondent were involved in sedentary sports.



**Figure 2. Types of physical activities**

**Table 4: Reasons for non-engagement in physical activities**

		Frequency	Percentage (%)
Valid Do not carry out Physical Activity	Those engaged in physical activities	162	80.2
	Having a medical Condition inhibiting Physical Activity	3	1.5
	Having a medical Condition inhibiting Physical Activity Bulk of work in medical School	1	0.5
	Having a medical Condition inhibiting Physical Activity and others (I DON'T LIKE IT)	1	0.5
	Bulk of work in medical School	24	11.9
	Bulk of work in medical School and Having a medical Condition inhibiting Physical Activity	1	0.5
	Bulk of work in medical School and others (I DON'T LIKE IT)	5	2.5
	others (I DON'T LIKE IT)	5	2.5
	Total	202	100%

**Table 5. Nature of physical activities carried out by the students**

Major activity	Number	Frequency
<b>Exercise</b>		
Jogging	19	11.73%
Running	12	7.41%
Others	11	6.79%
<b>Contact sports</b>		
Football	34	20.98%
Handball	06	3.70%
Lone tennis	10	6.17%
Others	05	3.09%
<b>Non-contact sport</b>		
Singing	20	12.34%
Dancing	21	12.96%
Sedentary sport	24	14.81%
No physical activity	40	19.80%
Total	202	100%

**Involvement in physical activity and memory level**

Majority of the respondents had an improvement in their memory capacity with involvement in physical activity.

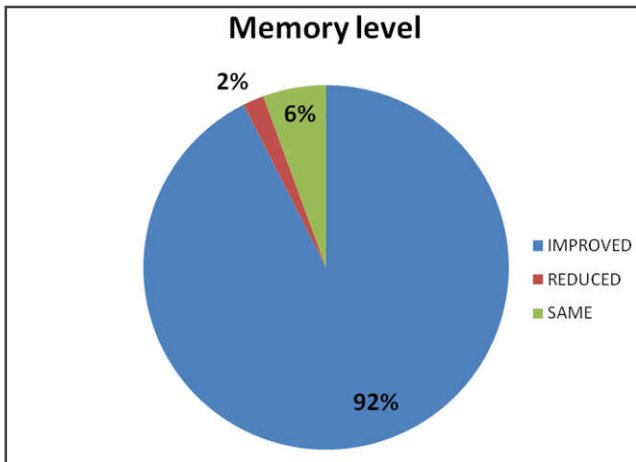


Figure 3. Physical activity and memory level

**Involvement in pa and change in the level of confidence**

Majority of the respondents had an improvement in their level of confidence with involvement in physical activity.

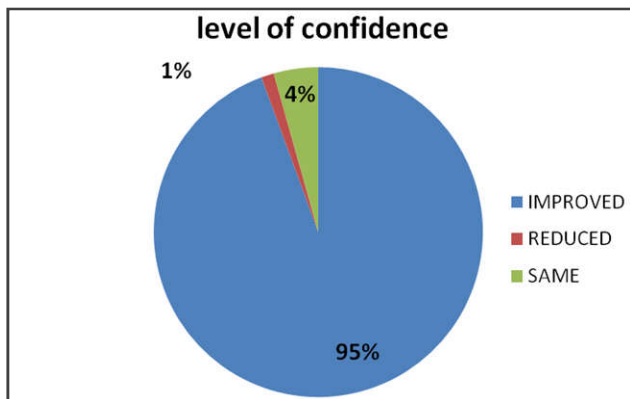


Figure 4. Physical activity and change in the level of confidence

**Physical activity and social interaction**

Majority of the respondents had an improvement in their level of social interaction with involvement in physical activity.

