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Health and Academic Achievement

Edited by Blandina Bernal-Morales

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Meet the editor

Dr. Blandina Bernal-Morales was born in Xalapa, Mexico, in 1971. She received a degree in Biological and Pharmaceutical Chemistry at the Universidad Veracruzana, Mexico. Soon after, she received an MSci in Neuroethology at the Universidad Veracruzana and a PhD in Psychology at the Universidad Nacional Autónoma de México. At present, she is a researcher in the neuropharmacology lab of the Institute of Neuroethology at the Universidad Veracruzana and teaches to pre- and postgraduate students. Dr. Bernal-Morales' preclinical and human research is on topics such as stress, academic performance and experimental pharmacology related to anxiety and depression in infancy and adulthood. She has directed theses and is author and co-author of original papers on stress, behavioral neuroscience, scientific divulgation and education.

Contents

Preface

The universal rights to health and education must be guaranteed for the entire population, and they should be accompanied by quality, as established by the United Nations Educational, Scientific and Cultural Organization (UNESCO). In this sense, good health and education ensure the proper development of citizens and a decent life. To assess how close we can be to these objectives, studies must be done on the assessment of the quality of health we have and the education we receive. From this, we should address the areas of opportunity that are telling us what must be changed. We live in a world with increasing rates of metabolic diseases that can occur along with mental illness among others. These clinical conditions can reduce the performance of children and young people as students. While it is important to work on the quality of teaching, it is also important to know what the factors are and how they impact the academic performance of students. This motivated the development of this book, entitled *Health and Academic Achievement*. It is a compilation of 14 chapters written by authors around the world who are expert in their disciplines. This book is organized in two sections and will take you on a lecture of Challenges in School Environments in the first one. Stressing factors that increase failure in academic achievement are addressed. In four chapters a background of internal and external stressing factors such as overload, oxidative stress, bullying, or drug abuse are reviewed to know the biological responses and the negative impact on executive functions and mental health. You will also find a valuable last chapter about a study of challenges of community college counselors when working with students experiencing mental health disorders. The second section of the book on Interventions for a Successful Health and Academic Achievement Binomy is formed of eight chapters. You will find a review about social relationships and emotional well-being in adolescent students related to academic achievement, and practices to foster family and teacher relationships with students. Also, the contributors present a review of the consequences in emotional health related to internalized problems in children and adolescents, therapeutic strategies, and prevention in the school environment, followed by a study that critically examines the concept of health, the connection with goals, and effective school-based interventions in academic achievement. Resilience is addressed in an original contribution to relate it to psychological well-being and academic performance in 12–17-year-old students through structural models. Another original contribution relates academic self-efficacy with two approaches of learning and academic achievement in young students and is followed by an original descriptive study about community engagement and its impact from the view of 10–19-year-old students. Due to the wide body of research that has proved the strong links between health behaviors and academic achievement, the last two chapters are reviews of physical activity practice, sleeping habits, and cardiorespiratory fitness on cognitive function and goals in young students. Due to the characteristics of this book as a whole and the quality of the chapters that comprise it, we are sure that the reader

will find in it a valuable point of reference to meet and discuss the growing information on health and education. Thanks to all the contributing authors who generously gave their work to this collective initiative and were patient with the process of publication. I hope readers find this book useful and I wish it reaches every decisive person in a way that finds the optimal development of our students' talents and potential.

Blandina Bernal-Morales, PhD
Universidad Veracruzana, Mexico

Section 1

Challenges in School Environment

Chapter 1

Introductory Chapter: Writing about Health and Academic Achievement

Blandina Bernal-Morales,
Cecilia Luz Balderas-Vazquez and
Juan Francisco Rodríguez-Landa

Additional information is available at the end of the chapter

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1. Academic achievement

Academic achievement has become a topic of great interest in recent decades. It arises as the result of a school process and its corresponding evaluation for the fulfillment of the learning objectives. The study of academic achievement has included different variables beyond cognitive aspects, like social and motivational aspects, which together anticipate an adequate academic result [1]. Some of these variables are related to personal aspects of the students within affective dimensions and are also related to the methodological implementations that the teacher uses in scholar settings [2]. Other variables are learning styles and strategies, as well as cognitive preferences (intentions and self-obligations), emotional preferences (desires), and behavioral habits [3]. These parameters are constructs that have been placed in an important way to understand how different conditions influence school learning and academic performance [4]. Thus, good academic performance can be understood as a synonym for academic achievement, since it is defined as the acquisition of knowledge and goals obtained in students, which are evaluated by qualitative and quantitative methods after the implementation of educational strategies [5]. The evaluation of academic performance can include exams, grades, teacher reports, or direct observations of classroom behavior, among others [6]. Only the cognitive potential is considered through the eyes of others most of the time; however, it is essential to consider the self-assessment of academic performance under academic stress [7] or under different levels of support that students perceive and receive from their environment. The family is the main group that contributes to an adequate social, emotional, and economic context for the development of the individual [8]. The adequate level of family support together with an optimum level of school confidence is a significant predictor of the degree of adaptation in which the student faces and resolves problematic situations [9, 10].

There are cases where the students with high intellectual abilities do not reach an acceptable academic performance. This is often the result of a lack of motivation. Motivation is considered an agent both internal and external to the individual, which emerges as the cognitive representation of performance objectives [11] and significantly influences each of the actions taken during the educational training process. Motivation facilitates to achieve goals and increases the probability to reach successful academic results [12]. However, the competitiveness generated in the school environment puts the individual's competences and abilities to be tested, as well as the degree of commitment of the students, which together with the school overload can decrease motivation [13–15]. The responses to school demands and competitiveness presumably depend to a large extent on the environment, the subjective evaluation and the behavior of the individual. So people can increase their effort under situations in their environment that demand competence [16].

2. Academic achievement relation with health

Changes in effort and motivation are related to health risk behaviors such as addictions, alcohol consumption, poor eating habits, and violence [17–19]. These behaviors in turn cause physical problems and increase emotional health problems [20, 21]. The association between unhealthy behaviors and the decrease in the productivity of the individual related to academic achievement has been evidenced [22]. Risk behaviors among young people are closely related to low grades and lower educational attainment [23], whereas in a bidirectional model, healthy students reach a better academic achievement, which in turn is beneficial for health. According to the above, the acquisition of knowledge and learning requires a high degree of motivation and an adequate social environment, so that the individual is directed to implement academic actions and healthy personal habits that allow a healthy emotional and physical state, which ensure achievement of their school goals [24].

When talking about health, the reference is not only to the absence of illness but to the state of complete physical, mental, and social well-being as established by the World Health Organization [25]. Therefore, the concept of health makes us to think about the physiological state in equilibrium within family relationships and sociocultural environment, which leads to adaptation and success. It is very important that the individual executes behavior to maintain an optimal state of health, in combination with the educational, social, and economic factors that play an important role [26]. The relationship between health and academic achievement is undoubtedly very close in both basic education and higher education [27]. The diagnosis of a chronic illness affects the dynamics of students in their school environment, produces some degree of disability, demands needs of complex medical attention, daily administration of medicines or the attention in an emergency. Students with chronic illnesses may have lower academic achievement, limited interactions with the work community, and fewer job opportunities as they enter adulthood [28]. Obesity, diabetes, epilepsy, and asthma are the main chronic diseases whose relationship with academic performance has been described [29].

Poor eating habits, physical inactivity, and overweight increase the likelihood of serious health complications, affecting equally individuals of all ages. According to WHO reports, in 2016, the

number of children and adolescents (5–19 years) who were overweight and obese increased significantly. The highest rates for this population group were registered in Polynesia and Micronesia, with prevalence close to 23%, followed by the United States, Canada, Australia, New Zealand, Ireland, and the United Kingdom. Among the countries of Latin America with high rates of obesity are Bahamas (17.3%), Argentina (16.9%), Chile (15.2%), Dominican Republic (15%), and Mexico with 4.8% of the obese population under 19 years [30]. In this regard, it has been shown that physical activity and practicing sports in students facilitate capacities to be able to respond appropriately to tasks [31], improve cognitive functioning [32], and predict better scores on standardized tests for mathematics or sciences [33, 34]. Although, proper eating and sleeping habits are desirable [35], it has been found that students living in vulnerable households with low income have a poor quality of diet, which reduces the chances of having a good performance in school due to an inadequate contribution of energy, fatigue, and lack of attention [36, 37]. Among other factors attributed to school dropout, social detrimental scenarios involve students into problematic situations and encourage them to display inappropriate behaviors as the consumption of substances that generate addiction, crime, or violence [38]. According to the National Institute on Drug Abuse [39], alcohol is the psychoactive substance that shows the highest consumption in young people worldwide (18.1 million), followed by marijuana (4.2 million), which generates the main health problems related to abuse substances. The consumption of these substances begins at early age (12–20 years), mainly in men [39–41] and brings with it the decrease of the executive functions related to attention and memory [40, 42], reduced goals, lower grades and school dropout as a measure of failed academic achievement [38]. The consumption of substances of abuse can be related to the lack of identity, reduced self-confidence, insecurity, and the degree to which the individual is self-considered a capable person [43]. Thus, an optimal level of self-esteem serves as a mediating element in stressful and negative situations [44], increasing the probability of adaptive responses [45] being a protective factor for avoiding unhealthy habits [41] and negative thoughts such as fear or sadness. When the feelings of fear and sadness are persistent and superior to moderate intensity, students could suffer anxiety or depression. The presence of symptoms of emotional distress, anxiety, and depression is negatively associated with the academic performance of students [46, 47] and increases suicidal ideation [48]. If suicide is the leading cause of death in young people between 10 and 24 years old [29], then more attention should be paid to attend mental health in school settings, moreover, when students often refer that psychological support in psycho-pedagogical department as inadequate or unnecessary to their situation [49].

Other elements that represent challenges for the student population are the academic demands coupled with work overload, as well as economic issues and health concerns, which generate a state of stress and trigger depressive and anxiety symptoms and to a lesser extent, situations of school and family abuse and mistreatment mainly in medical students [50–54]. Similar to the above, exposure to violence in the community negatively impacts effective learning and increases acts of delinquency in young people [55].

3. Concluding remarks

So far, we have mentioned some of many evidences of the relation of physical and psychological health with performance in students. All these topics that have been addressed in a brief

and general way above can be found in this book "Health and Academic Achievement" with the contributions that the authors present in a masterful way. School is the place where children and young people invest a great part of their lifetime; therefore, it is important to understand the relationship between physical and psychological health conditions that deteriorate the academic performance of the individual. It should be noted that the early identification and adequate management of acute or chronic situations that compromise health will lead to better academic results, but above all, to improve the quality of life of students. Therefore, the commitment does not only fall on the policies or strategies that the educational institutions can implement, but also requires a commitment, effective orientation, and action leading the active participation of everybody to promote a state of complete well-being in the students.

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Chapter 2

Stress and Cognition: Psychological Basis and Support Resources

Tamara Cibrian-Llanderal,
Montserrat Melgarejo-Gutierrez and
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Additional information is available at the end of the chapter

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Abstract

Executive functions are processes that help in tasks such as reasoning, planning, troubleshooting, and management of the individual's own life. A consequence of the specific connections of stress is that executive functions tend to be interrupted when the stimulation load is so big that the individual becomes stressed. The level of cellular stress becomes evident with the increase of cortisol. Cellular processes such as inflammation, proliferation/death, and oxidative stress have been shown in murine models resembling cognitive impairment in humans. This impairment translates into behavioral changes, loss of memory, inability for decision-making, and attention problems. The incorporation of factors, such as drug use and bullying, promotes the impairment of executive functions. Resorting to strategies, such as exercising, environmental enrichment, and changes in the diet, constitutes an excellent aid in the promotion of academic achievement. In this chapter, we discuss the impact of stress on cognitive executive functions associated with academic achievement and also suggest strategies to reduce the impact of stressing factors.

Keywords: academic achievement, cognition, executive functions, psychosocial stressor, physiological stressor

1. Introduction

Stress is a biological response to internal or external demands which have an impact on cellular homeostasis. The frequency and intensity of the stressful stimuli can promote physiological and psychological effects on the body, such as the executive functions of the brain. Executive functions are a set of cognitive skills that allow for the anticipation and establishment of goals,

the design of plans and programs, the initiation of the activities and the mental operations, self-regulation, and task monitoring. The prefrontal cortex acts as a controller of executive functions. The executive functions, which help us to organize thoughts, tend to be interrupted when the stressors load is too high [1].

The study of the determinants of academic performance has attracted a remarkable interest in the last few years, given the need to investigate new variables that explain frequent school failure and discouragement in students. Predicting the effect of executive functions on academic performance is important for adequate adaptation of the individual to the specific requirements of the school context. The association between chronic or acute stress and academic performance might be mediated by the effects of cortisol in the prefrontal cortex, which promotes impairment in cognitive functions. Prolonged exposure to stress during different stages of development interferes with both academic achievement and executive functions that provide a basis for learning [2, 3].

Several studies conducted both in animal and human models indicate that factors, such as physical activity, sleep, and a healthy diet, promote optimal cognitive functioning and better academic performance. In this chapter, we discuss both the impact of psychosocial and physiological stressors on executive functions associated with academic performance and some strategies that reduce the impact of stressors. This manuscript compiles a comprehensive review of articles and books indexed in PubMed, SciELO, Scopus, and Google Advanced Scholar.

2. Stress

2.1. Neuroendocrine response

The term "stress" was coined by Hans Selye in 1936 and is defined as a non-specific response of the organism in the presence of any demand imposed. It is produced by the alteration of the cellular homeostasis, with physiological and psychological consequences in the body [1]. At molecular level, stressors can generate the activation of oxidative stress, which is explained by the imbalance of reactive oxygen species such as O_2, O_2^-, OH^-, H_2O_2, and the antioxidant molecules (vitamin C, E, flavonoids) [4]. Stress at cellular level is always present to facilitate the processes of cell proliferation, maintenance, and death [5].

At behavioral level, it is recognized that stressors are a threat to which the body requires adaptive adjustments that will allow it to maintain homeostasis and ensure the survival based on experience, biological predisposition, and the status of the organism [6]. During stress, three phases have been distinguished: (1) alarm, (2) resistance, and (3) exhaustion phase. In the alarm phase, the initial reaction of the body to a stimulus generating stress, which restores homeostasis; in this phase, the stressor promotes the stimulation of hypothalamus to secrete ACTH-releasing hormone (CRH). In the resistance phase, prolonged exposure to the stressor leads the exit of the stressful condition or adaptation. During the exhaustion phase, the gradual reduction of the stress response leads to the gradual loss of adaptive capacities [7].

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The physical and psychological stressors can trigger the activation of neuronal circuits and peripheral process, for example the inflammation. Cytokines produced by the cells of the immune system can exercise their anti- or pro-inflammatory effect on the cells of the CNS and peripheral organs [8]. The IL-1, IL-6, and IL-17 act on the HPA axis by increasing the secretion of ACTH and cortisol [9]. The TNF-alpha has the ability to destroy certain cell lines and initiates the cascade of proinflammatory cytokines [10]. The regulatory suppressive function of the immune response will depend on the balance of the synthesis of cytokines. If the inflammation is prolonged, other systems will also be activated such as the endocrine system and neurotransmission systems (e.g. noradrenergic, serotonergic, and dopaminergic) [11] (**Figure 1**).

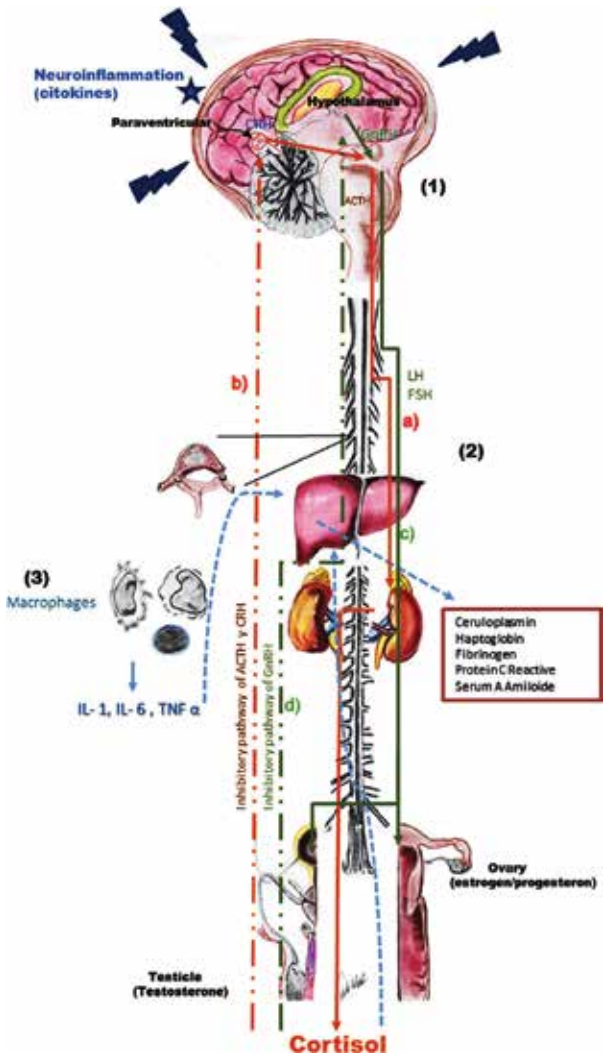

Figure 1. Neuroendocrine response to stressors. Stressors (physical, chemical, or psychological) lead to the activation of components of the endocrine system, brain, and systemic inflammatory processes. (1) Neural activation and neuroinflammation, (2) peripheral release of modulators of stress, and (3) inflammatory peripheral process. (a) ACTH release, (b) ACTH inhibitory pathway, (c) production of cortisol, and (d) cortisol inhibitory pathway.

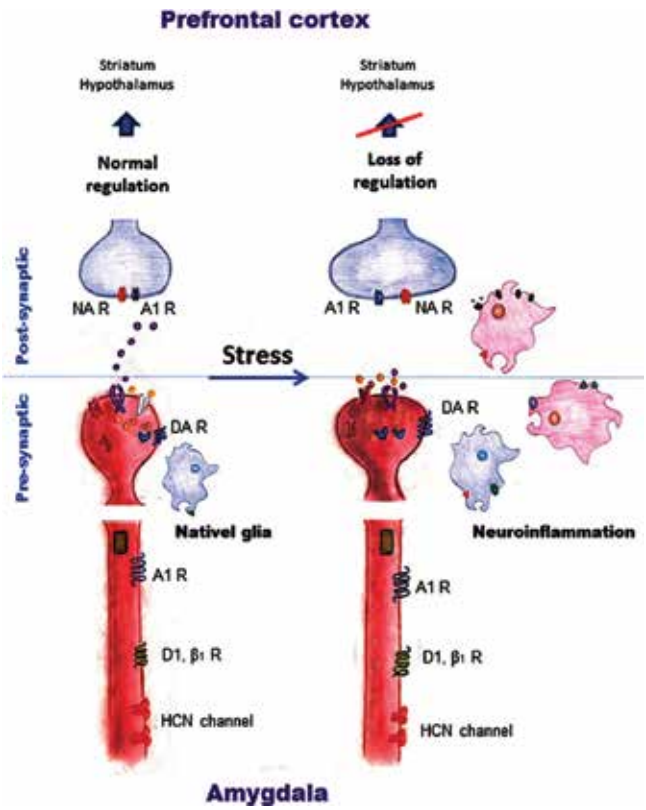

Figure 2. Overview of cellular process associated with executive functions.

Studies in humans and in experimental animals have shown that psychological stressor can suppress or increase the immune response, depending on the length of the stress (acute or chronic). Both in acute and chronic stress, physical exercise induces increase in the production of IL6, IL-4, IL-10, IL-13, IL-17, and TNFα [12]. However, few studies have explored the variation of cytokines in individuals with physical activity; in the case of the IL-17, it has been determined that their serum levels are not altered by the effect of practicing vigorous physical activity (chronic stress) [13]. The real impact of stressor is associated with intensity and frequency.

2.2. Stress and cerebral cortex

The prefrontal cortex allows efficient connectivity between the circuits associated with emotions, memory, and planning. An example of this is the intricate relationship with neurons of the *locus coeruleus*, *substantia nigra pars compacta,* and ventral tegmental area, by neuromodulators such as norepinephrine and dopamine. Despite to neuroanatomical location and catecholaminergic nature of its afferents, the prefrontal cortex is highly sensitive to damage; for example, during acute stress in rats, the neurites change shape and length over several weeks post damage [7, 14]. In preclinical studies in rats, two sensors and/or regulators of stress associated with the prefrontal cortex have been identified. (1) The direct connection with the

amygdala provides an important point of regulation. In the presence of stressful conditions, the prefrontal cortex becomes highly sensitive to damage due to the catecholaminergic nature of its innervating afferents. (2) The critical point of regulation of the amygdala to the prefrontal cortex is characterized by the promotion of the release of noradrenaline and dopamine, which will act at the level of different receptors (D1, D2, A1, β1), activation of hydrogen, calcium, and nitrogen bombs (HCN channels), and even as triggers of the release of neurotrophic factors such as BDNF and GDNF (**Figure 2**). In addition, the endocannabinoid-mediated pathway also acts as a regulator of stress and emotions [15].

Human studies have revealed that the "self-control of stress" can promote reduction of the action of the amygdala, and the subject can solve the stressful situation. An opposite situation will lead deleterious effect on mental and physical health. It has been determined that the absence of control of stress can promote the acquisition of addictive behaviors. During adolescence, addiction to nicotine [16], or even to the internet [17], causes cortical alterations due to decreased mesolimbic dopaminergic function [18]. Limited studies that have focused on this topic have opened a new line of study. Interestingly, the incidence of stressors can promote the establishment of three levels of response to stress in humans: (1) mesencephalic nuclei, (2) cellular response, and (3) systemic (immune-endocrine) [19]. This leads us to infer that: a lack of control strategies can promote alterations at these three levels, increasing the levels of cortisol in the blood, which has an impact on the psychomotor integrity of the individual. At present, diverse activities are being suggested to manage the impact of academic stressors, such as arts-based activities [20] or controlled physical activities [21].

3. Executive functions

Executive functions are a set of cognitive skills that allow for anticipation and establishment of goals, the design of plans and programs, the initiation of activities and mental operations, self-regulation, task monitoring, the precise selection of behavioral, flexibility for cognitive tasks, and organization in time and space. On the other hand, various authors have defined cognitive control as an "executive control" which refers to a set of higher order processes that modulate the interactions of the environmental context of the subject [22, 23]. These functions aim to optimize the selection, management, and coordination that underlie aspects such as perception, memory, and execution [24].