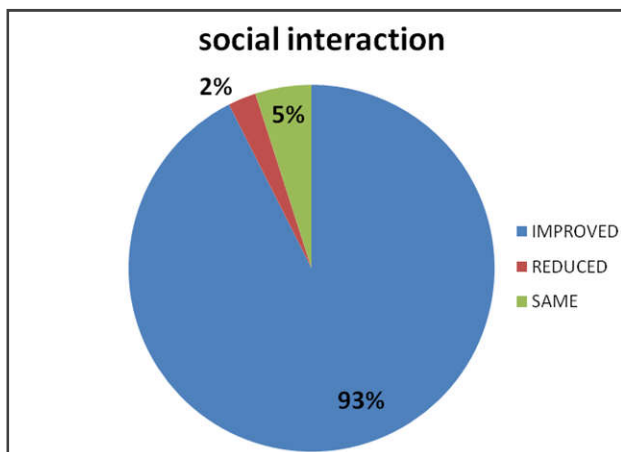


Figure 5. Physical activity and level of social interaction

**Physical activities and academic performance**

The respondents were asked whether or not they engaged in physical activities and the academic performance was measured in terms of the GPA of the students.

Table 6. Association of engagement in physical activity and student academic performance

Engagement	Academic performance in G.PA (%)			Total	Chi Square
	3	2.5-3	<2.5		
No	18(8.9%)	16(7.9%)	6(3.0%)	40(19.8%)	X <sup>2</sup> =24.283
Yes	115(56.9%)	34(16.8%)	13(6.4%)	162(80.2%)	

X<sup>2</sup> = 24.283; P<0.001

A significant association was observed between physical activities and student academic performance (X<sup>2</sup> = 24.283; P<0.05). This implies that whether or not a student got involved in physical activity had significant impact on their academic performance.

Table 6. Comparing the academic performance of students engaged in physical activity from Fhs-ub and Buib

Institution	Academic performance in G.PA (%)			Total	Chi Square
	3	2.5-3	<2.5		
FHS-UB	56(27.7%)	18(8.9%)	04(2.0%)	78(38.6%)	X <sup>2</sup> =0.201
BUIB	59(56.9%)	16(7.9%)	09(4.4%)	84(41.6%)	
Total	115(56.9%)	34(16.8%)	13(6.4%)	162(80.2%)	

X<sup>2</sup> = 0.201, P= 0.866

There is no significant change in GPA (P>0.05) between students from FHS-UB and BUIB who were engaged in physical activity.

**Number of physical activity a student is engaged in and academic performance**

The numbers of physical activities in which the students participate in were grouped into two categories. This includes; those who did more than one physical activity and those who did just one physical activity.

Table 7. Comparing the number of physical activity and academic performance of the students

Number of physical activity	Academic performance			Total
	>3	2.5-3	<2.5	
More than 1 PA	76(46.9%)	12(7.4%)	4(2.4%)	92(56.8%)
1 PA	39(24.1%)	22(13.6%)	9(5.6%)	70(43.2%)
Total	115	34	13	162(80.2%)

X<sup>2</sup>=19.112 P<0.05

A significant association was observed between the number of physical activity carried out by the respondent and student academic performance (X<sup>2</sup> = 19.112; P<0.05). This implies that the number physical activity had a significant impact on their academic performance.

**Weekly frequency of physical activities carried out by students**

Majority (23.8% and 20.3%) of the respondents carry out physical activity once and twice a week respectively. 17.8% and 11.4% of the respondents carry out physical activity three days and everyday respectively. A minority (6.9%) carry out physical activity 5 days a week.

**Table 8. Average number of hours spent weekly on physical education and academic performance**

	Frequency	Percent(%)	Valid Percent(%)
Once a week	48	23.8	23.8
2 days a week	41	20.3	20.3
3 days a week	36	17.8	17.8
5 days a week	14	6.9	6.9
Valid Everyday	23	11.4	11.4
Don't carry out Physical activities	40	19.8	19.8
Total	202	100.0	100.0

### Hours of physical activity carried out by students

A majority (71%) of the respondents carry out physical activity 10minutes/day. Follow by 19.3% and 13.9% of the respondents who carry out physical activity 20 minutes/day and 30minutes/day respectively. A minority (11.9%) of the respondent carry physical activity 1hour and above.