According to Diamond [25], the key executive functions are inhibitory control, working memory, and cognitive flexibility. Other functions, such as reasoning, planning, and organization, would be built from the three main functions. Other authors have defined the executive functions using warm and cold. Warm executive functions are cognitive/emotional processes related to decision-making, motivation, and social cognition. Cold executive functions are related to the rational/cognitive process of high order skills that are used when emotions are not an important factor [26].

Executive functions can be assessed using neuropsychological tests and are dependent on the prefrontal cortex. The frontal lobes plan, regulate, and control human behavior. This control

allows the individual to evaluate and select the most appropriate response and avoid impulsive responses, restraining compulsive behavior, and appetitive behavior. At neural level, the prefrontal cortex, particularly the dorsolateral portion, is a fundamental region involved in executive functions. Other regions, such as the orbitofrontal cortex portion, are closely related to the limbic system. The thalamus and the basal ganglia are brain regions also involved in executive functions [27].

3.1. Executive functions and academic performance

When a child enters school, he/she is in need of a series of cognitive processes (comparison, attention, differentiation) to be able to develop reading and writing and mathematical calculation, that is why, a proper neurological maturation is essential to deal successfully with the demands of learning, as the alteration of cognitive processes translates into learning problems [28].

The predictive effect of executive functions on academic performance is important for the proper adaptation of the individual to the specific requirements of a learning context; the correct development of the executive processes makes it possible for the individual to recognize and represent mentally different problematic situations, in addition to designing strategies for the resolution of them. There have been some works that have focused on evaluating executive function and academic performance.

A study was conducted in which the relationship between performance in mathematics and the performance in tasks of working memory and processing speed was assessed, finding that children with normal performance in the area of mathematics were faster and had greater accuracy in responding to tasks that required numerical identification, recovery and retention of numerical information, and ability to do mathematical calculations in relation to children with poor performance. In error-detection tasks, both groups of children (low performance and normal performance) could recognize the errors without difficulty. However, children with poor performance failed in the detection of such errors at a rate of 1 of 3 tests [29]; one of the explanations of the authors is that there is an inappropriate intervention of the central executive that regulates cognitive processes such as the transmission of information to long-term memory, planning, and recovery strategies.

Blair and Razza [30] conducted a longitudinal study in which they measured the capabilities of the temperamental factor associated with self-control (Effortful Control), understanding of false belief, inhibitory control, and shift of attention. The objective was to study the relationship between some skills involved in executive functions and academic performance in mathematics and language. The results showed that the scores of children at the initial level, in shift of attention and inhibitory control, did not predict performance in the tasks of phonological and letter recognition. However, the scores on inhibitory control were related with the performance at the mathematical tasks during pre-school period (3–5 years). During this period, the scores of inhibitory control and attention shift were associated with the literary capacity of children (phonetic recognition and knowledge of letters).

A longitudinal study in children from 5 to 7 years evaluated the way in which short-term memory, working memory, inhibitory control, cognitive flexibility, and planning impacted on

academic performance. The results showed that performance on tasks of short-term memory and working memory was associated with better initial performance of children in reading and math skills. Likewise, analyses of correlation and regression carried out revealed that the visuospatial memory and working memory operated as predictors of children's mathematical performance in all the periods in which they were evaluated. On the other hand, inhibitory control, flexibility, and planning acted as predictors of general learning capacity, but were not associated with the performance of any specific domain [31].

Reyes and colleagues [32] found that the correlation between the variables identified significant relationships between academic performance and executive functions. At the age of 6, significant correlations are found between selective sustained attention and working memory with all the courses understanding that these courses require the constant ability to select the most important information and focus attention for long periods of time within the classroom, mainly in the areas of Math, English, and Social Sciences; considering that the children of 4–6 years have short periods of sustained attention in the presentation of a task, from 6 years, the attention that children can give to a task or to a game can be extended for a long time.

In summary, the different studies mentioned show that a good academic achievement is predictive of the executive capacity that individuals have, this must be considered to promote strategies for improvement in the executive functions of the students through training to have impact in academic performance.

3.2. Stress and executive functions

One of the factors that can affect executive functions is stress. As we mentioned earlier, stress occurs when demand exceeds the regulatory capacity of the organism. It is very difficult to determine the extent of the impact and the duration of daily stress, especially if in acute stress situations where the individual is facing situations with a physical or psychological stimulation in which he/she must decide quickly or make an assessment of a particular situation. Stressors promote physiological, psychological, and behavioral reactions, but individuals react differently to stressors. That makes a laboratory setting very useful for the study of the psychophysiological responses to stressors of different nature, which allow evaluate subjects under controlled modulatory variables [33].

There is evidence of the negative effect of high levels of circulating of stress-induced glucocorticoids on cognitive performance [2, 34]. The different studies related to declarative memory tasks have focused on the hippocampus [35, 36]; some other studies have examined the effect of stress on working memory [37], which has shown that the administration of cortisol can also adversely affect the performance of the working memory [35, 38]. Some authors have evaluated one or two components of the executive functions under conditions of stress where they have observed that stress can reduce attention in inhibition [39, 40]; the administration of tasks assessed with paradigms of dual task was improved under stressful conditions [41], while the administration of tasks through a paradigm change of tasks was observed to be impaired under conditions of stress [42]. A systematic study investigated the effect of stress in five components of the executive functions: attention and inhibition, task management,

planning, monitoring, and coding. The results showed that stressed participants had a better performance compared with non-stressed participants in all the components with the exception of the monitoring [43]. One study evaluated the relationship between specific stressors and deficits in executive functions in undergraduate students. The results determined that general social abuse was the factor most correlated with deficits in executive function. Factors such as challenges of development (struggle and dissatisfaction with cognitive and physical attributes and abilities) and dissatisfaction with school were also predictive of diminished executive functions [44].

Chronic stress can generate high levels of cortisol in the prefrontal cortex, which can lead to an impairment of cognitive functions. There is evidence that stressors such as bullying and addiction can affect the executive functions; although they are not the only existing stressors, they are to be found with higher prevalence in the school setting.

Questions about how stress can affect or improve behavior are important in different contexts and in this particular case on academic performance. One of the factors that interfere suggests that the controllability is a key factor on the impact of stress on behavior; to learn how to control stress-causing factors protects people from the negative effects of stress in tasks of high cognitive demand. In addition, research suggests that the impact of stress on cognitive functioning depends on an individual's response to stressors: moderate responses to stress can lead to improved performance, while extreme responses (high or low) can lead to a low performance [45–47].

Factors such as bullying and addictions stimulate stress by promoting specific neurophysiological responses, followed by alterations in executive functions. Components such as physical activity, good nutrition, and sleep hygiene can reduce academic stress and its neurophysiological consequences (**Figure 3**).

3.3. Bullying

Bullying is characterized by intentional, repetitive, and persistently aggressive behavior causing harm to a victim [48]. Several studies have investigated the social and emotional aspects related to bullying; however, few studies evaluate how cognitive aspects are involved. Studies

Figure 3. Interaction of positive and negative components in academic achievement.

with aggressive individuals indicate a malfunction in cognitive functioning and decision-making. One study found that children who were not involved in bullying situations such as bullies or victims had better scores on intelligence tests. Both victims and bullies had greater difficulties in the inhibitory control according to the reports given by the parent version of the Behavior Rating Inventory of Executive Function (BRIEF); the result suggests a probable deficit in executive functioning related to being involved in situations of bullying [49].

Medeiros and collaborators evaluated decision-making, inhibitory control, working memory, and cognitive flexibility in children. They found that the bully made less favorable decisions in assessments for decision-making, while the group of victims took more time to complete assessments of cognitive flexibility. This study suggests that bullies have difficulties in warm executive functions, while victims have lower performance in cold executive functions [50].

3.4. Addictions

The association between the low academic performance and the use of alcohol (risk consumption) has been studied by several authors in the literature [51]. Due to their biological limitations in the ability to engage and integrate executive functioning, teens are very susceptible to the noxious consequences of the use of tobacco, alcohol, and other drugs. Unlike adults, alcohol causes greater impact on the brain of adolescents and young adults in the areas of working memory and learning. The early onset of nicotine use leads to deterioration in memory capacity and increases the frequency of episodes of depression and heart irregularities. Marijuana consumption associated with low academic performance has been described [52]. Other drugs, such as stimulants and opioids, are directed to the dopaminergic receptors in the brain and can cause damage throughout life to the development of impulse control and the ability to experience reward. Substance abuse contributes to the delay in skills of the executive functions and in immature or under-controlled emotional responses

4. Strategies for the good academic performance: Physical activity, sleep, and diet

4.1. Physical activity

Several studies conducted on animal and human models provide sufficient evidence for an important relationship between various factors such as physical activity, sleep, and healthy food, with optimal cognitive functioning. This invariably leads to a better academic performance. These studies have been conducted through different stages of development, from prenatal to old age. Some of the cognitive functions that may be affected by the activities or changes throughout life are short-term and long-term memory, learning, attention, spatial memory, and working memory, among others. Evidence suggests that the connection between these cognitive functions, physical activity, nutrition, sleep time, and social interactions have a direct impact on the structure and function of the central nervous system [53].

Consequently, cognitive control has been implicated as an important and necessary component of academic performance, in that it relates to brain areas that are involved in processes of behavior and processing of information required to interact with the environment in both children and adults. Neuroimaging studies such as magnetic resonance imaging (MRI) have been used to demonstrate potential mechanisms by which physical activity improves cognitive health. These techniques have demonstrated that physical activity improves the function and structure of the brain [53, 54], possibly associated with an increase in the neuroplasticity, and neurogenesis due to BDNF which can be measured peripherally in blood serum or plasma (pBDNF) [55]. Therefore, it is possible to analyze a direct correlation between physical activities with neurocognitive changes and subsequent blood analysis directly after the physical activation. BDNF belongs to the most important family of proteins in the brain, which plays an important role in neurogenesis, synaptic plasticity, learning, and memory. Therefore, a low concentration of pBDNF can lead to a poor execution of cognitive tasks associated with spatial memory in the hippocampus [56].

Physical activity is defined as bodily movement that requires energy output above normal with physiological demands, which can be measured through records and data obtained by accelerometers or other devices. It has been demonstrated that physical activity can have an indirect effect on the body by reducing stress and with it, the oxidation and inflammation, improving cognitive function, and reduced risk of developing dementia [57]. In addition, it has also been observed that a decrease in physical activity coincides with an increase in age. This in turn shows an impact on the functioning of neurotransmitters of the dopaminergic system [58], which is important for both processes. The absence of dopamine can anticipate problems with working memory and learning [59]. It has also been suggested that there is a relationship between cardiovascular exercise and the volume of gray matter in the hippocampus and prefrontal cortex in the elderly population, which results in an improvement in the memory. Other self-report studies of subjects with memory problems have shown that physical activity over 6 months significantly improves memory compared with those subjects who did not perform physical activity as a control group [60].

Recently, a group of researchers conducted a comprehensive analysis of studies done in humans over the past 15 years. The aim of this study was to determine the relationship between various factors, such as age and physical activity, and the performance of cognitive skills and memory. The results showed a strong relationship between cognitive skills and physical activity, which reduced by up to 10% the risk of developing neurodegenerative diseases such as Alzheimer's and dementia. In addition, they also showed that the intensity of exercise impacts differently on the functions and cognitive skills. For example, low-intensity aerobic exercise has a positive effect on visual perception and attention, while moderate physical activity impacts in a general way the cognitive skills such as memory, verbal memory, and attention. The previous, intense exercise requires much more attention and less cognitive processing due to a reduction in reactions, selective attention, and flexibility toward the tasks. Currently, there is controversy about the type of exercise and the greater benefits in the cognitive performance; in this sense, this study suggests that physical activity is without doubt a good factor of cognitive improvement, but more studies are needed on the intensity, type of exercise, and cognitive activity, which deserve to be analyzed in depth and from different scientific points of view [61].

In summary, all these studies point to the fact that physical activation at different stages of life is an important factor for the maintenance of a healthy body and, in addition, for mental health and cognitive therapy. In children, physical activity significantly improves selective attention, working memory, and learning diminishing behavioral problems and overweight and improving their academic performance. In adults and the elderly, it prevents the deterioration of memory and improves the execution of tasks, as well as maintenance of optimal mental health through the activation of the dopaminergic system and neurogenesis, which can prevent the development of neurodegenerative diseases [62].

4.2. Sleep

Today, reduced and/or disrupted sleep has become common among people of all ages, including pre-school children. The reduction in the hours of sleep in adolescents is considered a public health problem by the American Academy of Pediatrics. These changes can lead to the deterioration of various physiological functions, particularly in the brain, such as learning, memory, and the deterioration of cognitive processes and therefore of academic performance. Sleep is a physiological process controlled and orchestrated by diverse brain areas, including the cortex, brainstem, hypothalamus, thalamus, and hippocampus, and the release of neurotransmitters that in addition to generating the wake-sleep cycle is also involved in the execution of tasks and behaviors on a daily basis [63]. It has been suggested that during sleep there is a flow and storage of information between the hippocampus and cerebral cortex; the interaction between these areas promotes the consolidation of information gained during the day, suggests that the storage´s model promote the short-term memory consolidation into hippocampus, and long-term memory on the brain cortex [63]. In the first place, it is known that Rapid Eye Movement (REM) sleep and slow-wave sleep (NREM) provide different processes of memory storage, for example, it has been proposed that NREM facilitates declarative memory or explicit memory, while REM facilitates the non-declarative or procedural memory and learning [64]. During NREM sleep, the hippocampus consolidates the memory and transfers the information to the cortex for the long term. Stickgold and colleagues suggest that during REM sleep cortical plasticity could be promoted, which plays an important role in procedural memory or in a high-level cognitive processing, but not so in episodic memory bound to a hippocampal process [65]. In addition, it is believed that the processes of neuronal plasticity take place both in the NREM [66] and in the REM [67].

The pace of activity currently has led us to a reduction and alteration of the wake-sleep cycle and with that the presence of many disorders associated with this. It is for this reason that many studies have focused their attention on studying the deleterious effects of deprivation and/or alteration of sleep on different processes of the body as is cognitive deterioration. Currently, sleep deprivation is very common among students, which have been associated with poor academic performance and a decrease in physical activity. For example, numerous investigations have found evidence that sleep in infants plays an important role in the consolidation of memory, making the process more stable and less prone to forgetfulness [65]. Another study conducted on infants from 6 to 12 months of age showed that taking naps for at least 30 minutes significantly improves learning and memory in association

with objects in comparison with those infants who did not take naps. In addition to the benefits on learning and memory, it has been shown that naps may be beneficial for language learning. It is known that the sleep in adolescents may be affected by the use of electronic devices at night. This directly affects the neurons of the suprachiasmatic nuclei and the pineal gland, inhibiting the secretion of melatonin and delaying or disrupting sleep. In addition, the wavelength and intensity of light can negatively affect attention during the morning [68]. Given that the use of electronic devices may not be restricted completely, it is advisable not to use them at night in order to avoid the effects on sleep and health in general. In adults, a short nap has an impact on stress response. Cognitive disorders, such as the formation and storage of memory, including attention, executive functions, emotional reactivity, decision-making, and judgment, result in a reduction of their quality of life in general [69]. In this sense, a good night sleep is an essential factor for maintaining mental health on cognitive processes associated to learning and academic performance such as memory, attention, perception, and physical activity.

4.3. Nutrition

Academic performance may be susceptible to change or impact on various factors, such as those we have previously addressed like sleep and physical activity among others. However, it is important to know if the supply or nutrition can modify the student's academic performance or cognitive functioning, with the aim of generating strategies that support mental health in school-age children and adolescents. During childhood and adolescence, eating behaviors are very important. Given that in this stage, brain uses the most glucose or energy to the processes of attention, memory, and learning [70].

In addition to the breakfast hours, various analyses have noted the relationship between the types of food and academic performance. For example, fast food or "junk food" which contains the greatest number of calories and few nutrients. It was noted that low consumption of this type of food is associated with a better academic performance in children of preschool age, particularly with less consumption of sugary drinks [71]. As was expected, the intake of vegetables and fruit improves academic performance, although more studies are needed in this regard in different population [72].

A group of researchers recently analyzed the dietary effect of breakfast on scholar achievement in children from 8 to 15 years of age. The research consisted of a variety of diets such as fruit, vegetable, and sweetened drinks. The goal of the research was to analyze the relationship between the consumption of these diets and the grades of the students. The results showed that diet is associated with higher academic grades in children who consumed vegetables and fruits compared with those children who consumed sweetened drinks, who showed the lowest scores, mainly in grammar, reading, and writing [73].

The consumption of proteins and other nutrients from a diet of fish showed that there also exists a significant association related to academic performance and vocabulary scores in a study that observed 700 students between 12 and 18 years of age in the Netherlands. Nevertheless, more studies are necessary with respect to age, sex, and academic trajectory, as well as with different populations [74].

On the other hand, a recent study of a meta-analysis of 226 patients in a random study demonstrated that resveratrol, a natural phenolic compound contained in a normal diet, has been attributed to have a wide spectrum of biological properties, such as anti-carcinogen, anti-inflammatory, and antioxidant, in addition to a therapeutic effect on cognitive disorders. Resveratrol does not have an effect on memory or cognitive skills, including linguistic ability or retention of information [75].

However, the direct consumption of vitamins and other nutrients, such as iron, omega 3, among others, also shows a solid relationship between academic performance and intake [76]. The majority of studies suggest that there is an important association between the selective consumption of foods with the cognitive and academic performance. It is, therefore, necessary to research this further using animals in pre-clinical studies to provide sufficient evidence of the effect of diet, nutrients, and the quantity of food on the cognitive capacity and academic achievement.

5. Conclusion

This chapter has looked at studies in executive function and stress through the eyes of neurophysiology. Self-control of stress can promote a reduction in the action of the amygdala, and the subject can resolve the stressful situation. However, if we do not have control, it will cause alteration in the prefrontal cortex affecting the mental and physical health of the subject.

In relation to academic stressors, the lack of control strategies can promote increasing blood cortisol levels, which affect the psychomotor integrity of the individual. One of the factors that can affect executive functions is stress. The relationship between specific stressors and the deficit in executive functions in academic performance includes factors such as bullying and addictions. This knowledge leads to creating information strategies to alert teachers and parents about the consequences of these factors on cognition.

This chapter has also described a number of interventions designed to increase the level of executive function. Physical activity, good sleep, and nutrition at different stages of life are important factors for the maintenance of the body health. These are essential factors for maintaining mental health on cognitive processes associated with learning and academic performance such as memory, attention, and perception. The authors contend that using any of these different techniques may prove successful in alleviating the chronic or acute stress that permeates the school setting and is predictive of executive function deficits.

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Chapter 3

Stress in Nursing University Students and Mental Health

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Additional information is available at the end of the chapter

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Abstract

Stress is a physiological response that impacts the cognitive, emotional, behavioral, and social components. It also involves the adaptation of the organism, the coping resources, and the environment. In young people, stress can be triggered by social interactions or school requirements. This chapter is a narrative review analyzing scientific bibliography from the main databases (NIH, Scielo, Redalyc) that explored the main stressors and their effects on nursing students. These stressors include the care of patients, assignments and workloads, academic evaluations, and negative or hostile social interactions. Data include the deleterious effects of stress in nursing students as anxiety, depression, inhibiting learning, and burnout, which negatively impact their academic development and health. Finally, some interventions to reduce the impact of stress are discussed. Conclusion: Stress responses in nursing students vary in duration and intensity during their academic training; final effects depend on the coping mechanisms, individual resources, and hospital environment. The effects of stress on nursing students impact on academic performance but could also trigger several psychiatric disorders as depression or anxiety, as well as other associated problems such as sleep disorders, alcohol, and psychoactive drug consumption, which in the short and long term may affect the patient care.

Keywords: nursing students, stress, psychiatric disorder, scholar stress

1. Introduction

The term stress comprises the physiological and psychological responses that prepare the organism to cope with stimulus called stressors that are interpreted as challenging to the individual [1]. Deleterious effects of stress have been observed from the first scientific description of stress by Selye [2]. Traumatic events can trigger intense stress response on the organism,

while daily routines as job, economical, or academic pressures can elicit mild responses of stress during prolonged periods of time; in both cases, stress responses can be altered producing deleterious effects on health [3]. Although today the concept of stress has been extensively used and discussed, at least two different perspectives of stress must be mentioned: one is organic and the other is psychological [4]. **Table 1** shows the main similarities and differences of these two perspectives.

Another point of view proposed that stress occurs due to demands that exceed individual resources, affecting the adaptive, cognitive, and emotional capacities of the subject [5]. From this perspective, psychological stress has three types of cognitive assessments. In the first cognitive evaluation, the subject discards or recognizes the threatening, beneficial, or insignificant situations based on personal beliefs, self-efficacy, goals, and situational factors. In the secondary cognitive evaluation, the subject estimates the own resources of coping, including the skills to change the situation or reducing the aversive impact. In the last cognitive stage, the subject perceives and reinterprets the stressful situation; that is, there is a reevaluation of a situation that originally was considered threatening and is reinterpreted as benign. In nursing students, stress can be produced when the demands are perceived as excessive and uncontrollable, and its effects are related to health problems [6, 7]. **Table 2** describes the classification and impact of stress on health.

Another theoretical perspective on stress is Neuman's model, which considers stress as the product of the instability of a client system (individual-environment-staff), in which stressful elements join in [9–12]. Although some stimuli that are generated within the limits of the client's system are stress-producing, they trigger a result that can be positive or negative; it makes necessary to explore the results that stress produces in nursing students during academic training. The stressors that nursing students face daily would be the following: (a) Intrapersonal forces occur within the individual, such as conditioned responses, thoughts, and sensations. (b) Interpersonal forces refer to negative relationships between students, patients, and staff, e.g., the expectations of the patient or student about the role in a hospital. (c) Extra-personal forces occur outside the individual, such as the student's economic circumstances [9, 10]. Thus, interventions to reduce stress should be routed in three directions. The goal of primary prevention is to reduce the possibility of facing a stressor or reduce the possibility of a reaction. In secondary prevention, intervention is made after the client responds to

Perspective	Differences	Similarities
Organic	Stress like an uncontrolled response by the organism that can be pleasant or unpleasant	Stress as an adaptive process and the development of the organism's abilities
Psychological	Stress seen as a process of transaction between environment and individual that is emphasizing the cognitive part and the response of the organism to the stimulus, not only by physiological reactions	

Adapted from: Holahan [4].