**Table 9. Average number of hours spent weekly on physical education and academic performance**

	Frequency per day	Percent (%)	Valid Percent (%)
10MINS	71	35.1	35.1
20MINS	39	19.3	19.3
30MINS	28	13.9	13.9
Valid 1hour and above	24	11.9	11.9
Don't carry out Physical activities	40	19.8	19.8
Total	202	100.0	100.0

**Table 10. Association between average hours spent in physical activity and academic performance**

Average hours/day	Academic performance			Chi square
	Good (3 to 4)	Moderate (2.5 to 2.9)	Average (<2.5)	
Low activity(10mins)	54(76.1%)	13(18.3%)	04(5.6%)	$X^2=0.496$
Normal activity (20&30mins)	51(76.1%)	13(19.4%)	03(4.8%)	$P=0.112$ $X^2=23.934$ $P=0.000011$
High activity (1 hour>)	10(41.7%)	08(33.3%)	06(25.0%)	

$$X_1^2=0.496 \quad P_1=0.112; \quad X_2^2=23.934 \quad P_2=0.00$$

The daily hours spent in sports were categories into three; low (10minutes), normal (20 and 30 minutes) and high (1hour>) activities. The association was done between the average hours spend in physical activity and the academic performance of the students. P value obtain was >0.05 which implies there's no significant relationship between low (10minutes) and normal (20 & 30 minutes) hours spend in physical activity and the academic performance of the respondents. A significant relationship did exist between normal (20 & 30minutes) and high (1hour>) hours spend in physical activity and academic performance with P value <0.05.

**Table 11. Association between average times in physical activity and academic performance**

Average number of times	Academic performance			Chi square
	Good	Moderate	Average	
Low activity(1 & 2 days)	56(62.9%)	25(28.1%)	08(9.0%)	$X^2= 19.673$
Normal activity (3 & 5 days)	41(80.2%)	08(16.0%)	01(2.0%)	$P=0.0001$
High activity (everyday)	17(73.9%)	02(8.7%)	04(17.4%)	$X^2=2.231$ $P=0.083$

The association was done between the average number of times respondents carry out physical activity and the academic performance of the respondents. P value obtain was <0.05 which implies there's a significant relationship between low (1 & 2 days) and normal (3 to 5) days respondents carry out physical activity and the academic performance of the

respondents. There was no significant relationship between normal (3 & 5) days and high (everyday) number of days respondents carry out physical activity and academic performance with P value >0.05.

**Table 12. Types of physical exercise and academic performance**

Physical activity	Freq (%)	GPA recoded		
		Good	Moderate	Average
Exercise	33(20.4%)	07(4.3%)	02(1.2%)	
Contact Sport	46(28.4%)	08(4.9%)	01(0.6%)	
Non-Contact Sport	27(16.7%)	10(6.2%)	04(2.5%)	
SedentarySport	09(5.6%)	09(5.6%)	06(3.7%)	

### Exercises and contact sport in comparison with academic performance

**Table 13. Association between exercise and contact sport**

Type of physical activity	Academic performance		
	>3	2.5-3	<2.5
Exercise	33(20.4%)	07(4.3%)	02(1.2%)
Contact sport	46(28.4%)	08(4.9%)	01(0.6%)

$$X^2=1.478; P=0.477$$

The table above illustrates whether there is any statistically significant difference between exercise and contact sport. There is no significant difference ( $P>0.05$ ) between exercise and contact sport groups therefore, both physical activities are beneficial to academics.

### Exercises and non-contact sport in comparison with academic performance

**Table 14. Association between exercise and non-contact sport**

Physical activity	Academic performance		
	>3	2.5-3	<2.5
Exercise	33(20.4%)	07(4.3%)	02(1.2%)
Non-contact sport	27(16.7%)	10(6.2%)	04(2.5%)

$$X^2=0.1257; P=0.939$$

The table above illustrates whether there is any statistically significant difference between exercise and non-contact sport. There is no significant difference ( $P>0.05$ ) between groups therefore both physical activities are beneficial to academics.

### Exercises and sedentary sport in comparison with academic performance

**Table 15. Association between exercise and sedentary**

Physical activity	Academic performance		
	>3	2.5-3	<2.5
Exercise	33(20.4%)	07(4.3%)	02(1.2%)
Sedentary	09(5.6%)	09(5.6%)	06(3.7%)

$$X^2=22.6649P=0.000012$$

A significant association was observed between the student academic performance in relation to the practice of exercise or sedentary ( $P<0.05$ ). This implies that student academic performance significantly depends on engaging in exercises as more students who do not carry out PA tend to have GPAs less than.

### Contact sport and non-contact sport in comparison with academic performance

**Table 16. Association between contact and non-contact sport**

Type of physical activity	Academic performance		
	>3	2.5-3	<2.5
Contact sport	46(28.4%)	08(4.9%)	01(0.6%)
Non-contact sport	27(16.7%)	10(6.2%)	04(2.5%)

X<sup>2</sup>=1.316; P=0.517898

The table above illustrates whether there is any statistically significant difference between contact and non-contact sport. There is no significant difference (P>0.05) between contact and non-contact sport groups. This implies that a change in Physical activity from contact to non-contact sport does not significantly affect the academic performance of the students.

**Contact sport and sedentary sport with respect to academic performance**

**Table 17. Association between contact and sedentary sport**

Physical activity	Academic performance		
	>3	2.5-3	<2.5
Contact sport	46(28.4%)	08(4.9%)	01(0.6%)
Sedentary	09(5.6%)	09(5.6%)	06(3.7%)

P=0.00043

A statistically significant association was observed between academic performance and type of Physical activity (P<0.05). This means that the GPA of the students were dependent on whether or not they carried out contact sport or were sedentary

**Sedentary and non-contact sport with respect to academic performance**

**Table 18. Association between contact and non-contact sport**

Physical activity	Academic performance			Chi square
	>3	2.5-3	<2.5	
Sedentary	09(5.6%)	09(5.6%)	06(3.7%)	P<0.05
Non-contact sport	27(16.7%)	10(6.2%)	04(2.5%)	

X<sup>2</sup>=13.125; P=0.0014

A significant association was observed between academic performance and type of physical activity when considering sedentary and non-contact sport (P<0.05).

**Physical activity and course re-sit.**

The engagement of the student in PA and whether or not they have ever re-sited a course was also taken into consideration.

**Table 19. Association between physical activity and course re-sit**

Engagement	Re-sit (%)		Chi square
	Yes	No	
Yes	24(11.9%)	138(68.3%)	X <sup>2</sup> =18.891
No	17(8.4%)	23(11.4%)	

P=0.009

There was a statistically significant (P<0.05) between those engaged in physical activity and those who are not, with respect to re-sit of course(s).As observed above, there is a variation in the level of engagement in PA and re-siting to a course. Hence the prevalence of NOT re-siting a course is higher (68.3%) among those engaged in physical activities and lower (11.4%) among those who do not engage in PA.

**Physical activity and level of repetition**

The engagement of the student in PA and whether or not they have ever repeated a course was also taken into consideration. Results are seen on the table below.

**Table 20. Association between physical activity and level repetition**

Engagement	Repeated Level		Chi square
	Yes	No	
Yes	2(1.0%)	161(79.7%)	X <sup>2</sup> =0.0713 P= 0.789
No	1(0.5%)	39(19.3%)	

There was not a statistically significant (P=0.789) between those engaged in physical activity and those who are not, with respect to repetition of level.

**DISCUSSION**

The purpose of this study was to evaluate the effects of physical activity on the academic performance of nursing students of the Faculty of Health Sciences-UB, together with nursing students from Biaka University Institute Buea.

**Assessing the students’ knowledge on physical activity**

Majority of the students had an understanding of what physical activity entails. In our study, a greater proportion of the respondents were involved in physical activity and majority of the students were females. This was similar to a study carried out in Manipal University in India[22], yet contrary since majority of their respondents were males. The difference in gender was as a result of the high female admission into FHS-UB and BUIB.