Table 1. Perspectives of the concept of stress.

Kind	Description	Impact on health	Examples
Acute	It comes in daily life environment, is short in duration, and has no severe effects on health. This type of stress helps the individual develop coping skills	Emotional agony; muscle, stomach, and intestinal problems; and transient over-excitation	Loss of a loved one
Episodic	This type of stress is intense and repetitive without being established as chronic	Prolonged agitation, severe and persistent headaches, migraines, hypertension, chest pain, and heart disease	Individuals with personality type A (DSM-V) and people who develop in hostile environment
Chronic	Intense, repetitive, and exhausting and leads to the development of diseases	Violence, nervous breakdowns, heart attacks, strokes, cancer, and even suicide	Traumatic experiences of childhood and suffering some illness

Adapted from: Herrera [8].

Table 2. Classification of stress.

the symptoms of stress. The customer's internal and external resources are used to reinforce internal resistance, reduce reaction, and increase resistance factors. Tertiary prevention takes place after active treatment or the secondary prevention phase; it aims to ensure that the patient recovers the optimal stability of the system in Neuman's model [9, 11, 12].

In summary, stress should be seen as the result of the interaction between the environment and the individual; in the case of nursing students, the specific stressors are related to factors of academic life and hospital practices, which are often intense, repetitive, and exhaustive (see **Figure 1**).

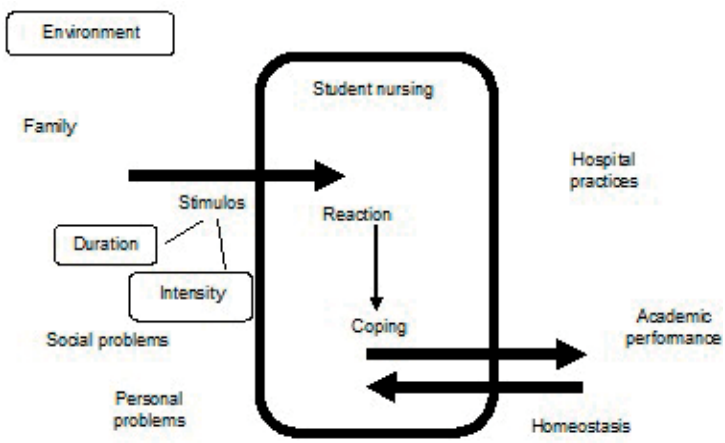

Figure 1. Model stress in nursing student. Note: This figure illustrates the interaction between the nursing student and the stressors.

2. Stress and health in nursing students

Exploring the effects of stress in students is important in many aspects, but two are outstanding. First, most of the students are young, and the effects of stressful events in young can last until adulthood, increasing the risk of suffering mental health disorders [13, 14] among other risks on health [15]. Mental health in nursing students will be reviewed in Section 5. Second, stress can reduce learning skills [16] indispensable in academic environments; the reduction of learning skills is a factor of great importance since it reduces the resources of students to achieve academic success. It is known that stress is triggered by stimulus according to the age of the person [17]. In this sense, school environments can expose individuals to stressors as harassment by peers, schoolwork pressure, and being treated careless by teachers; all these stressors can be severe enough to produce psychosomatic pain, psychological complaints such as feeling unsafe and nervous, irritability, sadness, and depression [18, 19]. The effects of stress in school can negatively impact social dynamics between peers and teachers, and these in turn can produce more stress that in consequence triggers mental health problems such as anxiety and depression [20, 21].

Prevalence of academic stress is very high in health students, especially in nursing and medicine students according to several reports [22–26]. Thus, the importance of studying the stressors in nursing students lies in the deleterious effects on cognitive performance and health, i.e., the development of mental disorders such as depression, anxiety, eating disorders, sleep, and substance use [27], but also experience of stress can result in students experiencing ineffective communication and inefficient at work, decreasing the quality of health-care services [24].

3. Social stressors in academic life

Social stressors affecting nursing students can be grouped according to the experience of formative knowledge and applied knowledge. Formative knowledge element refers to the academic life of the nursing student. In a study that included 81 postgraduate students in full-time and part-time nursing in Jamaica, the authors found that 50% of participants indicated experiencing the moderate level of stress related to the program of study. The highest stress scores were related to the preparation, the final result of the exams, and the academic load of the student [28]. These findings are similar to those found in Latin American students, in which 89 students of nursing from Lima (Peru) reported in 2005 excessive academic workload, academic test, and lack of time to complete academic assignments as the main stressful stimuli during training [29].

Regarding the styles of coping stress, according to a longitudinal research with 249 Spanish nursing students, there exist differences between coping styles related to sex, being women who use more an emotional coping approach than men, while male students tend to use more behaviors as alcohol and drug consumption to cope with stressful situations. Surprisingly, the emotional coping observed was positively correlated with neuroticism and negatively with friendliness and scrupulousness.

Finally, the authors demonstrated that nursing students experienced an adaptation to the stressful events during academic life when comparing last year students with the first year nursing students [26]. Similarly, stress and resilience scores in a cohort study of 1538 undergraduate nursing students in China showed an influence of academic progress (years) on the stress scores; senior students reported lower stress scores compared to less advanced students [30]. Also, a cross-sectional study of 474 nursing students from three different universities in China found high scores on two subdimensions of the stress role scale: role of conflict and role of ambiguity. This means that the main cause of stress is because most students have no idea what activities they are going to do during their stay in the hospital. Additionally, the authors demonstrate that when the student has a very well-defined identity as a nurse he or she tends to have low scores of stress [31].

When students experience applied knowledge, stressful situations are mainly related to the nurse–patient interaction, which implies specific care according to the illness and needs of the patient, in addition to the application of knowledge and skills during nursing practices (see Section 4.1). For example, a qualitative study analyzed seven Iranian nursing students and found that the social environment of hospitals is stressful enough during their first practices, where students experience feelings of being inefficient, followed by being ignored, and also experience ineffective communication, sadness, and ambiguity of the activities they are assigned to do [24]. Additionally, experiencing the death of a patient is considered an extremely stressful situation for nursing students [32]. In another example, using an adaptation of the Student Nurse Stress Index (SNSI) to Turkish nursing students, it has been found that there are four stressors in students: academic load, clinical concerns, personal problems, and interface worries. The factor with greater influence was the personal problems of the patients, while the factor with the lower influence was the academic load. This means that the problems related to the patient tend to be more stressful than some other stressors [33].

Besides, it has been shown that the sense of self-efficacy is positively correlated to active coping styles as planning, positive reinterpretation of the context, acceptance of the event, and emotional support during the first clinical practice; all these are observed in 394 polish students during the first year of the career. This means that the student tends to experience less stress when they feel ready to successfully perform a procedure to the patient. In the same way, people with low perceived stress tend to have a high sense of self-efficacy [34].

In all previous studies, the stress levels were increased when the student started clinical practicing, i.e., the application of knowledge and ethical and legal responsibility about the care of the patient; this stress response can differ according to individual differences. One of those differences seems to be gender, as shown in a research in which 215 nursing students from Murcia showed that women had higher stress scores than men during clinical practice, in subjects related to emotional items (contact with the suffering of others, emotional implications with the patient); these findings do not mean in any sense that women are less prepare to cope with stress, but women are probably more empathic with the patient. Likewise, there is a statistically significant relationship between age and subjects experiencing impotence or uncertainty in a given situation, excessive overload of work, and lack of knowledge of a clinical situation, especially in students under 21 years of age [35]. In contrast, in a study that included

45 students of the University of Murcia, it was found that men get more stressed than women; this statistically significant difference between both sexes was present on the topics related to the management of new technologies, contact with the suffering of others, not knowing how to control the relations with the patient, and the concern about the results of the evaluation in practice [36]. In short, the first professional practices like social service prove to be more stressful for nursing students than theoretical training because student are required to put into practice all the acquired knowledge and skills in a real context. So, experience stress during nursing practice could be due to a possible discrepancy between curricula and practice, in addition to the structural conditions found in most Latin American hospitals [37, 38].

Another social factor producing stress in students can be related to cultural differences due to nationality or cultural identity. Ethnically, diverse nursing graduate students, including Latin, have reported difficulties to adapt in school due to cultural differences during academic life in foreign countries; that is, these students felt the need to validate their capacities and skills to others, based on the fact that native students recognized their differences as evidenced by skin tone or language. In these cases, feelings of isolation and marginalization are experienced when the environment do not recognize their cultural identity. These students tend to feel they are not socially integrated or fully accepted, which causes stress and increases the probability of attrition and desertion [39, 40]. In the same study, protector factors against the stress produced by cultural differences, such as services of financial aid that alleviates monetary worries, social activities, assignment of a faculty mentor, achievement, or progress of academic goals, were also identified [40]. All these supports findings reported in Mexican American students that related academic success with financial assistance, bicultural relations, and experiencing authentic caring relationships from institutional agents, family, and peers [41].

4. Neuroendocrine responses in stressed nursing students

Research about the effects of stress on nursing students has been developed since the early 1970s; nevertheless, the effects on the hormone levels and other physiological functions in nursing students have been scarcely reported until now [42]. Stress hormones, i.e., cortisol, are produced by hypothalamic-pituitary-adrenal axis. The paraventricular nucleus of the hypothalamus produces corticotropin-releasing hormone (CRH), which in turn stimulates the pituitary to produce adrenocorticotropin (ACTH). Then, ACTH stimulates the adrenal cortex to secrete cortisol in order to increase energy availability [15, 43], but in a long term, this response can be deleterious. On healthcare professionals, the explored deleterious effects of stress on physiological status comprise alterations on energetic metabolism and body mass [44]. Additionally, stress hormones impair plasticity in the hippocampus of animals [45] and human beings, affecting learning skills [16] and contributing to the development of pathologies as anxiety and depression [46, 47]. For these reasons, the study of physiological effects of sustained high stress hormones in nursing students is a key factor to understand the deleterious effects of stress. In this sense, measures of salivary cortisol seem to be useful to explore the effects of different environmental stressors and anti-stress interventions [48].

4.1. Stress-related cortisol response in nursing students

Studies of cortisol levels in nursing students have been performed under several circumstances in which students are exposed to different kinds of stressors. For example, 21 nurse anesthesia students were tested on salivary cortisol levels during 3 days for baseline measures; after that, 16 continued the experiment and experienced a session of *high-fidelity patient simulation* used for training students on the contact with patients. The simulation was carried on in the presence of evaluators. Results showed a significant increase of cortisol levels of students after experiencing the simulation, in which cortisol levels were threefold higher than the control [49]. Another study explored the effects of social factors on stress responses by exposing final semester nursing students to *high-fidelity patient simulation* under three different circumstances: low anxiety (patient was a Laerdal© *advanced life support* [ALS] manikin, additionally an actor played as a registered nurse), medium anxiety (the patient and a registered nurse were actors), and high anxiety (patient and registered nurse actors were accompanied by a visiting and inquisitive friend [actor] that asked questions from a standardized script as "Why do you have to flush the line?" and "When do you think I can take him out of here?"). Students from the group of high anxiety had higher changes in heart rates and levels of cortisol when compared to the low anxiety group [50]. These findings show that stress in students can be modulated through different factors, including social interactions. It is also important to control the levels of stress during simulation, since the effects of stress on learning in nurse students during simulations are still not clear enough [51].

Additionally, nursing students are required to complete clinic practice; this process often implies covering night shifts. It has been documented that night shifts in nurses are stressful enough to alter the circadian rhythm of cortisol secretion after 5 days when compared to nurses with day shifts. At least 2 days off seem to be necessary to restore the circadian rhythm of cortisol [52]. Moreover, in a Brazilian study, nurses (46 females, 11 males) had higher levels of salivary cortisol (564.1 ng/mL) on work day than cortisol levels (354.1 ng/mL) on days off [53]. These data should be taken carefully since samples were collected by participants itself under different uncontrolled circumstances, and values reported in abstract are different to values reported on tables. It is logical to assume that nursing students doing clinical practice under night shifts and high workload are vulnerable to changes in cortisol patterns, and then night shifts and workload are other stressors that may be affecting health in nursing students.

On the other hand, measures of cortisol obtained from 26 female nursing students in the fourth year of school in Osaka showed that salivary cortisol (μg/dL) did not significantly change 10 min before an academic examination (0.148 ± 0.024), immediately after the examination (0.156 ± 0.037), and 2 h after the examination (0.102 ± 0.034) [54]. In contrast, the same study found increases of salivary immunoglobulin A (IgA) and salivary chromogranin A (CgA) in response to the stress of examination. This finding contrasts with other studies in which salivary cortisol levels changed in response to examination in junior and senior nursing students [55]. Plasma cortisol levels were also measured in 92 female nursing students (19–21 years old) from Suzhou Health College under school and clinic conditions during a month. Although results of this study suggested a modest increase of anxiety in clinic conditions measured with the State Anxiety Inventory (SAI), cortisol levels did not vary significantly [42]. Authors suggest that plasma cortisol could be a good marker for acute stress but not for the chronic

effects. All together, these findings suggest that salivary cortisol measures in healthy nursing students vary according to the kind of stressor and the schedule of exposition.

Finally, in a study on 69 health professionals from a palliative care unit, including 32 nursing assistants and 30 nurses that met the burnout criteria with the *Maslach Burnout Inventory-Human Services Survey* (MBI-HSS), the average levels of salivary cortisol in the group with one dimension of burnout (14.17 nmol/L) were higher than non-burnout group (8.83 nmol/L) [56]. High levels of salivary cortisol are also observed in nursing students with high scores of depression, anxiety, and stress [46]. These findings suggest that cortisol is a useful biomarker of emotional health deterioration due to stress in nursing students and professionals.

4.2. Effects of anti-stress interventions on endocrine responses of nursing students

Several anti-stress interventions have been implemented with the aim to reduce stress in nursing students and professionals, but most of these works are based in self-reports of a decrease in symptoms of stress, and they lack of physiological measures as stress-related hormones. In this sense, few works have explored the effects of anti-stress manipulations on endocrine responses in students to test the efficacy of these interventions. For example, nursing students (16–20 years old) from a nursing college in Taiwan which have scored 8 points or higher on the *Depression Mood Self-Report Inventory for Adolescence* (DMSRIA) were randomly assigned to a control group (n = 40) and an experimental group (n = 31) that was exposed to Chinese five-element music for 40 min twice a week for 10 weeks. Saliva samples were collected before music exposure and during weeks 1, 5, and 10 of music at 11 am. Music treatment reduced cortisol levels on weeks 5 and 10; however, these changes did not reach statistical significance [57]. It is also important to note that music was played in a group setting, while control groups had no manipulation; thus, the effect of music cannot be isolated from any possible effect of being part of a group when listening to the music, a possibility that remained to be explored.

It has been reported that physical activities can ameliorate the impact of stress. For example, 18 nursing students who practiced a traditional Chinese exercise called Qigong twice a week for 10 weeks had lower scores of depression, anxiety, or stress than 16 control students interviewed with questionnaires DASS-21 and PHQ. This improvement was related with a decrease in salivary cortisol concentrations [46], which agrees with the beneficial effects of exercise in the brain functions at the preclinical level [47].

Taken together these findings suggest that cortisol is not strongly correlated to the stress experienced by nurses or nursing students in different circumstances. Studies from other healthcare professionals point out the same findings. In physicians and paramedics, cortisol showed very little variation in response to the stress produced in high-fidelity patient simulation used for training, while salivary alpha-amylase appeared to be more sensitive than salivary cortisol to measure stress in a simulated prehospital environment [58].

5. Stress and mental disorders

Mental illnesses are a health problem with high prevalence in the young adult population [59, 60]. Within this population, students are highly vulnerable, especially in the areas of health sciences.

Careers as medicine, dentistry, and nursing are very demanding physically, intellectually, and emotionally for the students, who are exposed to high levels of stress during their formation. Particularly, in the last year of student training, they are exposed to severe emotional stress and exhaustion. The stressors they face come from different ways such as academic factors, the demands of proper performance in clinical practice, academic assessments, and future expectations about employment [60]. In addition, social, emotional, and physical pressures, as well as family and personal problems, affect student's learning ability and academic performance [61] and predispose the young students to the development of mental disorders such as anxiety and depression [62–64]. The impact of stress on nursing students can affect the nurse–patient relationship; nurses have more interaction during and after an intervention with the patient. Similarly, being exposed to environmental stressors could lead to dissatisfaction and burnout in nursing staff [65–67].

It is estimated that up to 55% of young adults report depressive symptoms, burnout, and increased frequency of alcohol consumption during their life as student [68, 69] and about 42% of students develop a mental disorder, a situation that predominates in the female gender with a prevalence of 62% of this population, with an average age of onset of 23.5 years [70]. The most common mental disorders affecting students are anxiety disorders, particularly in women [60], and they also report higher levels of stress than men [71]. Seventy-five to ninety percent of medical students, including nursing, increase alcohol and tobacco consumption particularly in the last year of their medical education [72]. Most of the cases (72%) feel a state of emotional well-being that helps to cope with the experienced psychological stress they are exposed to, despite being aware of the consequences of excessive alcohol and tobacco consumption [72]. Something similar has been reported in nursing students, where stress, environmental influences, social acceptance, and easy availability of alcohol, as well as anxiety generated by the difficulty of the educational program, are factors that increase alcohol consumption in this population [73]. In the general population of these students, 44.4% report feeling emotionally stressed and develop some mental disorder.

On the other hand, subjects exposed to stressors but with a network of emotional support reported feelings of happiness; so, it is suggested that support networks help to decrease susceptibility to develop mental disorders [70]. The absence of such emotional support networks in students increases the risk of developing some mental disorder; students reported having some physical illness or mental disorder diagnosed by a psychiatrist with no significant differences on prevalence between careers of the health science, such as medicine, dentistry, and nursing [70]. Additionally, it has been observed that factors such as religious practice are a potential factor for resistance to mental disorders, such as alcoholism, anxiety, depression, suicide rate [74, 75], and burnout [68].

These data support the idea that there is a strong relationship between the physical and psychosocial stresses to which nursing students and other health careers are exposed, with the susceptibility to develop some mental disorder, and that the presence of some religious beliefs and social support networks, such as the family, diminishes the susceptibility to the development of such disorders.

6. Conclusion

There is plenty of evidence that nursing students are exposed to high levels of stress during their preparation. Among the most frequently stressors mentioned in literature are excessive

workload, lack of time to accomplish academic assignments, test, interaction with patients, and negative interactions with peers and family. At the academic level, the stressors can be the result of a gap between the academic preparation and the practical training or the environments produced in universities and hospitals. In this sense, the educational models must contemplate simulations of the real life that the students will face at work. Such programs must also include the development of social, emotional, coping, and buffering skills. Levels of stress on nursing studies are strong enough to change secretion of cortisol with potential deleterious effects. Physical and psychosocial stress in nursing and healthcare students increased susceptibility to develop some mental disorder, and social support networks diminish the susceptibility to the development of such disorders. Thus, stress must be considered during the formation of nursing students to optimize their academic performances and avoid deleterious effects.

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Chapter 4

Bullying in School

Nahla Mansour Al-Ali and Khulood K. Shattnawi

Additional information is available at the end of the chapter

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Abstract

Bullying in school is a significant problem worldwide and is one of the most common antisocial behaviors among adolescents and children. Despite implementing anti-bullying prevention programs in almost every school within the United States, Europe, and some initiatives in low-income countries, yet bullying is more pervasive problems in schools than any other problems. This chapter provides a review of research and evidence on school bullying: understanding the definition of bullying in school, and the size of the problem, the consequences of bullying, academic correlations, who is at risk, students' perceptions of bullying and the evidence school-based programs to reduce and prevent bullying.

Keywords: bullying, peer victimization, students, academic performance, prevention, mental consequences

1. Introduction

Bullying has been defined by many scholars and organizations differently. The classical definition is first proposed by Olweus [1] as "intentional and repeated acts that occur through physical, verbal, and relational forms in situations where a power difference is present." Olweus states that "A student is being bullied when he or she is repeatedly exposed and over time, to *negative actions* on the part of one or more students." The negative action is "One that intentionally inflicts, or attempts to inflict, injury or discomfort on another" [1]. Thus bullying is likely to occur when there are differences in power between the bully and the victims when the victim is unable to defend against bullying behavior. Bullying behavior can be direct, including face-to-face confrontation; such as hitting, damaging, kicking, and other types of physical harm; and indirect involving a third party, such as social exclusion, spreading rumors, and other types of psychological harms or even online (cyberbullying) [1–3].

Most definitions of bullying have similarities regarding the features of bullying such as being repeated over time, intent to inflict harm, an imbalance in power, and all highlight the chronicity of bullying. The Center for Disease Control (CDC) defined bullying in school as "any unwanted aggressive behaviors by another youth or group of youths who are not siblings or current dating partners that involves observed or perceived power imbalance and is repeated multiple times or is highly likely to be repeated" [3].

A new emerging type of bullying called electronic aggression or cyberbullying. Bullying through electronic media becoming a critical concern through the increasing virtual interactions among adolescents and children. This type of bullying is known as an aggressive online behavior in the digital space and defined as repetitive, aggressive behavior using technology through cell phones and social media. Students who experienced cyberbullying bullied through email, chat rooms, instant messages, websites, or texting [4, 5]. This type of bullying is different from the traditional bullying in that it is difficult for school staff and administrators to control because it happens outside schools and mostly in the forms of anonymous messages posted online through social media. Students who experience cyberbullying have similar consequences as traditional bullying [5, 6].

2. Why bullying is a public health problem

Bullying in school is the most common type of violence among adolescents, recognized as a serious concern for students and has become a public health problem and global concern. Although the prevalence of bullying is difficult to estimate because of the different measures used throughout the studies, researchers have agreed that bullying is a pervasive and significant problem in our schools today. In 2016 nationwide survey, 20.8% of students report being bullied [7]. In 2015 survey of students ages 12–18, 21% reported being bullied at school, 13% reported being made fun of, called names, and insulted; 12% were the subject of rumors; 5% were pushed, shoved, tripped, or spit on; and 5% of students were socially excluded. In the same survey, 4% of students experienced threatened with harm, 3% were forced to do things they did not like to do, and finally, 2% reported that their belonging was damaged on purpose [7]. In the same survey, females (23%) more than males (19%) reported being bullied and females (15%) were more than males (9%) being the subject of rumors. However, male (5%) more than female (3%) students reported threatened with harm. Black students (25%) and white students (22%) more than Hispanic students (17%) reported being bullied in school [7].

The rate of bullying throughout the survey studies ranged from 9 to 98%. The bullying rates from 80 studies for students age 12–18 year was 35% for traditional bullying and 15% for cyberbullying [8]. Only 36% of children were bullied reported the bullying, and 64% did not report it [9]. Among high school students in 2015, 16% reported cyberbullying, and 20% are bullied on school propriety. For middle school students, 24% are cyberbullied, and 45% are inside the school. From 2007 to 2016, the rate of cyberbullying is doubled from 18 to 34% [3]. Students with special needs are two to three times more likely to be bullied than the normal students. Moreover, they found to report feeling unsafe in school compared to their normal peers [10].

Ethnic minorities are more likely to be bullied than others, African-American students (24.7%) more likely to report being bullied than Hispanic students (17.2%), followed by Asian student (9%). About 74 and 36.2% of students were verbally and physically bullied because of their sexual orientation, and 55.2 and 22.7% of students were verbally and physically bullied because of their gender expression [10]. The analysis of students from 19 countries (low-and-middle income countries) that participated in the Global School-based Students Health Survey (GSHS), 34.2% of students reported being bullied in the last month, 55.6% of them had been victimized 1 or 2 days, and 7.9% all 30 days in the last month. The prevalence of bullying for each country ranged from 20 to 61% [11].

2.1. Health consequences of bullying

Scientific research indicated that experiencing bullying has short and long-term psychological and emotional impact on both victims and perpetrator [5, 12, 13]. Victims of bullying reported poor mental and physical health, more symptoms of anxiety, depression; feeling sad, being loneliness; vomiting; sleep disturbance; nightmares; body ache; a headache; abdominal pain, and frequent illnesses. This, in turn, increases students' absenteeism either from direct physical or indirect psychological impact [12, 14].

Students, whether they are bullies, a victim, or bystanders, report a suicidal behavior. Among students age15–29, suicide is the second leading cause of death [15]. Students who experienced bullying are two times at risk for have suicidal ideation, and 2.6 times more likely to attempt suicide than other students who did not experience bullying [16]. According to the Youth Risk Behavior Survey (YRBS), 17.7% of school-aged students had attempting suicide within the past year [17]. Depression, violent behavior, and substance abuse are among the most mediated factors between bullying and suicide [12, 18].

2.2. School bullying and academic achievement

Bullying in school not only affects students' physical, emotional and psychosocial lives, it is also found to affect their academic achievements and their classwork directly. Theoretical and empirical literature has been supported the direct association between bullying and student' academic achievements [5, 19–23]. A study among secondary level students shows that traditional as well as cyberbullying has a significant negative impact on students' academic performance when controlling the socioeconomic status of the student [24]. Other findings among students of 13–18 years old revealed that academic achievement negatively correlated with bullying [25]. The research examined the achievement scores of 46 schools and found that peer harassment was negatively correlated with achievement and that students who are teasing they miss school and missing educational opportunities [26]. A recent study among primary school children revealed that verbal bullying among female students was associated with poor academic performance on writing skills. Physical bullying was negatively associated with performance on numeracy, and writing for both males and females. Students who report being verbally and physically bullied had poor achievements in reading, writing, spelling, grammar, and punctuations [23].

Research to date indicates that bullying can seriously affect adolescents' psychosocial functioning, school adjustment particularly academic performance. Peer victimization and low academic performance often correlated because children who are chronically victimized experience negative emotional and psychological outcomes that can inhibit their engagement in the classroom and thus affected their academic achievement. Although small percentages of students are chronic victims of bullying in school, but also temporary victimization can seriously impaired students' academic performance and achievement [5, 21, 27–29].

Results of longitudinal studies highlight strong correlations among peer victimization and lower grade-point averages and lower teacher-rated academic engagement across middle-school years [29]. Students who experienced bullying has 2–3 times negative school perception than those who did not involve in bullying activities [30]. Data from three African countries including participants aged 12–16 year, who participated in Trend study in mathematics and sciences. The results show that bullying is a significant problem in the three countries and is among the most common factors associated with low academic performance [31]. From Arab country, students who report being bullied have symptoms of depression and anxiety and poor academic performance [32].

Research also assessed the mediating and moderating factors that influence peer victimization, and suggested that bullying contributes to poor academic achievement through mediating influences of internalizing behaviors, such as depression, anxiety, and low self-esteem [33]. Victims of bullying are often blaming themselves for being bullied which in turn develop a negative self-perception that affects their concentrating on school work, and become potential to have lower grades and perform poorly on standardized tests [13]. The most commonly investigated factors as having a moderating role in the relationship between bullying victimization and academic performance were friendship quality, peer social support, school maladjustment, and school disconnect [21, 22].

Findings from a nationally representative sample of 7th and 8th-grade students suggest that classmate support was negatively related to victimization and positively related to academic performance for both boys and girls [34]. On the other hands, having friends with high prosocial behavior, and low social anxiety reduces the risk of victimization and enhances academic performance [35]. Bullying and a violent school culture are also interfering with students' academic performance and negatively affect their social and emotional well-being [35, 36].

3. Who is at risk for bullying

There is no specific profile of students who involved in bullying [37]. Findings of previous studies illustrate that there are many factors impact the occurrence of bullying in the schools, ranged from the students' sociodemographic, schools size, number of students, and students' perception of bullying [19, 26, 33, 38]. Several studies investigated the characteristics of those who involved in bullying both bullies and victims. The result showed that preschool aggressiveness, low socioeconomic status, and poor family relationships increase the probability of involvement in bullying cycle at later stages [26, 33, 39]. The results of Meta-analysis study, in which the students were categorized according to certain characteristics (either as victims,

bully, and bully-victim), found that student who bullies others has a negative attitude toward other, trouble with academic and social cognition, and come from low-income family. Victims, on the other hand, were more likely to have the characteristics of bad self- recognition, lack of social skills, isolated and rejected by peers. Victim of bullying viewed as being passive or submissive victims, often quite, careful, sensitive and may easily cry, are unsure of themselves, having low self-confidence and a negative self-image [33].

Previous research found that gender of students is one reason that students get bullied, and females students more likely of being harassed by their peer [26, 29, 39, 40]. Ethnic and racial background were also identified as a reason for being bullied, minorities and Asian Americans students more likely to be a target of bullying behaviors than others. Students from lower socio-economic status are at a higher risk of being bullied [17, 41].

The research took into consideration the mental health issue as the characteristics of those involved in school bullying. One of these critical issues is self-esteem. Although the idea that low self-esteem is a prominent characteristic of the victims, some results contradicted this idea. Some who says it is both for the victim and bully and other supported that bullies often showed lower self-worth, but higher social acceptance [12, 40]. Some research assessed self-esteem as a protective factor from involvement in bullying behaviors. Family factors such as employment status of parents show significant association with being at risk for bullying, a result of cross-sectional study among Greek students of 16–18 years old show that students of low school performance and unemployed father were more likely to be a perpetrator. Students, who have unemployed mother have the chance of being either as a victim or perpetrator of bullying [40]. An analysis of data on 5th and 9th-grade students in 1000 schools in Colombia, investigates variables associated with bullying such as socioeconomic status, family characteristics, and community characteristics. Results revealed that male students, low level of family empathy, family violence, community violence, hostile aggressiveness, and supporting beliefs in the community are associated with bullying [19].

4. Students' perception of bullying

Although bullying in schools has gained the attention of research over the last three decades, there are some inconsistencies of how students perceive bullying [37]. The research found that students perceive the bully as one who has characteristics such as feel superior, seeking the attention of another, giving the way the victim behaved or look (e.g., wearing glasses, types of hairstyles or clothes), or act in a manner that makes others irritable. Moreover, students perceived the way the victim look, talk or dress as an essential leading factor for bullying. Being odd, such as wearing different clothes, eating different food, listening to different music, and having strange behaviors perceived as an exclusive characteristic associated with the victim of bullying [19, 26, 33, 38, 42].

A recent study found that students described a bully as "one who is a coward underneath, lacks respect for other people, wants to show power, wants to impress others, and wants to feel superior". Students perceived victims of bullying as "having low self-esteem, talking or sounding different than others, shy, and having no friends" [37]. Both victims and bullies,

male and female students, agreed that being poor and fat were the main reasons for being bullied. Male students who are physically weak and shorter girls were also perceived as the main reasons for being bullied. Students also perceived the bully as having a bad manner and always making trouble in classrooms [38–40, 42].

5. School-based intervention to prevent and reduce bullying

The mission of any bullying programs is to prevent bullying before it occurs. However, the research on preventing bullying is still emerging. In the light of increasing prevalence of bullying in schools, schools must improve school climate by emphasizing on strengthening the educational system to reduce the bullying [35]. The school climate is defined as the physical structure, social and emotional environment, including school safety measures, comfortable means, and harmonic relationships between students and school staff [10]. In this context, health and well-being of students should be a priority to the mission of public education.

A research review for bullying prevention programs suggested many practical strategies for bullying prevention and reduction [1, 13, 14, 18, 21–23, 29, 35, 43–58]:

- School policies must emphasize on enhancing the social and emotional climate of the school by replacing detention with meditation and improving students mental resilience.
- Schools must put policies in place to help their students developmental resilience to communicate appropriately with each other and to develop effective coping skills and find the meaning of their lives.
- Promoting collaboration among different professionals and school staff (teachers, school administrators, school counselor, social workers), criminal justice practitioners, and researchers to identify the environmental, social and emotional factors that enhance bullying reductions in the schools.
- Implementing a comprehensive, evidence-based bullying prevention program is crucial to reduce and prevent bullying in schools. Use surveillance data, at all levels local, state, and national to identify school needs.
- Using positive behavioral support system and behavioral managed skills, in the classroom and in the school to identify cases of bullying.
- School policies should reflect a zero tolerance for weapons, discrimination, harassment, and gang activity.
- The anti-bullying policies should be implemented consistently to assure students safety in all school locations.
- Developing and enforcing curriculum that is culturally responsive and sensitive to all students' diversities. Bullying definition, types of bullying, who get bullied, and strategies to stop bullying should be integrated into the curriculum.

- Design an educational program to helping students develop skills in conflict resolution, negotiations, listening, communication, and decision making.
- Technical, psychological, social and cognitive interventions are recommended to prevent cyberbullying, such as technical web-protection including blocking cyberbully, changing the password, deleting messages, training of students as cyber mentor-safety, designing cybersafety resources for parents, and cyberbullying professional development programs for schools.
- Anti-bullying school programs should benefit from implementing peer interventions. Peers who have high self-efficacy, more likely to defend negative behavior and they are more likely to act in the bullying situation.
- Schools need to create a culture of intolerance for violence by enforcing all school policies consistently and fairly.
- Schools must develop a professional preparation and development program for teacher and staff to help them teaching mental resilience.
- School-based bullying programs should benefit from the mental health resources in schools (including the counselors, school psychologists, and social workers) in recognizing and understand the relations between the mental health of students such as depression, and anxiety and attendance and bullying problem.
- Schools have to implement a systematic protocol for the early identifications of students facing challenges and crisis.

6. Conclusions

Bullying in schools is a widespread problem around the world, and no community is immune from this problem, despite the anti-bullying initiatives that implemented almost everywhere. Research on bullying has provided rigger evidence about the nature of bullying, the factors contributing to bullying, the characteristics of a bully and the victim, the physical, social, mental and academic consequences of bullying. Research also suggested many practical strategies that help in preventing and reducing the incidence of bullying in schools. Effective prevention bullying programs must define bullying in a clear way to the community and include as its core team, students, school staff, parents and other community members. In order to have a safe environment for students to learn, and to grow up, students must learn how to communicate with each other, resolve conflicts effectively, and learn how to be empathetic to others.

Conflict of interest

The authors have no conflicts of interest to declare.

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Chapter 5

Influence of Drugs on Cognitive Functions

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Additional information is available at the end of the chapter

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Abstract

Disorders related to the misuse of certain drugs represent not only a worldwide public health problem, but also an economic and social issue. Adolescents and children represent the most vulnerable population for drug consumption and addiction. At this early stage in life, a crucial phase of the neurodevelopmental process, substance abuse can induce brain plasticity mechanisms that may produce long-lasting changes in neural circuitry and ultimately behavior. One of the consequences of these changes is the impairment of cognitive functions, with academic negative impact in the acquisition of new knowledge. In this chapter, we will describe the effects of illicit substances of abuse, both stimulants and depressants as well as prescription drug misuse and its influence of on learning and memory processes. Recent evidence on the new so-called smart drugs is also discussed.

Keywords: abuse, cognition, performance, nootropic, smart, stimulants, depressant, memory, impairment, adolescent

1. Introduction

According to United Nations Office on drugs and Crime, in 2015, around a quarter of a billion people used drugs, and approximately 29.5 million showed drug use disorders, including dependence [1]. Drug abuse produces health disruption. Disorders related to the use of certain drugs are associated with an important worldwide rate of morbidity. A wide range of drug-induced neurobiological modifications have been described; some of which can affect learning and memory functions. Stimulant drugs, like nicotine and amphetamine, improve cognitive function at lower doses but impair memory performance at higher doses. Depressant drugs, like alcohol, can cause long-term effects on prefrontal cortex function, disrupting cognitive abilities.

Several studies have suggested that the influence of psychoactive drugs on learning and memory might be explained, at least in part, because of the shared neurobiological mechanisms involved in learning and memory processes and the drug-induced structural and functional changes in the brain. Anatomically, there is an important overlap between the neural substrates of learning and memory and those of addiction. Some of the areas that show overlap include the cerebral cortex, hippocampus, amygdala and striatum [2]; all of them are components of the mesolimbic dopaminergic system.

Adolescence is a sensitive period in brain development characterized by a decrease in gray matter and an increase in white matter. The diminution of gray matter is thought to be due, at least in part, to the process of synaptic pruning, which is the developmental refinement of brain circuits by removal of superfluous synapses [3]. Early drug exposure is associated with frontal lobe damage, low cognitive performance and emotional learning, as well as other behaviors. Moreover, it has been demonstrated that adolescent exposure to both prescription and social drugs impairs cognition, as well as other behaviors, in the adulthood [4].

There is a clear bidirectional relationship between abuse of drugs and poor academic achievement. It has been suggested that cognitive deficits could make adolescents more vulnerable to substance abuse than others; conversely, other proposals argue that substance abuse is the source of cognitive impairments [5–7]. Of course the two possibilities are not mutually exclusive; teenagers with poor academic performance may be more prone to abusing illicit drugs, which may impair their results at school even further. While the several social science theories have been proposed to try to explain each of these phenomena [6], in the following text, we will focus on the cognitive consequences of adolescent substance abuse on the functioning of the nervous system that may have a deleterious impact on cognitive abilities, academic achievement and long-term satisfaction with life in general.

2. Stimulant drugs

Memory is the natural counterpart of learning; both are necessary for behavioral change that precedes survival of species. Substance abuse has been demonstrated to exert detrimental impact upon learning and memory. According to the United Nations Office on Drugs and Crime through World Drug Report 2017, 29.5 million people globally suffer from drug use disorders [8]. Cognitive impairment is a well-established consequence of long-term substance abuse, with stimulants as nicotine, methamphetamine (MA) and cocaine leading deficits in the area of executive function. Stimulants are a class of illicit drugs that can have negative impact on individuals who use them, although this impact might be masked by the believed benefits (**Table 1**) [9].

2.1. Nicotine

Nicotine is the main psychoactive component of tobacco and the responsible agent of tobacco dependency. According to the World Health Organization, despite its severe health consequences, about one billion people smoke worldwide.

Drug	Cognitive process	Effect	Model	Reference
Stimulant drugs	Attention Vigilance Memory	*Acute*: Improving selective visuospatial attention, spatial working memory and associative memory	Monkey Rat Mice Zebrafish Human	[10, 11]
		Chronic: Tolerance Withdrawal syndrome Mild deficits in memory and inhibition response Disruption in prospective and visual memory, verbal ability, reasoning and decision making	Human Rat	[13, 25–27, 29]
Depressant drugs	Attention Memory	*Acute/low doses*: Facilitation in working memory, verbal fluency and executive functions Impaired working memory, verbal fluency and executive functions	Human	[37, 38, 41, 55–57]
		Chronic/high doses: Disruption in working and episodic memory, consolidation memory, attention and memory Also, presence of blackouts	Human	[39, 61–67]

Table 1. Effects of the stimulants and depressant drugs in cognitive functions.

When nicotine is administered acutely, it produces positive effects improving cognitive functions, including sustained attention, vigilance, visuospatial selective attention, spatial working memory and associative memory, both in animal models [10] and in humans [11]. Conversely, a vast amount of literature has showed that chronic nicotine use leads to tolerance, and 1 h after cessation of nicotine exposure, nicotine withdrawal syndrome emerges and it is characterized by mild cognitive deficits. In other words, nicotine tends to improve cognitive function at lower doses and impair performance at higher doses [12]. Furthermore, heavy smokers under acute abstinence from smoking experience decreased neurocognitive functions, including impairments in sustained attention, working memory and response inhibition [13]. Strong activation of memory-related brain regions that include the dorsolateral prefrontal cortex and hippocampus has been correlated with smoking-related cues in adult heavy smokers [14]. These areas are involved in emotional learning and reward-related learning.

Some reports have shown that nicotine and nicotinic agonists, as mecamylamine, evoked cognitive enhancement by potentiating the release of dopamine [12, 15]. Working memory is critically reliant on dopaminergic neurotransmission. In addition, rodent studies have revealed a direct relationship between dopamine release in the prefrontal cortex and on memory task accuracy [16]. Moreover, cholinergic systems and nicotinic receptors are essential for cognitive processes and have been implicated in diseases associated with cognitive impairment [17].

2.2. Methamphetamine (MA)

MA abuse represents a serious public health issue associated with a high likelihood of relapse. By 2008, nearly 25 million people worldwide were estimated to have used MA, with abuse being among younger age groups [18]. MA used is mainly for recreational purposes and it is known to induce a variety of desirable effects, including increased energy levels, positive mood, euphoria, reduced appetite, weight loss, enhanced mental acuity and social and sexual disinhibition [19]. In addition, MA-dependent individuals often claimed enhancement of cognitive function and ability to focus following drug administration. However, this drug induces long-term changes in the brain structure and function, changes in synaptic plasticity, cell death via apoptosis and neurotoxicity, and consequently, it causes dependence and withdrawal syndrome [20].

Anatomically, MA has a preferential neurotoxic effect on the frontostriatal systems that contributes to both emotion dysregulation and neurocognitive impairment [21]. For instance, MA addicts showed impaired performance on tests of cognitive flexibility, which measures the ability to modify behavior when presented with new information or changing outcomes. These deficits may impair MA addicts from altering their habitual drug abuse behavior, leading to an inability to initiate abstinence or resist relapse [22]. Cellular mechanism of this MA impairment has been associated with long-term downregulation of dopamine transporters, suggesting that there are structural changes in some of the dopamine nerve terminals [23]. Other findings suggest that MA use causes changes in the metabolism of the insula and striatum [24]. In a study in humans, MA-dependent participants had significantly lower results than control participants on memory tasks, including prospective memory and visual memory [25]. Accordingly, studies in young adult MA abusers have shown impaired verbal ability, deficits in psychomotor processing [26], reasoning deficits reflecting problematic decision-making abilities as well as retrospective memory task impairment [27].

The evidences pointed that acute administration of MA improves cognitive functions, while chronic consumption of MA deteriorates them.

2.3. Cocaine

Cocaine has long been one of the most common recreational stimulants, especially for adolescents. A recent estimate indicates that half a million of United States habitants use this drug weekly; in this sense, cocaine addiction represents a substantial burden for societies worldwide, linked to adverse outcomes such as violence, suicide and disability, as well as high rates of chronic relapse [28]. In the brain, crack cocaine use has been shown to cause toxic effects, particularly in the prefrontal cortex. These abnormalities are associated with neuropsychological impairments.

Abundant evidence has shown that cocaine withdrawal induces memory decline after its chronic use. It has been reported that chronic cocaine users showed significant harm on verbal memory and fluency as well as deficits in cognitive flexibility, but not in spatial memory, after acute withdrawal. Further, Briand and colleagues observed that object recognition was disturbed after withdrawal from chronic exposure to cocaine by an object recognition task in 2-week abstinent rats [29]. Several reports have shown that the insular and prefrontal cortices, involved in cognitive control, show reduced activity on selective attention and inhibitory

control tasks in cocaine addicts [30]. These brain areas may be involved in the maintenance and relapse of drug use [31]. Individuals with cocaine abuse and dependence show higher insula, frontal and/or striatum activation in response to cocaine-related cues, reflecting heightened attention in response to this drug [32, 33]. Furthermore, imaging data have revealed that gray matter volume loss over time is twice as fast among cocaine addicts as in healthy individuals. Given that gray matter volume in prefrontal cortex has been related to working memory performance, these findings are in keeping with the idea that long-term cocaine use may cause sustained deleterious effect on working memory.

3. Depressant drugs

Adolescence is the critical period for initiation of alcoholic beverage consumption. Epidemiologic studies reveal that alcohol use is remarkably common among teenagers, with increasing rates of alcohol abuse in the US including heavy episodic drinking [33]. After alcohol and tobacco, marijuana is the social drug most frequently consumed by this cohort. Additionally, a high percentage of alcohol abusers also consume marijuana [34]. Several studies have shown that both alcohol and marijuana tend to alter the structure and function of the brain and are associated with impaired decision-making, memory and impulsivity in young adults and adolescents (**Table 1**).

3.1. Ethanol

Evidence shows a direct correlation between early onset of alcohol intake and alcohol-related problems in adulthood, suggesting that adolescent exposure to the reinforcing properties of this drug increases the probability of its abuse later [35]. However, as for other addictive substances, the effect of exposure to alcohol depends to a great extent on how much and for how long it is consumed.