**Determining the level of engagement and the type of physical activity carried out by nursing students**

From our results, out of the 202 participants, 162(80.2%) were engaged in physical activity, meanwhile 40(19.8%) were not engaged. Out of the 162 participants who were engaged in physical activity, 78(38.6%) were from FHS-UB and 84(41.6%) were from BUIB. Alsoit was observed that majority (34%) of the respondents were involve in contact spots, precisely football. At the level of engagement, a few carried out physical activity for at least 30 minutes of moderate intensity activity per day, 5 days a week and 20 minutes of vigorous intensity activity per day, at least 3 days per week. Most of the students who were not involved in physical activity gave reasons with majority being the bulk of work in the nursing education leaving them with little or no time for other activities. This was in line with the study carried out in RAK medical and Health Sciences University [22].

**Assessing the level of memory, confidence and social interaction, in relation to the physical activity of the students**

From our study, there was a marked improvement in the level of memory and feeling of confidence with the nursing students who are involved in physical activity. Similar finding was gotten in the study carried out in the Manipal university in India [24]. This could be explained with the fact that physical activity increases blood flow and nutrients to the brain leading to increase brain performance and subsequently improving cognitive functions [25,26]. Our study portrayed that physical activity helps improve the students level of social interaction as majority of the students attested that their level of social interaction increased with those who were involved in physical activity. This could be as a result of physical activity improving communication among teammates and subsequently

course mates. This helps them in class to express themselves by asking questions and contributing during lectures and after lectures amongst their peers. This also lead to a spirit of competition in class thereby improving students' academic performance [27,28].

### **Determine the effects of physical activity on the grade point average, and re-sit and repetition of class of nursing students**

An association was done between those involve in physical activity and those who were not, with respect to their academic performance. A significant statistical relationship ( $P < 0.05$ ) was obtain. Majority of those involved in physical activity had GPA greater than 3. From this result, it can be seen that physical activity has a positive impact on students academic performance. This was similar to research carried out by David Bella *et al*, in 2014 where  $P < 0.001$ , also similar to a study carried by Mohammed A *et al*, in RAK medical and Health Sciences University [22]. However, association done to compare the GPA of students from both institutions (FHS\_UB and BUIB) with respect to physical activity was not statistically significant meaning the students were involved in the same type of physical activity. Also our study showed that physical activity reduces the number of course(s) re-sited as majority of the students who were involved in physical activity attested that they had few or no re-sits compared to those who were not involved in physical activity and it was statistically significant ( $P = 0.009$ ). However, there was no statistically significant between engagement in physical activity and repetition of class. Our study also portrayed that there was a statistical significant association ( $P < 0.05$ ) between the average number of days students carried out physical activity and their academic performance as those who spend 3 to 5 days per week in physical activity had good GPAs compared to those who spend lesser time (once and 2 days a week) in physical activity. Whereas, there was no statistically significant ( $P = 0.083$ ) between those who spend 3 to 5 days in physical activity and those who carried out physical activity everyday with respect to academic performance. This was consistent with a study carried out in the University of Illinois America [31].

However, there was no statistically significant association ( $P = 0.112$ ) between the number of hours (10 minutes, and 20 to 30 minutes) spent in physical activity and academic performance of the students. This negative association was probably as a result of the voluminous academic workload involved in the nursing education, leaving little or no time for other activities. A statistically significant ( $P < 0.05$ ) association was observed between those who spend 20 to 30 minutes in physical activity and those who spend more than an hour. Those who spend 20 to 30 minutes as recommended by the physical activity guideline had better GPAs compared to those that spend more than an hour in physical activity a day. Reason being excessive involvement in physical activity per day will most often leave students exhausted and unable to meet up with their studies. It was also noticed from our study that there was a statistical significant association ( $P < 0.05$ ) between the number of different physical activities a student is involved in and his or her academic performance. This could be as a result of the fact that those involved in more than one physical activity, have more grasp on memory techniques and time management. From our study, a statistical association was carried out to determine which form of physical activity would possibly give the best academic performance. We noted that