Acute alcohol intake has a biphasic effect on brain activity, causing excitation and euphoria at low blood concentration and depression as it increases [36]. However, regarding cognitive functions, experimental data have been inconsistent using a variety of cognitive tests. Thus, low or moderate doses of alcohol, relative to placebo, produced facilitation [37, 38], deficits [39] or no change [40] in memory performance at subtoxic amounts (<65 mg/dl). Moreover, it apparently does not produce adverse effects and may even slightly improve working memory in nonproblem drinkers, regardless of sex [41]. However, as the dose of alcohol increases, confusion, loss of awareness and selective attention begin to occur, significantly diminishing the execution of working memory and its long-term consolidation. The effect of alcohol on long-term memory formation is much greater than its impact on the capacity to remember previously consolidated memories or to retrieve short-term memory. It is well known that if subjects are asked to repeat newly acquired information following short delays (seconds) after its presentation while intoxicated, they often do fine [42]. Likewise, they are able to retrieve information acquired before acute intoxication. On the contrary, subjects perform very poorly using delays longer than 20 min, particularly if they are distracted between the stimulus presentation and testing [43].

As studies indicate that the extent of alcohol-induced memory deficits increases with the dose but maintains the same pattern (i.e., greater difficulty at forming new long-term memories than recalling the existing ones), it appears that this drug mostly affects memory consolidation.

Unfortunately, during adolescent life, repeated intoxication with high doses of alcohol becomes more frequent and memory impairments are more profound, commonly resulting in blackouts, that is, a complete incapability to remember all or part of a drinking event [44]. Heavy alcohol drinking associated with blackouts [45] does not necessarily involve loss of consciousness, but rather a failure to transfer information from short- to long-term memory [46]. Individuals with a history of blackouts show episodic memory impairments while intoxicated [47], particularly at retrieving the spatiotemporal context of events [48]. Moreover, long-term (3 years) heavy alcohol intake in adolescents between 15 and 19 years of age induced memory deficits [49] as well as volume reduction in subcortical and temporal regions [50].

The mechanisms underlying alcohol-induced memory disruption are still elusive. Throughout several decades, it was supposed that alcohol produces a nonspecific general depression of brain activity. Later, research led to assumption that alcohol depressed the activity of neurons by altering the fluidity of the neuronal membrane and consequently the activity of proteins, including ion channels that might, in turn, produce synaptic dysfunctions [51].

It was not until recently that new pharmacological information regarding the effects of alcohol on neural cells revealed that this drug has actually very selective effects on various neurotransmitter systems, both excitatory, e.g., glutamatergic and cholinergic, and inhibitory, such as GABAergic, glycinergic and serotonergic among others. Alcohol could alter the activity of specific receptor subtypes as well [52]. All these neurotransmission mechanisms have a deep impact on cognitive functions. Paradoxically, repeated alcohol exposure might promote the formation of a particular drug-reward–associated implicit memory that could underlay its addiction [53].

The main risk of alcohol ingestion early in life is that the adolescent brain is still in a maturation period and drug intoxication greatly affects its development and the individual's future life.

3.2. Cannabis

Recently, endocannabinoids, endogenous ligands that bind to and activate the same receptors as 9-delta-tetrahydrocannabinol (THC), the psychoactive component of cannabis, were found to play an important role in the diminution of gray matter [3]. Cannabis is the third most prevalent drug of abuse among teenagers, behind alcohol and tobacco [54]. Many studies in humans have shown that chronic cannabis consumption, especially when initiated early in life, correlates with a range of cognitive impairments in adulthood, including learning and memory deficits. Meanwhile, the evidence remained equivocal, partly due to the myriad of confounding factors, characteristic of human studies, as well as different methodology employed by the distinct studies, some unveiling clear effects, while others finding marginal or no effects [55]. However, in recent years, a clearer picture is emerging, which seems to suggest that teenage cannabis consumption may indeed have long-term detrimental effects on cognitive processes, including memory. The present section surveys the evidence linking adolescent cannabis consumption

and prevailing memory deficits. We will further discuss the present state of knowledge on such questions as how is it that cannabis consumption can affect memory? Is memory homogenously affected or are there certain types of memory more impaired? Also, if cannabis intake during adolescence affects brain function in the long-term, are such sequelae reversible?

First, as for the acute effects of marijuana consumption, impaired working memory during the acute phase of cannabis intoxication has been observed in several studies [55, 56]. For instance, randomized clinical trials with dronabinol, a synthetic derivate of THC, revealed impaired verbal fluency, working memory and executive functions in healthy subjects during and in the hours following intoxication [57]. On the other hand, other works on healthy subjects found that performance on verbal working memory was left unaffected but that the tasks elicited a higher activation of parahippocampal areas, which may indicate either "neurophysiological inefficiency" or alternate/compensatory neural mechanisms in these subjects [58]. This is consistent with another fMRI study that was conducted on otherwise healthy adults that were current marijuana users and that showed hyperactivation during a verbal working memory challenge, which the authors suggest may be related to suboptimal efficiency during cognitive challenge in this group [59]. Finally, another study by the same group showed that the frequency of cannabis use is positively correlated to blood oxygenation level–dependent signal in the left parahippocampal gyrus during a visual associative memory task, regardless of the age of onset (early vs. late adolescence) [60].

But beyond the acute intoxication phase, one obvious question is whether cannabis consumption produces long-term sequelae on cognition. Working memory performance appears to be especially sensitive to cannabis consumption in the early teenage years (before the age of 16–17). Testing 122 long-term heavy cannabis users on a corroborated 28-day abstinence period and 87 control subjects, Pope and collaborators showed that although adult-onset cannabis users hardly differed from controls, those that started before the age of 17 were impaired in a series of cognitive tests, most especially in verbal memory [61]. Further research has shown that the observed cannabis-induced deficits may prevail even after 6 weeks of discontinuation; although after 3 months of complete discontinuation, no difference was observed between previous heavy users and controls [62]. However, a more recent study in adolescents 18–20 years old with a history of chronic, heavy cannabis use, while performance in a verbal memory test was comparable to that of age-matched controls, a significant bilateral atrophy was observed, even after 6 months of supervised drug abstinence [63]. The putative detrimental effects of cannabis use appear to be dose-dependent. For example, performance in the Rey Auditory Verbal Learning Test correlated negatively with the number of years of cannabis misuse [64].

However, these results did not allow to determine whether cannabis had long-term detrimental effects on the cognitive abilities and brain functioning of these youths once they reached adulthood or whether a preexisting set of slight cognitive deficiencies such as lower verbal memory somewhat predisposed these youths to maladaptive behaviors including early-onset cannabis consumption. More to the point, as the authors pointed out, even if the toxic effects of cannabis were the culprit, it was impossible to determine in the light of these results, whether the observed differences were due to long-term effects of cannabis on these subjects or more short-term effects during adolescence that made them perform poorly at school and therefore made them less prone to develop these cognitive skills through adulthood.

In this regard, a recent widely reaching analysis from the Cannabis Cohorts Research Consortium using data from three distinct longitudinal studies started to shed light on this issue [57]. The study found that young adults that were cannabis users as teenagers were more likely to experience adverse outcomes as diverse as cannabis addiction, suicide attempt and high-school dropout. Importantly, the authors report that controlling for the potential confounding factors present, both before and during adolescence and spanning individual, parental and peer factors, failed to abolish most of the associations observed. Along with the fact that they also observed a dose-response relation, heavy users having the poorest outcomes as adults, the findings support the hypothesis that teenage marijuana consumption has long-term detrimental effects on cognition, memory and general well-being. Finally, preclinical research brought further support for a causal relationship between teenage cannabis consumption and adult cognitive impairments; chronic consumption of cannabis in rats during adolescence, but not adulthood, impaired spatial working memory when tested as adults [65, 66].

4. Prescription drugs

According to the Anxiety and Depression Association of America, mental disorders are common among children in the United States. Anxiety and major depression disorders are usually diagnosed in children between 8 and 15 years of age (National Health and Nutrition Examination Survey). The treatment of metal disorders in children and adolescents depends on the impairment degree. However, these treatments usually include drugs that affect cognitive functions. On the other hand, during childhood and adolescence, sports activities, especially at college levels, are frequently a cause of painful injuries that requires acute or chronic treatment of anti-inflammatory and/or analgesic drugs. All these treatments that are administered to school students could have an impact on cognitive functions and therefore on academic achievement. In this section, we will discuss the effects of nonsteroidal anti-inflammatory, anxiolytic and antidepressant drugs (**Table 2**).

4.1. Nonsteroidal anti-inflammatory drugs (NSAIDs)

NSAIDs are therapeutic agents commonly used in clinical practice for their analgesic, anti-inflammatory and antipyretic activity [67]. Although these chemical compounds are structurally different, they all inhibit both isoforms of the cyclooxygenase enzyme, COX-1 and COX-2, an enzyme responsible for inflammation and pain, which is necessary for prostaglandins and prostanoid synthesis [68]. Normally, COX-2 is expressed in dendritic spines of hippocampal and cortex neurons and has been implicated in synaptic modification, because its expression increases during long-term potentiation [69]. Moreover, astrocytes express prostaglandin E2 receptors (EP) and prostaglandin E2 (PGE2), which regulate membrane excitability, synaptic transmission and synaptic plasticity implicated in learning and memory processes [70]. Also, the administration of misoprostol, an agonist of PGE2 receptors, ameliorates the long-term deficits observed in Huntington disease R6/1 mice by increasing the branching in hippocampal neurons and stimulating the synthesis of brain-derived neurotrophic factor (BDNF) [71].

Drug	Cognitive process	Effect	Model	Reference
Prescription drugs	Spatial memory impairment	Acute administration: Neuroprotection	Rat	[70–75]
		Subchronic administration: improving cognitive functions	Mouse	
		Chronic administration: improve spatial memory impairment		
	Cognitive and emotional alterations	Reestablishment of the deterioration in memory and spatial learning	Human Rat	[78, 81–86]
		Diminish despair and memory impairment		
		Chronic administration: increase cell proliferation in hippocampus		
		Increase of BDNF levels		
	Memory and learning impairment	Restore cognitive impairment	Mouse	[88–90]
		Improve executive function		
		Increase spatial memory		
Cognition-enhancing drugs	Formation of memories and performing tasks	Enhancing cognitive performance in Alzheimer's disease patients	Human	[95, 96]
		Improve cognitive functions as: verbal memory, attention memory, information processing, executive function and memory mood		
	Alertness and enhance cognition	Improves attention, memory and executive function in sleep-deprived individuals	Human	[101–105]
		Limited effects in nonsleep deprived		
		Mental performance of subjects with low baseline performance		
	Attention deficit/ hyperactivity disorder	Improve cognition processes as: working memory, speed of processing, verbal learning and memory and attention	Human Rat	[107–109, 111]

Table 2. Effects of the prescription and cognition-enhancing drugs in cognitive functions.

Furthermore, subchronic administration of acetylsalicylic and ascorbic acids increases expression of receptors related with cognitive function such as learning and memory, while chronic treatment of acetylsalicylic acid lessens the spatial memory impairment observed in an experimental model of Alzheimer's disease [72]. Several reports indicate that celecoxib, a selective COX-2 inhibitor, reduces oxidative stress in a model of hypoxia reoxygenation, reducing the activation of microglia and astrocytes in the neonatal rat brain and improving cognitive function, suggesting that celecoxib may have neuroprotective actions [73]. In addition, multiple exposures to sevoflurane, a model that mimics the neurotoxicity induced by anesthesia, produces an increase in proinflammatory cytokines and deterioration in cognitive function in young mice, effects that were attenuated by the administration of ketorolac [74]. Another

study showed that meloxicam ameliorated the depressive-like behavior, cognitive impairment and neuroinflammation in hippocampus caused by chronic unpredictable mild stress [75]. Then, NSAIDs indirectly could disrupt cognitive functions.

4.2. Antidepressant drugs

Major depression is a common mental disorder affecting adolescents in the United States. According to the National Institute of Mental Health, in 2015, an estimated of 3 million adolescents aged 12–17 in the United States had, at least, one major depressive episode. Major depressive disorder is a long-term disabling condition occurring with relapse and recurrences, which could become a chronic condition [76]. Among all the symptoms presented in this psychopathology, memory and attention deficits are considered an important clinical manifestation of major depressive disorder [77]. Furthermore, cognitive and emotional alterations observed in depressive patients have been associated with changes in neuronal activity of prefrontal cortex, cingulate cortex and hippocampus. In major depressive disorder, orbitofrontal, ventromedial and prefrontal cortices are hypoactive, and postmortem evidence indicates histopathological changes in orbitofrontal and prefrontal cortex [78]. Additionally, significant hyperactivity in anterior cingulated cortex, inferior frontal gyrus and occipitoparietal regions has been observed in adolescents with major depressive disorder [79]. Also, a reduction in the volume of the hippocampus was reported, which is related to the severity and the duration of the major depressive disorder [80]. All these alterations were shown to contribute to changes in cognitive and emotional processing in depressive patients. Nevertheless, antidepressant treatment contributed to reestablish mood and cognitive functions. For instance, the chronic administration of deprenyl, a monoamine-oxidase-B inhibitor, reestablished the deterioration in memory and spatial learning and also diminished the lipid peroxidation and the neuronal loss in prefrontal cortex, striatum and hippocampus [81]. Moreover, treatment with desipramine, a norepinephrine reuptake inhibitor, caused reestablished long-term potentiation and diminished despair and memory impairment, through activation of CREB in the hippocampus [82]. Similar effects were observed with fluoxetine (serotonin reuptake inhibitor); rats receiving a chronic treatment of fluoxetine increased cell proliferation and BDNF in hippocampus associated to a memory and learning improvement [83]. These studies suggest that antidepressants revert memory and learning deterioration observed in animal models of depression.

Regarding clinical studies, patients with major depressive disorder showed lower levels of BDNF in plasma, which correlates with memory function deficits; hence, BDNF levels increased after the antidepressant treatment [84]. Nevertheless, the impairment in psychomotor and memory processes observed in depressed treated patients has no significance for clinical purposes [85]. Moreover, some evidence has shown that conventional antidepressant treatment selectively diminishes cognitive dysfunction [86].

The involvement of antidepressant drugs in cognitive functions is not clear; however, animal model studies have shown that synaptic plasticity is increased in neuronal regions involved in mood and memory processing [81–84].

4.3. Anxiolytics

Cognitive impairments have been consistently reported in anxiety disorders. Benzodiazepine, which acts in a specific site of the GABA A receptor, has been, for many years, the first-line therapy for the treatment of anxiety disorders. Although benzodiazepines are attractive for their rapid therapeutic effect, these drugs have undesirable side effects both in the short term (e.g., sedation) and in the long-term (e.g., dependence and memory impairment [87]). Some reports have indicated that GABAergic neurotransmission in the hippocampus is involved in the modulation of learning and memory functions [88]. Also, the administration of an inverse agonist of α5 subtype GABA A receptors (RO4938581) enhances long-term potentiation in hippocampus, restores the cognitive impairment caused by the scopolamine treatment and improves the executive function in monkeys without affecting emotional state [89]. Furthermore, a partial inverse agonist of α5 subtype GABA A receptors increased spatial memory [90]. These studies indicate that GABAergic neurotransmission regulates memory and learning processes, which opens the possibility of designing new selective molecules with clinical utility, not just for treating anxiety disorders, but also for improving cognitive functions.

5. Cognition-enhancing drugs

The search for drugs that improve cognitive functions to treat several diseases, including Alzheimer disease (AD), attention deficit disorder (ADD), attention deficit hyperactivity disorder (ADHD), has derived a wide number of synthetic drugs that, in turn, increase learning, executive functions, or creativity in healthy people. These drugs, also named "smart drugs" or "nootropics," have different chemical origins and mechanisms and in general have showed little or no effect in improving learning and memory tasks. There is a growth in the consumption of these drugs by adolescents [91, 92], mainly due to academic demands and competitiveness [93]. According to the Federal Substance Abuse and Mental Health Services Administration, every year around 137,000 college students in the US begin to use psychostimulants. Furthermore, consumption of stimulant drugs of abuse increases in key academic dates (**Table 2**) [94].

Nootropics have focused their targets on modulation of neurotransmission, hormones, transduction systems and neuron metabolism. However, we will focus on legal stimulants commonly used by students to improve academic performance: acetylcholinesterase inhibitors, memantine, modafinil and methylphenidate.

5.1. Antidementia drugs

5.1.1. Acetylcholinesterase inhibitors (AChEIs)

Most of the drugs that are used to enhance cognitive functions, both in patients and in healthy volunteers, work through acetylcholine (ACh) neurotransmission. ACh is a neurotransmitter closely involved in synaptic transmission and also in the formation of memories and performing tasks. Donepezil, rivastigmine or galantamine had good results enhancing cognitive

performance in patients with mild to moderate AD, when compared with placebo [95]. However, diverse studies conducted in healthy volunteers have showed that AChEIs lightly improve verbal memory after semantic processing of words, attention memory, information processing, executive function and memory mood [96].

5.1.2. Memantine

Memantine is a psychostimulant used to treat moderate to severe AD. It acts on the glutamatergic system by antagonizing N-methyl-D-aspartate (NMDA) receptors. This drug has been showed to slightly improve cognitive functions as monotherapy of AD [97]. There are few studies about the cognitive-enhancing capacity of memantine on healthy volunteers. The studies published were tested with acute single dose of memantine, finding that this drug does not increase mental performance significantly [96].

5.2. Modafinil

Modafinil is a psychostimulant indicated in the treatment of narcolepsy, shift work sleep disorder and excessive daytime sleepiness [98]. Since approval by FDA, in 1998, modafinil has been widely used not only to treat wakefulness disorders, but also to increase alertness and enhance cognition. Modafinil exhibits advantages among other psychostimulants, including the lack of unwanted side effects (e.g., tolerance, abuse potential, sleep rebound and locomotor excitability) [99], and, in most countries, it is not a controlled substance; therefore, it can be easily purchased online. Modafinil exerts its actions through an unknown mechanism. Still, it is recognized that modafinil inhibits dopamine and noradrenaline uptake, elevates catecholamine's levels, therefore raises extracellular serotonin, glutamate, histamine and orexin and reduces GABA's concentration [100]. Although the effects of modafinil as a wakefulness promoter have been proven [101], its properties as cognitive enhancer are still controversial. In sleep-deprived individuals, modafinil improves attention, memory and executive function [102], while the effects of modafinil in non–sleep-deprived adolescents are limited [103]. Other reports have found that modafinil actually improves several cognitive functions [104]. Interestingly, modafinil has showed to enhance mental performance of subjects with low baseline performance or IQ on several tasks evaluated [105].

5.3. Methylphenidate (MPH)

MPH (Ritalin©) is a psychostimulant approved for the treatment of attention deficit/hyperactivity disorder (ADD/ADHD) [106]. Additionally, MPH is one of the most effective cognitive enhancers used by healthy people [107], because it acts through a mechanism analogous to that of cocaine: increases the levels of the catecholamines, dopamine, norepinephrine and serotonin, by blocking their transport [108]. This drug improves working memory, speed of processing, verbal learning and memory and attention [102]. Nevertheless, MPH effects are not restricted to spatial problems, since it also improves digit span test score [109]. Although MPH has demonstrated to be effective and safe in most of the patients when used in the short term, several side effects have been reported: decrease of appetite, insomnia, headache, irritability, weight loss, sadness, abdominal pain, nausea, somnolence, dizziness, among others.

Several studies have reported that MPH treatment during childhood produces "permanent" changes in behavioral responses to other psychostimulants [110]. Moreover, a recent study made on rats has showed that acute and long-term exposure of adolescents to MHP has important effects on reward-dependent learning and decision [111].

5.4. Considerations about use and misuse of cognition-enhancing drugs

There are some difficulties evaluating the efficacy of smart drugs, mainly due to the heterogeneity of subjects and the differences in the cognitive evaluation methods. Besides, the disparities in the design of the studies have been challenging the evaluation of smart drugs in healthy subjects. However, there are some studies that have used systematic methodology to analyze the literature published on healthy volunteers [96, 97]. According to these reviews, antidementia drugs, AChEIs and memantine enhance cognitive functions in patients with AD; nevertheless, their effects on healthy volunteers appear to be very poor [107]. Another aspect to consider is the interindividual variability of volunteers, because it could be an important reason that masks the cognitive effect of these drugs.

There are also several ethical considerations about the use of psychostimulants in healthy people. Currently, caffeine is the stimulant most commonly used to get alertness. However, the misuse of MPH and modafinil is growing among students, since these drugs are cheap and easy to obtain illegally.

6. Perspectives

Drug abuse and addiction to legal and illegal substances have become a major challenge in western developed and developing societies. Growing evidence has shown that the onset age of drug consumption is around 15 years. At this age, the central nervous system is still under maturation. Childhood and adolescence are critical stages for neural and social development. Therefore, worldwide increasing prevalence of drug abuse among teenagers will certainly have an effect on scholar performance. All the evidence described in the present review suggests that teenagers that consume drugs risk deleterious consequences in their academic growth, since the neural mechanisms targeted by these drugs may have long-term impacts on cognitive functions. Therefore, prevention initiatives and public health programs must be implemented in schools to protect children and teenagers from escalating drug use.

7. Conclusion

In summary, the evidence regarding the possible long-term detrimental effects of teenage drug consumption on learning and memory adds to the increased risk of developing mental disorders, and therefore it should be included in public health information campaigns that seek to encourage delaying and/or reducing drug consumption at this stage of life. The scientific information obtained from studies such as those described above will be of little use without adequate public policies aimed at alleviating this serious problem.

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Chapter 6

Community College Counselors' Experiences and Challenges with Postsecondary Students with Mental Health Disorders

Janki Shankar and Conita Ip

Additional information is available at the end of the chapter

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Abstract

Mental health disorders among students are a growing problem in today's postsecondary institutions. Counselors in many of these institutions are overwhelmed by the increasing demand for their services. This chapter presents findings from a qualitative study that examined the challenges community college counselors face when working with students experiencing mental health disorders. Ten counselors from seven colleges in the province of Alberta in Canada participated in semi-structured individual and telephone interviews that were analyzed thematically. The counselors dealt with a high proportion of minority and ethnically diverse students who experienced multiple barriers to postsecondary study. Two broad themes with several subthemes emerged from the analysis. The two broad themes were (1) challenges for counselors arising from the mind-set of students about their mental health condition and (2) challenges for counselors arising from lack of resources. Implications of these findings for practice and policy are discussed.

Keywords: postsecondary students, mental health problems, community college counselors

1. Introduction

Mental health disorders are a growing problem among postsecondary students in Canada [1], the USA [2, 3], United Kingdom [4], and Australia [5]. A recent Canadian study conducted by the Ontario Reference Group of the National College Health Assessment [6] 2016, in which more than 25,000 students from 20 Ontario postsecondary institutions participated, indicated that postsecondary students in Ontario are generally experiencing a decline in mental health compared to

the same survey undertaken in 2013. Specifically, 46.1% of students reported feeling so depressed that it was difficult to function, 65.4% of students reported experiencing overwhelming anxiety, 14.8% of students reported experiencing tremendous stress, 13.7% of students reported having seriously considered suicide, 2.2% of students reported a suicide attempt, and 9.3% of students reported having intentionally cut, burned, bruised, or otherwise injured themselves in the previous year [7]. The comparative figures for 2013 are 40.1, 57.9, 12.7, 10.9, 1.5, and 7.5%, respectively, in 2013 [8]. These figures highlight that the rates of depression, anxiety, stress, suicidal thoughts and attempts, and self-harming behaviors are trending up among the college students. The Ontario college students study reports that students diagnosed or treated by a professional for depression and anxiety increased from 10 and 12.2% in 2013 to 14.7 and 18.4% in 2016, respectively.

With increasing numbers of students experiencing mental health disorders and the growing social acceptance of counseling as an intervention that can be helpful for people struggling with mental health as well as developmental and life issues, college counselors are experiencing a significant upsurge in the number of students who are seeking out campus counseling services [9, 10]. In this context, it is important to understand how campus counselors are responding and the challenges they are facing in providing best practice counseling and support in all aspects of their work.

2. Literature review

2.1. Reasons for the increase in mental health difficulties among postsecondary students

Postsecondary educational qualifications are fast becoming an essential requirement to gain employment in Canada, and an increasing number of students from all socioeconomic backgrounds are enrolling in postsecondary study. However, many students are ill prepared for the challenges involved in postsecondary study. Starting postsecondary study can be stressful for many students. They may face complex needs and experience many intersecting transitional stressors when moving from teenage to early adult developmental stages signified by the beginning of college life. These potential stressors may include but are not limited to identities shifting from teenagers to young adults, transitioning from a more structured high school learning environment to a less structured and often more demanding college learning environment. For some students moving away from home may demand more sophisticated skills and approaches including personal time and financial management, diverse relationship building skills, making long term life goals and career decisions [11, 12]. Stressors may also arise from pressures to succeed academically and the need to undertake employment to meet study costs and manage family responsibilities [3, 11, 13, 14]. Immigrant, indigenous, and international students from diverse cultural backgrounds can face additional pressures arising from limited racial diversity in predominantly white academic environments, discrimination, cultural isolation, acculturative stress, lack of access to same-ethnicity role models, and low educational expectations, all of which increase their risk of experiencing mental health disorders [15, 16]. Students who have come as refugees may have unrecognized preexisting vulnerabilities arising

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from war and pre-migration traumas, which can interact with environmental factors in postsecondary institutions and impact academic performance [2].

2.2. Experiences and challenges of campus counselors

Campus counselors are responsible for providing a range of services to students. These can include long- and short-term counseling, consultation with faculty and staff, providing academic support and career counseling, and working with interns in the crisis and emergency services [17–20]. The type and scope of services they provide depend on factors like the structure of the student affairs division of the institution, the type of institution (e.g., 2-year, 4-year), budget and resources, and staff size and training [18, 20]. Counselors at community and technical colleges generally have very broad responsibilities that may include admissions, academic advising and registration, testing, teaching, consultation with faculty, career coaching and counseling, crisis and intervention, psychoeducational programming, mental health evaluation, referrals for long-term services, and individual counseling [20–22]. By contrast, counselors at 4-year institutions can provide services that are more congruent with traditional mental health counseling. These can include counseling, consultation services to faculty and staff, workshops focused on prevention and remediation, and specialist services like couples counseling [23]. Research shows that students who receive counseling services are more likely to persist and graduate within 6 years than those who do not [24–28].

A review of research on the experiences of campus counselors shows that they are currently facing several challenges. First, there has been a significant increase in the number of students with mental health disorders seeking counseling services. Second, counselors are experiencing an increase in the severity of symptoms manifested by students [21, 29, 30]. Third, many campus counselors are feeling the pressure of a rapidly changing, culturally diverse, and nontraditional student population that includes older, part-time, and full-time working evening students and ethnic minorities. Traditional counseling models may not work well with these diverse student groups. Lastly, despite a significant increase in their workload, there has been no appreciable increase in the support services available from campus counseling centers [15], and counselors have "do more with less," a dynamic that can create significant challenges [31]. The situation is worse in community colleges [15]. As highlighted by Much et al., "over the years campus counseling services have become stretched because of diminishing financial resources, shifting accountabilities, and intensifying scrutiny on the part of governing boards, policy makers, and the public" [32].

2.3. The current study

Given the enormous challenges that campus counselors are facing, the aim of this study is to examine how they are dealing with these and the kinds of support they need. This study specifically focuses on the challenges faced by community college counselors. This is because community colleges are vastly underrepresented in much of the study on college student mental health [33–35]. Further, compared to universities, community colleges receive far less funding to provide counseling support services [22, 36, 37], despite evidence that community

colleges have a greater proportion of students from lower socioeconomic and ethnic minority backgrounds [38, 39] who would benefit from having access to more psychological support services.

Research question: What are the experiences and challenges faced by community college counselors with students experiencing mental health difficulties?

3. Methodology

This study used a qualitative exploratory research design to examine the research question. A qualitative approach is ideal for this study because it allows the researchers to explore detailed accounts of problematic experiences of the counselors and the webs of social relationship that join persons to one another [40]. Qualitative methods are widely advocated for investigative inquiry into issues and topics that have not received considerable attention and to promote participatory research [41].

Ethics approval for conducting this study was obtained in 2010 from the University of Calgary Research Ethics Committee. The study was conducted during 2010–2013. Counselors from six publicly funded community colleges in the province of Alberta were contacted by a student research assistant to gain first-hand understanding of the student groups they serve, the kinds of student problems they encounter, the services they offer, and the difficulties they face in meeting the needs of students and managing their own workload. Based on the information provided by the counselors, a semi-structured interview schedule was developed which was then used for subsequent in-depth interviews with college counselors. Following this, counselors from 12 (including six that were previously contacted) publicly funded community colleges in the province were contacted by telephone, to tell them about the study and request them to participate in a one hour face-to-face or telephone interview. Private colleges were excluded from the study as their student cohorts and support services are different. Ten counselors from seven community colleges from across the province agreed to participate. They had between 3 and 20 years of experience as counselors. Four interviews were conducted face to face while the remaining six interviews were conducted via the telephone. Chance of misinformation by the interviewer was minimized by audiotaping the interviews with the counselor's prior permission and transcribing them verbatim.

The method of constant comparison was used for identifying codes, categories, and themes that helped to make meaning of the raw data and to transform it into a coherent depiction of the counselors' experiences [42]. Each transcript was read several times independently by two researchers to obtain an overall understanding of the experiences and challenges faced by the counselors. An initial coding framework was established based on the first few interviews. The researchers then conducted independent coding, and their codes were compared to ensure interrater reliability. The coders also wrote ongoing self-reflective memos documenting their personal reactions and thoughts on each counselor's narratives about their experiences, challenges, and needs. These memos helped in developing specific questions to target during later interviews, and these were included in the data analysis. An audit trail was maintained for the whole research process. Other measures that were taken to increase the rigor

http://dx.doi.org/10.5772/intechopen.75661

of the results included checking the comments of each participant counselor against those of others, debriefing after the interview, and including several direct quotes while discussing the results of the study.

4. Results

4.1. Population served

Among the seven community colleges that are represented in this study, only one is in a major capital city. This college was better resourced than the others in terms of the counseling supports that were available for students. Two of the colleges primarily served First Nations (indigenous) students and as highlighted by one of the counselors in this college: "…probably fifty percent of my clientele would be Aboriginals and that's because of the nature of some of the programming that we offer here. They are funded by the Saskatchewan government for Aboriginals …and lots of times they (students) are coming with lots of issues…". All the seven colleges offered upgrading programs, diplomas, and English as second language (ESL) programs. Two counselors were mainly engaged in providing academic and career support services for students. These included helping students to navigate through the process of accessing services, providing workshops on general issues like time management, and working with other departments to help students access various kinds of support that they were eligible for. The others performed multiple roles, like providing one-to-one counseling services, coordinating with external sources of support like mental health services, referring students to mental health and other specialist services in the community, monitoring general student issues, providing follow-up care for students who had ongoing difficulties related to mental health and academic study, and negotiating with faculty for accommodations for the students. Some counselors also provided training to faculty and college staff, on how to identify mental health issues in students and provide appropriate support.

A large proportion of the caseload of the counselors comprised first-generation migrant and refugee students from the Middle East and Africa (particularly Sudan, Ghana, and Liberia), who had experienced persecution, trauma, and death of loved ones. Many of these students were in ESL and upgrading programs, and according to one counselor, about 50–60% of these students experienced more mental health difficulties than those in the direct career stream.

> *there's a higher incidence of mental health issues in that (ESL and upgrading) group than the group who start directly into a career program…The folks in our career program often are…they may still have mental health issues but typically, either it's better managed or it's maybe not quite as severe…. it's a little different population than our ESL and our upgrading folks*

Depression and anxiety were by far the most common mental health disorders experienced by 70–75% of the students who sought counseling. The symptoms that students often presented with, in the words of a counselor, were, "they're having trouble focusing in class, they are not sleeping very well and not eating very well, they're really stressed out and you'll see a lot of symptoms of distress, like tearfulness and sadness." Counselors reported that about 25–30% of their students were on antidepressant or antianxiety medications. The counselors were uncertain if these prescriptions were provided by a general practitioner and whether the students

really needed these medications. After depression and anxiety, the most common mental health conditions that students experienced were attention deficit hyperactivity disorder (ADHD), bipolar illness, and posttraumatic stress disorder (PTSD). As explained by one counselor:

> *A lot of times you don't necessarily know that it's PTSD…what you see first is the depression or anxiety stuff and then you start to collect stuff, you know, the bits and pieces that tell you it's probably PTSD… it's only after you… do a little bit of digging to find out…to be able to start attaching that (their symptoms) to past trauma and the students don't always even tell you…We have lots of survivors of all sorts of trauma, whether that's domestic trauma or war trauma-----*

Counselors reported that some of the students had multiple disabilities, "they may suffer from depression but also have a brain injury or a chronic medical, ADHD, learning disabilities." The counselors regularly dealt with students who were battling with grief and loss issues, domestic violence, trauma of rape and sexual abuse, and chaotic family relationships.

4.2. Counseling approach

The counseling approach used by most counselors was a brief solution-focused counseling. Although counselors saw students with a wide range of diagnosed and undiagnosed conditions, ranging from anxiety and depression to bipolar disorders and schizophrenia, many said that they were averse to mental health labels because of the stigma attached to them and the impact these can have on students. They were reluctant to classify conditions like ADHD under mental disorders and preferred to describe these problems as learning disabilities. In the words of one of the counselors:

> *…when I look at mental health issues, I'm looking at bi-polar, borderline personality, dissociative type stuff and yeah, --I'm having difficulty with the term "mental health" because to me, mental health means they have been diagnosed with some kind of mental health issue such as schizophrenia or something like that, ---we have students with ADHD, we have students with dyslexia but we don't define those with mental health issues…and dyslexia is not a mental illness problem…We define them as they're having learning disabilities, let's help them out.--- I am really, really careful about diagnosing students because they carry that diagnosis the rest of their lives…And I suppose that that's their choice if they want to do that, I just…I won't do that because I respect our students too much to give them a mental illness label.*

4.3. Challenges

The perspectives of campus counselors on the challenges they face in meeting the needs of students can be classified into two broad themes, each with several subthemes: (1) challenges arising from the students' mind-set about their mental health condition and (2) challenges arising from lack of resources. Each theme and its subthemes are discussed subsequently.

4.3.1. Challenges for counselors arising from the students' mind-set about the disorder

4.3.1.1. Students fail to recognize mental health condition

Many counselors said that students often fail to understand that they have a mental health condition, despite their symptoms and behaviors being obvious and a nuisance to others in the campus. This posed a challenge for the counselors as they had to help students who lack insight to recognize their problems and seek treatment. As expressed by a counselor:

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We had a student from China who was later diagnosed with bi-polar disorder and we knew something was wrong because her behavior was becoming increasingly inappropriate or louder and then she got into photocopying room …our library staff had to put limits on her …Usually a person, where you say, "That's too much photocopying", they might be grumpy with you but they live with it but she totally escalated out of control with yelling and all that stuff so it's pretty obvious that there's something seriously wrong.

4.3.1.2. Students do not disclose their mental health condition

Another challenge arose because some students deliberately hid their mental health diagnoses from the college faculty and counselors. When the student does not disclose, counselors are unable to provide timely assistance and appropriate interventions, and this can hinder the students' academic performance. One of the counselors described her experience as follows:

I remember working with a student a couple of years back who had been diagnosed with schizophrenia before she started her career program. It was a very difficult career program and she had a heavy- duty exam coming up, none of us knew that she had been diagnosed. She told no one and what happened is she had stopped taking her medications a couple of days before the exam because it affected her memory and she took the chance that she would write the exam before she started having symptoms and guess what, she didn't quite make it. So the morning of the exam, she started hearing voices like crazy-- she was so overwhelmed----- so the teacher called us up ----first we called emergency …it was pretty frantic right-- Finally, just after the EMT (emergency mental health team) got here, she was able to say that she had medication in her purse but that stuff doesn't kick in right away --and anyway, bottom line was she didn't go with the EMT and she absolutely refused to let us discuss any of it with her---.

4.3.1.3. Students with mental health issues refuse to seek help

Counselors expressed that they do not have the right to force students experiencing mental health issues to seek help on campus, especially when they have not caused any danger to self or others. Counselors felt that some students are not comfortable seeking help, especially when the campus is small and there is a risk that others will come to know about their illness. In these instances, counselors would explain to the student that seeking help would reduce the risk of decline in functioning, refer the student to external resources, or as stated by a counselor: "I don't hesitate to give the students my referral list and let them choose whomever they would feel more comfortable with and then leave it to the student to follow through." Another counselor highlighted the consequences of not following through: "If they refuse then we can't force them, you can't help someone who doesn't want any help so if they weren't being successful in school, chances are they will be terminated at the end of the semester or whatever, like they'll be withdrawn from their course." Counselors also expressed their concerns about other likely consequences for students if they did not follow through with timely treatment: "what they'll tend to do is they'll abuse alcohol and marijuana rather than kind of find, you know, go and get diagnosed."

4.3.1.4. Students lack understanding about the impact of mental disorder on learning

Another concern that counselors expressed was the lack of understanding among many students of how their mental health condition can affect academic performance and the motivation to seek help:

> *…but even if they've been told, a lot of times they have no idea what it means and what impact it could have on their learning…even students who are told they have ADHD or diagnosed and know before they come to school that they have ADHD, often have no idea really, how that affects their learning …*

Students also often underestimated the time required to manage their mental health condition and requested quick fixes to address their academic issues. Some students also declined counseling follow-up, and counselors had to respect their choice. They did not want to be intrusive unless there was a concern that the student may be at risk of harming self or others.

4.3.1.5. Students' resistance to medications

College counselors noted a general reluctance on the part of students to take psychotropic medications due to stigma, worries about their side effects, and lack of understanding of the pathways through which these drugs could work on them. As stated by a counselor, "… there's only so much we can do in the therapy and we recommend that anti-anxiety meds be considered, or an anti-depressant and we get resistance. It seems to be a bit of a trend sometimes that students are reluctant to take any type of medication." Another counselor highlighted her experience with students who had ADHD, "people with ADHD resist medication, that seems to be a bit of a trend too and part of it is because they don't want to change personalities right, they like who they are and so there's sort of this stigma to the medication part of it." Counselors felt that in some cases, the reluctance to take medication could be part of the illness, where the student blamed everyone else for their problem and did not recognize "that it's within their own interests to seek help." Fear of the side effects was another driving force behind the reluctance to take medication. As expressed by a counselor, "I think people are fearful about what those kinds of medication might do to them, there's side effects right? So that's part of it. They've heard, you know, you gain weight, you're not yourself, whatever the case may be." In some cases, however, counselors were successful in convincing students about the benefits of taking a medication.

4.4. Challenges arising from lack of resources

4.4.1. Inability to provide the level of care needed

Counselors expressed that time constraints, heavy workloads, and lack of staff limited their capacity to provide the level of support that their students needed. Consequently, many counselors used short-term solution-focused approaches, even though they knew that these may have a minimal value in addressing the students' complex issues. Many students had experienced various kinds of trauma. Although counselors provided supportive counseling using brief solution-focused approaches, many felt this was inadequate or "superficial" as these students needed more in-depth long-term therapy. While some counselors felt that time constraints restricted their ability to provide the level of support needed, others expressed that they did not have the specialist knowledge/skills to provide the kinds of intervention that these students needed. Due to these reasons, counselors tended to avoid delving into the students' trauma issues and referred them to external community services, if these were available. Sometimes, when the trauma was accidently identified during the counseling sessions,

http://dx.doi.org/10.5772/intechopen.75661

counselors struggled with the dilemma of whether to address the trauma or just provide the usual short-term solution-focused counseling. As reported by a counselor:

> *We have lots of survivors of all sorts of trauma, whether that's domestic trauma or war trauma so my answers I don't know…because of our approach, …in and out problem solving kind of solution based stuff, to go in and start rummaging around in past trauma without being sure that you can provide the support and all the caring that needs to go into helping someone once you've dug it up, you have to be really careful with that so it, you know we don't always find out about it on purpose.*

> *"We don't ask all those questions (questions related to their trauma) deliberately because we know we can't provide all the support or get stuff in place in sufficient time for that person …so in some cases we've kind of deliberately left boxes unopened when we expect there's stuff in there".*

The level of support that counselors can provide very much depends on the resources that their college has. As expressed by a counselor from a college that was poorly resourced: "I know that some post-secondary's have really been able to do kind of more therapy oriented approach and we have not been able to do that…that's not a complaint, -- what seems to work better for us, I guess –is solution focused--a, step in, step out and at some point…".

However, this did not mean that counselors limited student visits to just a few sessions. They allowed emergency visits, drop-ins, and in some cases also provided specialized support. As highlighted by the following excerpt:

> *..we don't say to a student, you're allowed three visits…we don't do that but we are really busy so students often have to wait a couple of weeks…for counselors…we're booking about a month out, same for specialized support so it's not…we do have emergency appointments but it's not…like it's not an infinite number of contacts that a student has in terms of support.. If they walk in on drop in, we have half an hour with them to find out what they think the problem is and also for us to figure out what we think the problem is…we have to ask a lot of questions pretty quickly in a way that a student is willing to open up pretty quickly and give us some pretty key information*

Despite all that the counselors are willing and able to do for the students, the bottom line is that if there is resource scarcity in a campus, waiting times for seeing a counselor could be "as long as three weeks or more." This could negatively impact students with mental health disorders who need timely interventions. Unfortunately, as reported by the counselors, during times of economic downturn or if the college is going through a financial crisis, one of the first services to be slashed is the campus counseling service.

4.4.2. Juggling multiple roles

The role of a counselor in small campuses can be very demanding. One counselor from a small campus described her role as follows:

> *I am doing a lot, I do counseling, I provide students with academic support, I do standardized testing, I go into the classrooms and do presentations in the classrooms. I offer seminars to students in regards to study skills, time management, test anxiety. I'm also a sponsor of a club on campus. I do provide workshops for students as well as faculty and staff in regards to time management, study skills and test anxiety and stress management and all that but the majority of the time, people don't go so we also provide the same information on a one-on-one basis…That's the majority of my time and my day is usually booked back to back with either seeing students or in meetings because I am the director, I also have to*

> *attend certain meetings. The majority of my time is spent either counseling or working with students in regards to academic…not doing well academically…Well that was the stuff I was talking about earlier in regards to providing the students …helping them with the time management, the study skills, the test anxiety and helping them to figure out how to organize their day in such a way that they're going to have balance in their day and then fits into their day, study times rather than just having fun… probably about a third of my load is counseling issues but not mental health issues…and when I recognize that there's an issue with a student, then I do whatever I can to get them in as soon as possible, including seeing them after hours or on the weekend if I get called in by somebody then I come in-----*

4.4.3. Conflicts arising from "mandated and non-mandated" responsibilities

Some colleges were able to split the role of the counselor into two positions with one looking after student accommodations and related issues, and the other responsible for mainly counseling and associated functions. In less-resourced colleges, however, this division of responsibility was not feasible. Some colleges, despite being small, had designated accommodation specialists but often, because of their counseling/mental health background, these specialists had to take on counseling-related functions. One registered psychologist with a mental health background who had been appointed as an Accommodations Coordinator and Director of Student Development in a small college explained her situation as follows:

> *I am the Accommodation Coordinator--it could be for mental health or for learning disability, so I then help the students to get their academic accommodations which are quite different from counseling of course, so …that's my job here, one of my jobs. …the Director of Student Development does not have to be a registered psychologist, it just is a position that I've taken here. So yes, people would come and ask me but that's more or less, you know, because of my experience, not because of my position, I worked in mental health for twenty years but it would be a conflict of interest for me to start doing the counseling……but I can screen, I can give out the referrals, etc. so in many ways my position is still someone here who is a therapist and a psychologist who can do the mental health work but I don't engage in…I do not see students or staff in a therapeutic context.-- Well yeah, because I'm a therapist and a psychologist so I might --…it's not mandated by my position----.*

This psychologist, despite not being mandated to address counseling issues, would be consulted on counseling and related issues. She highlighted her ethical dilemma arising from her multiple roles in the following excerpt:

> *But they would because they know I'm a psychologist- you attract the questions --but you know that's quite……a part of the ethics when you are a registered psychologist, is that you are there to help people even though when you're actually not on call and there's a certain part of your work that you are ethically expected to contribute to society and to do a certain amount for free and it's not ever mandated, there's no police out there but in the ethics of it when you are in a registered health profession, it'd be just like a doctor wouldn't pass, you know, shouldn't pass by, you know, somebody having a heart attack on the street. I mean there's kind of an ethic that you have a certain skill that you give so I think that applies here…and because we're quite small and I teach in the faculty. I teach psychology and I do the accommodations, then I'm the Human Rights Officer and I sort of do a lot of the administration for student issues around here…*

4.4.4. Use of contracted counseling services and experiences with external providers

In some small campuses, there were no designated counseling departments. Sometimes, teachers or instructors, without formal training, were forced to take on a counseling role. Students

http://dx.doi.org/10.5772/intechopen.75661

with mental health problems would be referred to contracted mental health workers for counseling and support. Some campuses did have counselors, but if their responsibility was toward students with learning disabilities, they would not see students with mental disorders unless they also had learning disabilities. Counselors generally did not perceive contracting out services as the best option for students, and some viewed this as a cost-saving strategy used by colleges. They also expressed concerns about the quality of service provided by some contracted workers.