exercise and contact sports showed no statistical significance with respect to academic performance. Exercise and non-contact sports similarly showed no statistical significance. We further compared contact and non-contact sports; our results showed no statistical significance. This is suggestive of the fact that any form of physical activity is beneficial to academic performance; as a result performance wasn't strictly linked to a particular type of physical activity. These results were consistent with that carried out in Sri-Manakula Vinayagar, Medical College and Hospital, Puducherry, India which revealed no significant association between the different types of physical activity and academic performance [32]. We further compared Sedentary and different types of physical activity with respect to academic performance. Our study showed that there was a statistically significant association between sedentary group and students undertaking exercise. Our study was therefore suggestive of the fact that students who were involved in exercise had improved academic performances compared to students within the sedentary group. It also showed statistical significance association between sedentary and non-contact sport which was as well suggestive of the fact that students who practiced non-contact sports had better grade point averages than their peers of the sedentary group. Furthermore we similarly investigated the association between Sedentary and contact sport with respect to academic performance wherein the outcome remained statistically significant. However this was not the case with a study carried out in a Medical School located in India who reported that there was no significant difference between students who took part in either Exercise or non-contact sports compared to those within the sedentary group with respect to their academic performance. This difference noted could be as a result of slight differences in the number of participants recorded within the different types of physical activity. The study was however consistent with the current study, stipulating that students who participated in contact sports had an improved academic performance than those within the Sedentary group [32].

### **Conclusion**

This was a school based cross sectional study carried out in the city of Buea. From our study it was noticed that the students had a good knowledge of what physical activity entails, and a majority of them were engaged in physical activity. Most of the students were involved in contact sports, also majority of the students carried out physical activity less than 20 minutes per day and as well less than 3 days a week. The students who were involved in physical activity perceived an improvement in their level of assimilation, concentration, confidence, social interaction. Those who are involved in physical activity had better GPAs compared to those who were not engaged in physical activity. Also, the students who were involved in physical activity had fewer re-sits and barely repeated a level.

### **Verifying hypothesis**

- H<sub>1</sub>: Majority of nursing students carry out physical activity (for at least 20 minutes per day) less than 3 times a week.
- H<sub>2</sub>: Physical activity helps improve cognitive functions thereby improving academic performance

At the end of this study, it was found that:

- H<sub>1</sub>: Majority of nursing students (30%) carry out physical activity less than 20 minutes a day. Also a majority (44%)

carry out physical activity less than 3 days a week. 19.8% of the students were not engaged in physical activity.

H<sub>2</sub>: There was a significant association between the grade point averages of those engaged in physical activity and those who were not. Furthermore, a significant association was established for course re-sit between those engaged in physical activity and those who were not, with respect to their academic performance. Those who were involved in physical activity had better grade point averages and also reported to have improvements in their level of memory and confidence. Hence physical activity improves the cognitive functions, thereby improving academic performance of nursing students in FHS-UB and BUIB.

We therefore fail to reject our hypotheses.

On a whole, the nursing students of FHS-UB and of BUIB who are involved in exercise, contact and non contact sports have an improvement in their academic performance compared to those of sedentary sports and those who were not engaged in physical activity. Hence, physical activity improves academic performance of the nursing students of the Faculty of Health Sciences University of Buea and nursing students of Biaka University Institute Buea.

### Recommendations

- **To the Government:** Implement the creation of sports centers in health sciences institutions to promote engagement of students in physical activity
- **To Institutions/Universities:** Nursing schools should implement physical activity as part of their curriculum not just in a particular semester. Encourage students to follow the national physical activity guideline recommended by WHO.
- **To the students:** Physical activity especially exercise, contact and non contact sports should be encouraged among nursing students.
- Our study has the following strengths:
  - This study is the first to our knowledge to assess the effects of physical activity on the academic performance of nursing students in Cameroon and Africa.
- Our study has the following limitations:
  - The study was a cross sectional study in FHS-BUEA and BUIB and it did not reflect the entire nursing students since not all the nursing schools were sampled.
  - Data gotten from the nursing students were based on their judgments and some responses may have been biased.
  - Data collection was done during the lockdown phase of the covid-19 pandemic using online based questionnaire and the sampling technique was not accurate.
  - Year 1 nursing students were excluded from the study because they never had any previous academic results thereby limiting our sample population.

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