Many counselors also expressed frustration because some of their students with mental health problems had to wait for at least a month before they could see a psychiatrist, and during this waiting period, their condition would worsen. Another challenge that counselors faced was misdiagnosis of the students' mental health condition by general practitioners. In this context, a counselor said, "one of my students has been diagnosed with about five different things, and she's been put on all these meds and she's getting worse instead of better." Counselors also expressed concerns about the ease with which students were able to get prescriptions for antidepressants from general practitioners. They were aware that many of their students were on antidepressant medication without having consulted a mental health practitioner even once.

5. Discussion

This study examined the challenges experienced by community college counselors in addressing the needs of students who experienced mental health disorders. Though the findings are based on a small sample of counselors from seven colleges in one province in Canada, they are nevertheless significant. The results are in keeping with the previous research which suggests that community college students comprise a large proportion of indigenous and ethnically diverse first-generation migrant students who experience multiple barriers [33, 39]. The findings also confirm that community colleges, despite serving a highly vulnerable student population, that experiences severe mental health problems and complex life issues, are struggling for resources to meet the psychological and mental health needs of the students [15, 36, 37]. In keeping with other research [17, 43], many counselors in this study resorted to either placing students on waitlists for services or referring students to outside providers, despite apprehensions about the quality of outsourced services. Some studies show that 42% of students referred for services outside of the counseling center are unsuccessful in connecting with a mental health provider and that students of color have lower rates (43%) of successful referrals than Caucasian students (58%) [44]. Current findings also highlight that even in cases of direct service delivery, counselors were able to provide only a minimal level of service, because of time constraints, the need to balance multiple roles due to lack of staff, and lack of knowledge/skills in specialized areas of practice.

Stigma was the other significant factor that prevented students from accessing services. Several studies show that stigma is associated with denial of the illness, failure to disclose, and follow through with treatment [45, 46]. The combined effect of stigma and the lack of timely and appropriate services for students experiencing mental health disorders can adversely affect

their educational achievement, increase the risk of school dropout, lead to lower occupational attainment, workforce failure, and poor community integration.

5.1. Implications for practice and policy

The findings of this study have several implications for practice and policy. They suggest that community colleges are in urgent need for more comprehensive mental health resources to meet the needs of their diverse student body. Toward this, the counselors who were interviewed provided several recommendations. The first was to increase the number of part-time counselors especially during critical periods like mid-term and before the finals, as these are associated with an increase in the students' stress levels. Counselors who were providing the whole range of student support services including counseling suggested appointing people who could take on the academic and career-advising roles so that the counselors' time could be utilized for providing psychological services.

Counselors also proposed training some students within the campus to act as peer support for those experiencing mental health difficulties. The study on student support networks [47] suggests that students willing to take on peer support roles can be provided training in areas like (1) enhancing knowledge of mental health conditions, (2) promoting skill development in core-helping skills, (3) reducing stigma associated with help seeking, and (4) enhancing connection with key campus resources. Some research suggests that "peer support is associated with positive effects of hope, recovery and empowerment at and beyond the end of intervention" [48]. Because of fiscal limitations and pressures on counseling staff, an increasing number of postsecondary institutions are recognizing the advantages of this population-based model to serve the mental health needs of the student community [49]. However, training students to provide peer support will need additional resources like time commitment from counselors, at least initially.

Another population-based approach that was suggested is educating the campus community and other stakeholders, like parents about mental illness and the adverse impact of stigma. Some campus counselors were already engaged in this to some extent. This approach involves conducting workshops for faculty and college staff to respond helpfully to students in trouble, making referrals to college counselors, expanding external referral networks, and serving on college interdisciplinary committees to help in proactively identifying students who are troubled. Counselors also recommended that general practitioners, who see students on a regular basis and prescribe medications, must work more closely with mental health practitioners and refer students with mental health problems to these practitioners.

In addition to the above programs and recommendations, community college counselors can benefit from increased supervision and opportunities for specialized clinical training in areas like trauma-informed practice and suicide prevention. Since community colleges serve a significant number of ethnically diverse and marginalized students, community college counselors must also focus on developing multicultural counseling skills so that these students do not feel disenfranchised in the system. Finally, community college counselors must engage in building reliable partnerships and referral systems with off-campus service providers who can attend to students whose treatment needs exceed campus resources [50]. They must

ensure that students referred for services outside of the counseling center are successful in connecting with mental health providers [51].

6. Conclusion

Community college counselors' caseloads comprise a significant proportion of students from ethnically diverse and minority backgrounds. Many of these students experience complex life issues and severe mental health conditions. In the face of rising demand for counseling services and decreasing resources, the counselors face several challenges in addressing the needs of these students. These findings make a strong argument for increasing resources for community colleges so that they can meet the needs of the students and support counselors in their role. They also suggest the need for a comprehensive provincial strategy that can address the rising incidence of mental disorders among marginalized students who aspire to gain postsecondary qualifications and join the workforce. Despite the significance of the findings, this study has limitations. The findings are based on a small sample of 10 counselors from seven community colleges across one province in Canada. Hence, the results cannot be generalized to other regions and student populations. Future studies must include a larger sample of counselors across more provinces in Canada. Future research can examine the perspectives of community college students on the counseling support they need and currently receive to address the challenges they face during their study program.

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Section 2

Interventions for a Successful Health-Academic Achievement Binomy

Chapter 7

Relationships and School Success: From a Social-Emotional Learning Perspective

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Additional information is available at the end of the chapter

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Abstract

There is an increased body of research indicating the importance of social-emotional learning (SEL) in schools. SEL is the processes of acquiring the skills to recognize and manage emotions, develop caring and concern for others, make responsible decisions, establish positive relationships, and handle challenging situations effectively. It is promoted through both direct instruction and the establishment of safe, caring, and supportive learning environments in which all students feel valued, respected, and connected. In support of such arguments are studies linking SEL to a number of positive students' outcomes, including better academic achievement, social behavior, and emotional well-being. This chapter addresses how SEL, especially *relationships* as a critical component of SEL, contributes to school success and mental health especially among youth, with research evidence. Further, on the basis that we often do not feel efficacious in fostering SEL due to inadequate training and information, this chapter provides evidence-based practices to support healthy relationships and learning environments.

Keywords: social-emotional learning, relationships, bullying, school climate, youth, academic achievement, mental health

1. Introduction

Of all children and youth aged 5–18 in Canada and the U.S., 9 out of 10 attend school [1, 2]. Unfortunately, estimates suggest that students become increasingly disengaged as they progress through secondary school, with some studies estimating that 40–60% of youth show signs of disengagement [3], which often tend to be associated with other school maladjustment. Given that school adjustment problems foreshadow many types of dysfunction over the life

cycle [4, 5], it is important to understand the process through which students adapt to schools and identify different ways to support them.

Schools are challenging contexts for students, especially for youth, by nature and design. These challenges include the instructional features of classrooms and schools, such as didactic small- and large-group instruction, teacher-initiated/monitored learning activities, and programmatic curriculum sequences. At present, much is known about how students' cognitive and linguistic skills and their socioeconomic and ethnic backgrounds function as precursors of their achievement and adjustment. Less well recognized are the many types of interpersonal challenges that youth confront in school. Beyond basic tasks such as relating with classmates and schoolmates and forming ties with teachers, youth find that they are under increasing pressure to compare and evaluate themselves, their abilities, and their achievements to those of peers. Many of these challenges are repeated as students progress through grades. In each new classroom, they must negotiate their needs in dyadic and group settings and reestablish relationships with classmates and teachers. Moreover, it is likely that these challenges are intensified when students change schools or cope with school transitions [6, 7].

In light of the above, an important task facing educational and developmental researchers is to investigate the roles of students' classroom/school interpersonal skills and relationships as precursors of school adaption and adjustment. Indeed, diverging from the traditional focus on the three Rs, including *r*eading, w*r*iting, and arithmetic [8], an emerging line of research points to the importance of the fourth *R* of education, *relationships*. In corroboration, the school-climate [9] and social-emotional learning (SEL) [10] literature highlights the role of relationships in supporting school success and mental well-being.

The recognition of SEL has been gradually spread around the world in recent years [10]. SEL refers to the process through which children and adults develop a set of skills and competencies to recognize and manage emotions, develop care and concern for others, make responsible decisions, establish positive relationships, and handle challenging situations effectively; these skills are promoted through both direct instructions and the establishment of a safe, caring, and supportive learning environment in which all students feel valued, respected, and connected [11]. Its importance is evidenced through its relationships with various positive student outcomes [12].

To illustrate the importance to consider which aspects of students' school adjustment are affected by interpersonal factors, this chapter will first address how interpersonal relationships, including relationships with peers, teachers, and family, contribute to school success and mental health among youth. We will end the chapter with a discussion about how we can better support these relationships.

2. Relationships with peers

During early adolescence, peer groups become increasingly important as young people start to seek autonomy from their parents [13, 14]. In this section, we particularly address school bullying as a critical peer-group phenomenon that often threatens academic and psychological well-being.

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Bullying is typically defined as an aggressive peer-to-peer behavior involving a power differentiation between the perpetrator and the victim; this behavior is also enacted repeatedly over time with the intention to do harm [15]. Researchers and educators have increasingly acknowledged that bullying continues to be a serious problem in schools around the world, with evidence that involvement in bullying (as a victim or a bully) affects children and adolescents' health. For example, more than 40% Canadian students in grades 6–10 reported being both bullied and bullying others and this high prevalence remains [16].

Bullying takes several forms, including physical assault, ethnic discrimination, rumor victimization, sexual harassment, and verbal assault. Being a victim is not without consequence - indeed, victimization by peers is associated with a broad range of difficulties, both immediate and long term, in the areas of mental health, academic performance, and overall well-being [17]. The detrimental effects of bullying do not end with the victims, however. A recent study of students in grades 8 to 10 has reported that nearly 90% of the students had witnessed either their friends or other students being bullied at least a few times during the school year and that witnessing bullying was associated with higher levels of depression [18].

2.1. Associations with academic achievement

Academic achievements among youth are of great importance for prospective school and career choices. A growing body of research has demonstrated significant links between school bullying and academic achievement (e.g., see [19, 20]). Students who are bullied by peers are likely to demonstrate poor academic performance (e.g., see [19, 20]), as are children who bully others [21]. Together, this line of research is consistent with the arguments that children's social experiences at school affect their academic performance [11, 12]. A recent meta-analysis with 29,552 school students revealed significant negative correlation between peer victimization and academic achievement [22].

Few studies [20, 23] on bullying have investigated the influence of school-level factors on individual academic performance. Konishi et al. [20] conducted one of the few multilevel studies in this area and found that school-level bullying was associated with lower grades among 15-year-olds. This study has addressed the need to simultaneously investigate individual and contextual influences on students' academic achievement. There is also a link between bullying and high school dropout rates. Cornell and colleagues [24] have found that the prevalence of bullying as perceived by both ninth grade students and teachers was predictive of dropout rates for this cohort 4 years later.

2.2. Associations with mental health

Researchers have long demonstrated that being involved as both a victim and bully seems to compound the impact of bullying, with bully-victims experiencing worse outcomes than either bullies or victims and being at greater risk for various types of mental health problems. These include anxiety, low self-esteem, depression, self-harm, suicidality, physical injury, substance abuse, and delinquency [25–27]. A recent trajectory study [28] has further demonstrated that, as compared to low-involvement students and after controlling for initial psychopathology, stable victims showed greater levels of anxiety, depression, and attention-deficit hyperactivity

disorder; similarly, stable bullies reported higher levels of anxiety, and those who shifted from victimization to bullying reported more anxiety, depression, and somatization. These findings underscore the importance of considering a child's history of involvement in bullying over time and view bullying as a dynamic experience, influenced by the social ecology.

Given the growing efforts to reduce bullying, we would speculate that the prevalence of school bullying might be declining. However, this may not be the case, particularly for sexual minority students. Students who are stigmatized or marginalized due to ethnicity, sexual orientation, and mental and physical illness are often victims of bullying, and much of this harassment takes place in schools. A recent trend study on harassment among adolescents has shown that sexual minority students continued to report higher rates of victimization than exclusively heterosexual peers over time [29]. Victimized sexual minority youth were at greatest risk not only for mental health concerns [30–32].

3. Relationships with teachers

Educators and researchers have increasingly acknowledged the imperative for creating a positive school climate, both to promote social and emotional competencies and optimize students' learning; teachers hold the key to such a learning environment [12, 33, 34]. Strong and supportive relationships provided by teachers are fundamental to the healthy development of all students in schools [35, 36]. Positive student-teacher relationships serve as a resource for students at risk of school failure, whereas conflict or disconnection between students and adults may compound that risk [37]. Although the nature of these relationships changes as students mature, the need for connection between students and adults in the school setting remains strong from preschool to high school [38]. Even as schools place increasing attention on standardized testing and accountability, the social and emotional quality of student-teacher relationships contributes to both academic and social-emotional development [39]. As such, student-teacher relationships provide a unique entry point for educators and others working toward improving the SEL environments of schools and classrooms.

3.1. Associations with academic achievement

Although students have less time with teachers during high school, there is strong evidence that relationships with adults in these settings are among the most important predictors of school success [36]. The quality of relationships that students form with their teachers has been repeatedly associated with students' academic and social-emotional outcomes [40]. High-quality student-teacher relationships are most often characterized by high levels of warmth, sensitivity, and emotional connection, and low levels of dependency, negativity, and conflict, which are highlighted in both attachment and self-determination theories [41–43]. Although the need for emotional support is perhaps more self-evidently important in the lower grades, adolescents are highly sensitive to the emotional rapport they establish with adults in school settings, and experience of strong connections to adults has been consistently linked to long-term academic success [44]. By conducting a meta-analysis, Roorda and

colleagues [45] found significant associations between student-teacher relationships and students' academic engagement and achievement spanning from preschool through high school. Longitudinal research [40, 46] has also shown the positive associations between high-quality student-teacher relationships and academic adjustment. Although both family and teacher support are important in predicting students' achievement, research has indicated that student-teacher connection was the factor most closely associated with growth in academic achievement from eighth to twelfth grade [39].

3.2. Associations with mental health

Connectedness to school during adolescence has emerged as a key area for building protective factors for positive educational outcomes and lower rates of health-risk behaviors [47, 48]. Students who are not engaged with learning or who have poor relationships with teachers are more likely to use drugs and engage in socially disruptive and sexual risk behaviors, report anxiety/depressive symptoms, have poorer adult relationships, and fail to complete secondary school (e.g., see [49, 50]). Therefore, the potential consequences for the students to become disconnected from school are far reaching. Longitudinal research from the U. S. reveals that high school students reporting greater connectedness to teachers display lower rates of emotional distress, suicidal ideation, suicidal behavior, violence, substance abuse, and early sexual activity [51].

Teachers can also serve as a protective factor against negative developmental outcomes, especially for marginalized and minority youth (e.g., see [31, 52]). Indeed, since Werner and Smith's [53, 54] longitudinal study of over 30 years, the importance of having at least one significant adult as a means for fostering resiliency among children and youth identified as 'at risk' has become a well-documented phenomenon [55–57]. Previous research findings are in accordance with suggesting that this 'significant adult' needs not be a parent or relative. This may be especially true during adolescence when youth often seek nonparental mentors and role models. Many sexual minority youth fear or face rejection by their parents because of their sexual identity [58]. In support of this argument, a Canadian study, with population-based data from high schools, has shown that supportive relationships with teachers significantly contributed to reducing greater risk for social-emotional problems not only for sexual minority youth experiencing peer victimization, but also for heterosexual youth who had been victimized by peers [31]. The results support the resilience perspective that a significant adult is not necessarily a parent or relative but can be an outside adult, including a teacher.

4. Family involvement

Beyond peer and teacher relationships, the fourth R can also be manifested when the family proactively engages in practices and activities that serve to promote learning and development [59]. Given that these practices and activities can take place within the home, and in partnerships with the school and the community [60, 61], such involvement is in line with the ecological framework [62] that highlights the interplay between two important systems (i.e., the family and the school).

Family involvement is essential to academic and mental health outcomes for children [63] and youth alike [64–66]. Several frameworks are available in the conceptualization of family involvement. For instance, based on a sample of 24,599 eighth graders, Ho and Willms [67] established a four-factor model that includes home discussion (e.g., discussing school programs with the child), school communication (e.g., contacting school personnel), home supervision (e.g., limiting TV time), and school participation (e.g., attending parent-teacher meetings). More recently, Epstein and her colleagues [68] proposed a framework that details six common types of involvement in efforts to organize the disparate literature: (1) parenting: when schools and/or community provide help to the family in establishing a positive home environment that supports learning and development; (2) communicating: when the family and schools and/or community establish an effective channel to communicate about the child's progress; (3) volunteering: when the family supports school operations and functions in collaboration with the school itself and/or community; (4) learning at home: when the family supports the child's learning at home, such as by monitoring his/her homework or providing intellectual stimulations; (5) decision-making: when schools and/or community assist family members (e.g., parents) to become leaders and representatives in decision-making pertinent to school operations; and (6) collaborating with the community: when the family leverages school and community services and resources to better support the child's learning and development.

In light of these frameworks, family involvement encompasses not only home-based involvement but also a reciprocal relationship between the family and the school where they share responsibilities and goals to support learning and development [69].

4.1. Associations with academic achievement

There is little doubt that family involvement assumes a critical role in academic outcomes. Indeed, research has consistently indicated a significant association between family involvement, specifically that of parents, and academic achievement across students of different ages, cultural groups, and socioeconomic statuses [70, 71]. For example, a meta-analysis (50 studies) found that school-based involvement and academic socialization were positively and significantly associated with academic achievement among middle-school students [72]. Of note is that academic socialization, such as when parents communicate their expectations for education or discuss learning strategies with the adolescent, yielded the strongest effect size [72]. In corroboration, another meta-analysis (52 studies) involving a group of culturally diverse secondary school students revealed that parental academic expectations had the strongest significant relationship with overall academic achievement, followed by parenting style, homework assistance, and home-school communication [65]. Moreover, parental attendance and participation in school activities were strongly associated with specific grades [65]. In addition to achievement, youth of academically involved parents tend to use more self-regulated learning strategies, spend more time on schoolwork outside of class time, and show higher levels of academic engagement [73]. At the same time, they tend to exhibit stronger feelings of enjoyment, value, and interest toward learning [66, 74] and are more likely to pursue graduate studies [64].

In light of the multidimensional framework of family involvement, it is important to recognize that while certain aspects of family involvement may be positively associated with academic outcomes, other aspects may demonstrate a negative correlation. For example, in their meta-analysis, Hill and Tyson [72] found a negative correlation between homework assistance and academic achievement among middle school students. At first glance, these findings seem to be somewhat counter-intuitive because they imply that more parental involvement is linked with poorer academic achievement. Further considerations, however, suggest that these negative associations may reflect the tendency for parents to communicate more with schools or become more engaged with their child's homework when they realize the poor performance [63, 67, 72]. These associations may also illustrate age differences in terms of what constitute as effective forms of family involvement. For example, a reason why homework assistance is associated with poorer achievement among youth is that such aid may be viewed as threats to their sense of efficacy and autonomy [66, 75]. To elucidate these speculations, longitudinal studies are warranted.

4.2. Associations with mental health

To the extent that family involvement operates holistically as opposed to being geared toward academic achievement specifically, recent studies have associated such involvement with outcomes that extend beyond the academic domain. When families are involved in education, youth tend to have better relationships with their teachers [76], own a clearer sense of identity and future directions [77], and hold more positive perceptions of self-competence [73] and global self-worth [78]. In corroboration, a longitudinal study that followed a culturally diverse sample of students from grades 7 to 11 indicated that family-teacher communication and home-based involvement (e.g., scaffolding youth to take responsibility of learning) were associated with decreases in problematic behaviors and depressive symptoms over time [79]. Interestingly, the developmental benefits associated with home-based involvement were stronger for those experiencing more parental warmth. Of note is that although it remains unclear why family involvement promotes better mental health functioning, it is speculative that it does so by conveying a sense of caring and support that acts as a buffer toward maladaptive outcomes [66]. Another potential mechanism is that by engaging in frequent school-based involvement, families will have more opportunities to form positive relationships with teachers, which, as we will see below, also play an instrumental role in academic and mental health outcomes.

4.3. Parent-teacher relationship

Thus far, we have considered family involvement in board terms that capture not only home-based but also the structural part of school-based involvement (e.g., parent-teacher discussions or meetings). We will now extend our focus to a more relational aspect of school-based involvement. Specifically, we will explore the parent-teacher relationship, which is perhaps the most salient fourth R within the dimension of home-school partnership. A positive parent-teacher relationship is one that is characterized by factors such as interpersonal trust, mutual respect and support, two-way communication, cooperation, coordination, and collaboration [80, 81].

At the same time, it is related to teachers' and parents' perceptions of one another's beliefs, attitudes, and values toward education and involvement [82–84]. To the extent that the parent-teacher relationship quality serves as a stronger predictor for achievement and social adjustment than the frequency of home-school contacts [80, 84], an emerging line of research is emphasizing the need to examine the quality of the parent-teacher or parent-school relationship in relation to developmental outcomes [83, 85, 86].

When the quality of the parent-teacher relationship is favorable, student outcomes tend to be more positive. In the academic domain, the high-quality parent-teacher relationship is associated with better test scores and competence in language and math [82, 84], as well as overall school performance [80, 87] among kindergartners and primary and secondary school students. Further, although research regarding the role of the parent-teacher relationship on youth's mental health functioning is limited as compared to those on children (e.g., [88, 89]), available evidence underscores its importance. Among a group of secondary school students in the U.S., Froiland and Davison [87] found a negative association between a satisfying and trusting parent-teacher relationship and problematic behaviors. Similarly, a study conducted across 10 provinces in China found that the parent-teacher relationship was linked with better social (e.g., relationships) and career (e.g., goal-settings) outcomes among high school students [90]. Therefore, there is a need for schools to devote efforts to increasing the number of family-school contacts *and* enhancing the quality of the parent-teacher relationship as they both contribute to academic and mental health outcomes.

5. Practices to foster positive relationships

As illustrated in previous sections, the fourth R is related to students' academic and mental health functioning in meaningful ways. Accordingly, we will now consider potential ways to support healthy peer and teacher relationships, and family involvement.

5.1. Social-emotional learning (SEL) interventions

SEL is an approach that aims to protect children and youth from maladaptive outcomes by supporting their mastery of a range of affective, behavioral, and cognitive competencies [12, 91]. Broadly speaking, these competencies fall under the groups of self-awareness, self-management, social awareness, relationship skills, and responsible decision-making [92]. Within the school context, SEL programs are designed to complement the school curricula to foster the core competencies in two steps. The first step involves informing and modeling SEL skills to students, followed by opportunities for them to practice and apply these skills in developmentally, contextually, and culturally appropriate ways [12]. The second step involves creating a safe and caring environment through peer and family initiatives, improved classroom management, effective teaching approaches, and whole-school community building activities [12, 91].

School-based SEL interventions serve as a potential avenue to support peer-, teacher-, and school-family relationships for a variety of reasons. First, the core competency of relationship skills focuses on promoting students' efficacy in establishing and maintaining healthy

relationships through effective communication, social engagement, relationship-building, and teamwork [92]. Accordingly, students will be more adept at creating trusting relationships with their peers and teachers. Second, by emphasizing teaching approaches that support the clear communication of expectations, cooperative learning, and classroom order [92], teachers can create a safe environment for students to become academically engaged. Third, interventions that invite the collaboration of family may also indirectly encourage more frequent home-school partnerships and better relationships.

A number of programs have been developed in line with the SEL approach. An exemplar is RULER [93], which equips primary and secondary school students with the competence to recognize and label emotions in oneself and others, understand potential causes and consequences of emotions, as well as express and regulate emotions in socially adaptive ways. By becoming emotionally literate, students will be able to interact with others more effectively; moreover, they will be able to problem-solve difficult emotional situations and have better mental health functioning [93]. Further, because RULER is incorporated into the English Language Arts (ELA) curriculum, in which books are often used to exemplify emotions and relationships, RULER also predicts improved ELA achievement [93]. Other effective programs are KiVa [94] and Roots of Empathy [95]. For example, KiVa is an antibullying program that has been found to reduce negative perceptions of peers (e.g., peers are seen as reliable and supportive), anxiety, and depression among children and youth [94].

5.2. Service learning programs

Similar to SEL interventions, research also suggests that service-learning programs can enhance a range of competencies pertinent to academic and mental health functioning. By providing meaningful services to the community in ways that connect with the school curriculum, students are empowered with social (e.g., cultural competence and empathy), personal (e.g., self-esteem), civic (e.g., community behaviors), and academic (e.g., learning engagement) competencies [96]. With its emphasis on contributing to the community, service-learning programs are particularly suitable for older adolescents. As an example, college students who participated in a 12-week service learning program (Campus Corps) in which they mentored at-risk adolescents demonstrated improved interpersonal and problem-solving skills, community service self-efficacy, self-esteem, civic action, and political awareness [97]. These mentors were also adept at sustaining positive relationships with their mentees and families [97]. In view of this line of evidence, service-learning programs may also be a promising approach to equipping students with social competence that can benefit their peer and teacher relationships.

5.3. Intervention programs and professional training for family and teachers

To encourage family involvement, it is important to first consider the underlying factors that may motivate or hinder such involvement. At the family level, three major factors have been identified to drive involvement, including parents' motivational beliefs, perception of invitations, and perceived life contexts [85]. Specifically, family involvement is more likely to occur when parents hold a belief that they should be involved in education, feel efficacious

that their involvement would promote better outcomes, perceive that they are welcomed by the school, teachers, and the child, as well as have the necessary skills, knowledge, time, and energy to become involved [85]. In support of this, children whose parents endorse the belief that it is their role to be involved in education and feel efficacious in doing so have more adaptive functioning [86]. When families feel that they are welcomed and respected, they are able to form more trusting relationships with schools; this is also especially true in inclusive [98] and culturally diverse schools [99].

At the school level, teachers and school personnel may face multiple barriers in their efforts to secure a family-school partnership. One of these salient barriers is the cultural differences that exist between families and schools. For example, African American parents often feel less welcomed in schools and experience barriers in securing resources for their child, possibly due to past and current discrimination [79]. Due to cultural differences in the conceptualization of parental roles or frustration that resulted from previous collaborative attempts, Latino families in the U.S., context may feel uncomfortable to participate in school events [100]. When schools and teachers do not share a common culture with the students and their families, it is also more difficult to establish a collaborative relationship that aims to support learning [101, 102]. In some cases, this collaboration is hindered by language barriers.

In light of the above, it would be important for school practitioners to offer training programs to families so as to heighten their confidence in their abilities to support learning. Moreover, given that some families may be more resistant to forming a coalition with schools, it is imperative that school psychologists provide teachers with assistance and guidance to develop individualized approaches [100]. Furthermore, training workshops that are tailored toward instilling teachers with a comprehensive understanding on different cultures and traditions are needed. Schools should also be prepared to include bilingual school personnel into the picture, who can help as an interpreter, or in preparing for bilingual signage and materials [100].

A plausible way to enhance more positive peer relationships, student-teacher relationships, and home-school partnerships is to provide relevant training opportunities to teachers and school personnel. First, given that some teachers may hold unfavorable views toward families who rarely participate in school events or whose child demonstrates academic and behavioral problems, intervention efforts are needed to challenge these beliefs [89]. Second, professional training workshops should aim to enhance teachers' efficacy in facilitating positive peer relationships, student-teacher relationships, and home-school partnerships in a welcoming manner. Third, educators, researchers, or other relevant providers should consider implementing intervention programs that target teachers' own social-emotional competence. Indeed, when teachers are socially and emotionally competent themselves, they are more effective in fostering and maintaining healthy teacher-student relationship, managing a safe classroom, and implementing quality SEL interventions [103]. Moreover, when teachers are comfortable with implementing SEL programs (i.e., an implicit indicator of their own social-emotional competence), they experience greater sense of teaching efficacy and job satisfaction, both of which are functional to more positive teacher-student relationships [104].

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6. Conclusion

In this chapter, we have discussed the fourth R as it pertains to youth's academic and mental health functioning. The first relationship that is tapped by this "R" is among those with peers. Indeed, given that peers take a particularly strong presence during adolescence, it is perhaps not surprising that peer relationships have implications on both academic and mental health outcomes. On the one hand, peer relationships that take the forms of bullying and victimization are associated with lower achievement and dysfunctional well-being [17], potentially because poor relationships interfere with youth's ability to focus on their academic endeavors by placing an emotional burden on them. On the other hand, healthier peer relationships may promote adaptive outcomes by providing youth with academic (e.g., homework assistance) and social-emotional resources (e.g., emotional support) [105]. Thus, efforts are needed to equip youth with the skills and competence to establish and sustain healthy peer relationships. The second relationship that pertains to the fourth R is manifested between students and teachers. In view of the established literature highlighting a link between different pedagogical approaches and academic achievement (e.g., [106]), the significance of the student-teacher relationship on academic achievement is particularly telling. This significance illustrates that it is not only important for teachers to adopt appropriate instructional approaches, but it is also critical to maintain a supportive relationship with their students. To the extent that teachers and school personnel often receive very little or no training in building successful alliances with families and supportive and warm relationships with students [102], these efforts are necessary. Accordingly, there is an urgent need for preservice teacher training programs to revamp their curriculum so as to better prepare teachers. Finally, the fourth R is reflected through family involvement, and in particular, home-school partnership and parent-teacher relationship quality. Of note is that although the benefits associated with positive parent-teacher relationships are unlikely to differ as a function of age, the significance of specific types of family involvement may change over time [88]. For example, parents may provide less homework assistance as the adolescent grows older. Nonetheless, the positive association between family involvement and achievement may become stronger over time because older students become more adept at communicating to their parents regarding their learning needs, which can then facilitate more appropriate forms of involvement [63]. Moreover, recent studies have illustrated mental health benefits that accompany family involvement among youth. Given that adolescence is often marked by academic, social, and psychological challenges [107], it is of importance that efforts are dedicated to supporting policies that mandate family involvement in secondary schools, and perhaps even college. Similarly, it is critical to raise family's awareness regarding their significance in youth's learning and well-being. Ultimately, the concerted efforts of students, families, and school practitioners are needed to create a school climate where each member feels respected and supported.

Conflict of interest

We have no conflict of interest to declare.

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Chapter 8

Prevention of Internalized Problems of Children and Youth in Academic Setting

Miranda Novak and Josipa Mihić

Additional information is available at the end of the chapter

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Abstract

Research of internalized problems during school years shows their stability and tendency of enhancement during the period of growing up. There are many challenges children and adolescents have to face: greater academic expectations, changes in relationships with parents and peers, physical changes, and transitions. Given the context and their background, students' feelings such as shy or withdrawn behavior, frequent worrying, sadness, loneliness, and low sense of self-worth are unavoidable part of every classroom. Childhood and adolescence seem to be a critical age for prevention of internalized problems, and schools seem as a natural setting to support the accumulation of positive experiences that outweigh risks. When thinking about general evidence-based approach to internalized problems, findings show that is crucial to educate youth how to develop active coping strategies and to cope with negative thoughts. Schools can be good environments to do that. The aim of this chapter is to offer an overview of critical epidemiological data on internalized disorders of children and youth as well as a summary of evidence-based practices focused on their prevention in schools, going from universal to targeted programs and highlighting mindfulness-based interventions. Finally, Croatian example of investments in socio-emotional learning is presented, examining its effects on students' internalizing symptoms.

Keywords: internalized problems, prevention, school prevention programs, mental health

1. Introduction

1.1. Internalized problems of children and youth

Internalized problems are defined as group of emotional symptoms turned toward individual that reveals more prevalent effortful control of behavior, feelings of sadness, low self-esteem,

behavioral inhibition, and fears. A substantive body of research indicates that although children and youth are a healthy subpopulation group, 20% of them could experience mental health issue until early twenties, anxiety and depression being the most prevalent [1–3]. That statement is not so surprising if we are aware of the fact that puberty and adolescence bring more sensitivity to social clues, seeking approval from important others, immaturity of neurobiological system connected with emotions, progressive reduction of parental control, and greater importance of peers. Half of all lifetime mental disorders begin before the age of 14, anxiety even before between age 6 and puberty [4]. That being said, school setting is unavoidable when talking about factors that support children and youth to thrive. It seems that students' feelings such as shy or withdrawn behavior, frequent worrying, fears, sadness, loneliness, hopelessness, and low sense of self-worth are unavoidable part of every classroom.

Newer American epidemiological studies state [4] that there is a prevalence of 32% of anxiety disorders and 14.3% mood disorders in the group of youth from 13 to 18 years old, while around 8% of American youth had a major depressive disorder. A British study included younger children, from 5 to 15, and found a prevalence of 3.7% for any anxiety disorder [4]. 1-year incidence rate for the first onset of major depression in adolescents is between 5.6 and 10%, while 17.9% of adolescents have a recurrent episode within a year [5–7]. Adolescent depression is associated with high rates of comorbid anxiety disorders, disruptive behavior disorders, and suicide attempts. It predicts future adjustment problems including marital difficulties, unemployment, and attachment problems in offspring [5–7]. By late adolescence, twice as many girls are depressed as boys, and 40% of those who experienced depression during youth end up with a diagnosis of major depression in adulthood [7]. After the first major depressive episode, the chance of recurrence and chronicity is very high [8]. Worldwide data shows that depression is a major public health problem that requires the development, implementation, and evaluation of interventions preventing its onset. The World Health Organization estimates that depression is the third leading cause of global disease with projections that it will rank first until 2030 [9]. There is also a great impact of depression on physical health: 40–60% of people who have experienced depression die prematurely [9], often show greater rates of smoking, and, as an aftermath of various circumstances affecting the quality of life, deal with heart disease [10]. When talking about the costs for adults, comprehensive European study estimates annual cost of mood disorders on 113. 4 billion Euros for 33.3 million affected people [11]. Burden is not only personal but also economic, affecting families, communities, and governments.

All this evidence shows that it is crucial to tackle emotional health problems early and shift focus from treatment to prevention and early intervention [4], enabling full potential for future adults. Emotional well-being has implications on children's and adolescent's self-esteem, prosocial behavior, school attendance, and success and increases risk of suicidal behavior, smoking, substance abuse, and delinquency [1, 12, 13] as well as choices of profession, directly leading to circumstances for adulthood [6] and future life chances [9]. Good sense of self in childhood is transferred to adulthood, together with good problem-solving skills, social competence, and feeling of purpose [13]. These resources vouch for good outcomes, serving as buffers in times of risks, stress, and hardship, and they are not only dependent upon child or a teen but also upon family characteristics and various environments in which they live [13, 14].

Many authors suggest that research of interventions for children and adolescents should be a priority since the first signs of disorder often happen in adolescence. Adolescence seems to be a crucial window for preventive interventions given the fact that rates of emotional ill health increase during this developmental stage. The 2009 Institute of Medicine report on prevention of mental, emotional, and behavioral disorders presented evidence that anxiety and mood disorders can be prevented [14]. Leaders in the field of mental health recommend further research on prevention and interventions for mental disorders of children and adolescents [1, 9, 15].

1.2. Risk and protective factors for internalized disorder trajectories

Risk and protective factors on individual, family, school, and community level help to understand the possibilities of organized support for sustaining a state of mental well-being and buffering possible adverse circumstances. Offering opportunities that support strengths should be planned within regular, already existent settings and systems supporting development of children and youth [13]. Program activities and interventions should be theory driven and science based, addressing well-known factors.

It is not surprising that research of developmental cascades implies crucial importance of family influences, early attachment, and parent-child relationship [16]. Transfer of emotional problems from parents to offspring is related both with shared genetic factors and vulnerability as well as with inadequate parenting [17]. It seems that maternal depression or existence of parental anxiety symptoms is a risk factor for elevated internalizing problems [17]. Parents' negative emotional expressiveness, including hostility and irritability, affect child's feeling of security [17, 18]: depressed mothers are less responsive to child's needs, more authoritarian, and rejecting, while anxious parents tend to be controlling and express less warmth. Additionally, internalized problems are related with family dynamics where emotion expression is quite restricted, i.e., both positive and negative emotions are suppressed, leading to heightened negativity and avoidance as a mean of regulation [17]. Children in such family context show less emotion recognition and lower emotion regulation strategies. Same authors explain risks specific to child's temperament, such as inhibition, fearfulness, shyness, and avoidance of new situations. Additionally, cognitive style characterized with pessimistic attributions, negative expectations, external locus of control, and rigidity is also a contributor.

One of few longitudinal studies [19] assessing internalized disorders has shown that academic problems, elevated parental stress, serious health issues, and social isolation strongly predict internalized symptomatology that lasts until early adulthood. Specifically, children with three or more negative life events were almost nine times likely to exhibit internalized problems. Such experiences were neglect, maltreatment, family violence, or sexual abuse, rarely found in sample, but also parental conflict and divorce which happen considerably more. Substantive influence on internalized problem development is reported upon peer victimization, rejection, and bullying [20] what stresses the need of school interventions once again.

The more opportunities young people have to accumulate protective factors that outweigh the influence of risks, the more likely they are to preserve their mental health well-being. Key protective factors for stable emotional development include a sense of family belonging as well as school attachment, i.e., caring and warm environments where both adults and peers

are supportive [14]. Research shows that children who have a close emotional relationship with at least one peer have smaller chances to develop internalized problems than children who do not have such experience. Relationships with others are significant protective asset since they buffer negative experiences and low mood, symptoms often seen within children isolated by friends or by their own choice [20]. Active methods of coping such as problem-solving lessen the amount of negative feelings and improve functioning and regulation.

2. Interventions for prevention of internalized problems of children and youth

2.1. Changing role of schools in modern era

In the age of information, schools really have a duty to revise their mission: knowledge is available almost everywhere, but quality relationships are becoming quite rare. In order to prepare future adults for challenges in full scale, schools have to provide critical skills for future education, work, and life in general. Besides cognitive skills, to develop positively and be empowered and participating member of society, young people need social and emotional skills. Modern school has holistic focus and has to incorporate care for emotional and social well-being in their curricula [21–25]. Reduction of subjective distress as well as behavior problems is possible by implementing interventions and specific classroom-management practices that develop understanding of emotions, positive goal achievement, maintenance of positive relationships with others, and responsible decision-making. From preschool to middle school, those competencies are being taught within the process of socio-emotional learning and universal programs. International evidence strongly confirms that school interventions teaching socio-emotional learning advance mental health, social functioning, positive health behaviors, as well as academic success [21–25]. Cost benefit studies are also supporting the case: data from 2011 demonstrates that for every dollar invested in socio-emotional learning, average return is 11$ [26]. It is important to determine if universal evidence-based programs can respond to the needs of young people with different characteristics and if enhancement of young people's social and emotional skills and resilience building is sufficient strategy [24].

2.2. Evidence-based prevention programs for internalized problems

Since lots of evidence suggests that large proportion of children and young people with anxiety disorders and depression are not included in the treatment, universal prevention programs that promote well-being and preventative interventions are even more essential [27, 28]. Lack of effective treatment probably has a lot to do with problems in the provision of care and poor access to services but also has a cause in low symptom awareness, stigma, inadequate treatment, and available funding [29]. Comprehensive answer to the issue of internalized problems is slowly directing its aims to prevention since it could relieve the burden on health care and social services. When thinking about general evidence-based approach to internalized problems, findings from literature review [30] propose that effective strategy is using cognitive-behavioral therapy model, educating adolescents how to cope with negative thoughts, to solve

problems more effectively and develop active coping strategies, as well as to support caring relationships and quality interactions with important others.

Terzian and colleagues have reviewed 37 programs [30] aiming at internalized problems in general, from depressive symptoms, suicidal thoughts or behaviors, anxious symptoms, PTSD, and shy/withdrawn behavior. Twenty-four out of thirty-seven programs had positive impact, three had mixed findings, and ten were not effective. Programs that were found to work were from either therapeutic approach (individual, family, and group) or skills training approach. Evidence suggest that good programs should teach children and youth to cope with negative thoughts and feelings through (1) building cognitive-behavioral skills such as thought monitoring, identification of triggers, and reframing of negative thoughts and (2) investment in coping skills such as relaxation, seeking help from others, and teaching participants to react adaptively on stress. When focusing only on prevention programs in this review: 10 out of 19 were found to have positive impact on at least one internalizing problem.

After 2010, several reviews and meta-analytic studies have considered effectiveness of various types of interventions, being universal or focused on specific populations in various levels of risk as well as for those with already diagnosable internalized problems [29–34]. Within Cochrane review [29], prevention studies were grouped in universal and targeted; targeted included both selective populations in higher risk and indicated programs focusing on signs suggesting the onset of disorder. Examples of population in higher risk are related with children of parents with diagnosable mental health issue; children with elevated family risks such as violence, neglect, and disputes; as well as children and youth with experience of trauma or bullying. Issue was raised [29] about the inclusion of secondary prevention studies, i.e., those that included children and youth with a history of anxiety or depression, but typically previous history is not described well. Preventive interventions aimed at internalized symptoms, especially those in school settings, need to be researched more thoroughly in the future. Findings are mixed or small to moderate, and it seems that the most problematic issue is that effects easily fade after the program completion. Universal prevention programs last for between 3 to 9 months. Evidence is promising in ways of reducing levels of depressive symptoms and only in some cases episodes of clinically significant depression [29].

Conclusions for internalized problems in general are even more difficult since studies are usually focused on specific problem, depression being most often nowadays, and not the whole group of issues. For example, Cochrane review of programs aiming at depression included 53 studies and more than 14,000 participants and concluded that both targeted and universal interventions are effective for prevention of depression although effects of selective interventions last longer. Also, it has been shown that psychological interventions are more effective than educational interventions since they do more than teach; they really change thinking strategies and skills. Secondary analysis of Cochrane trials [31] aimed at investigation whether specific therapeutic approach was more effective, indicating variation in outcomes across trials. There is some evidence that more consideration should be given to specific therapeutic approach since cognitive-behavioral interventions were more often proven effective. Also, that additional review showed that results were not moderated by the type of prevention. On the other hand, meta-analysis conducted by Horowitz and Garber [32] included 30 studies where prevention of depression of children and youth was in focus and their conclusion was

that regarding depressive symptoms, selective and indicated interventions have larger effects than universal. Nevertheless, universal approach should not be neglected [33]: Australian examples show that universal programs involved less stigma and less attrition of participants.

Since the focus of this chapter is related to school context, choice of school preventive intervention programs is presented in **Table 1**. Current literature suggests those programs are either promising since they have mixed results in various evaluations or are still being adapted from more clinical interventions to preventive approach and school settings [30, 33–36]. Brunwasser, Gillham and Kim [34] looked at various studies of Penn Resiliency Program and highlighted promising results for more than eight-session program of longer duration, delivered by a healthcare professional. Generally, many school prevention programs for internalized problems tend to have cognitive-behavioral foundations, and it is notable that they incorporate optimism and hope as their values. Besides school, partners in prevention have to be parents, especially if parental style and parent–child relationship have its difficulties but also if they have anxiety or depression disorder as well. Parental part of the program is adjunct to program activities with youth, and it is implemented simultaneously [33–35].

It is important to emphasize that the use of online and computer delivery of interventions for internalized problems and their prevention is rapidly growing. For new generations of children and adolescents, usage of the Internet or their computer and cellphone seems easy and cost-effective, increases uptake, and secures anonymity that is often being an issue in help seeking. Description of new technology wave interventions is out of the scope of this chapter, but it is necessary to address numerous benefits such as instant availability (especially for mobile phones and apps) and less need for face-to-face professional or time-consuming

Name of the program.	Short description of the program
Mindfulness in Schools Programme (MISP)[1]	Universal, a set of nine scripted lessons tailored to secondary schools, supported by tailored teacher training; it involves learning to direct attention to immediate experience, moment by moment, with open-minded curiosity and acceptance
Learning to Breathe Mindfulness Curriculum[2]	Universal and selective, for adolescents, consists of six themes that may be delivered in 6, 12, 18, or more sessions; the six core lessons are body, reflection, emotions, attention, tenderness, and healthy mind habits
Mindfulness Group Program [53]	Universal, for students aged 13–20, includes eight weekly delivered 100-min sessions; it integrates elements of MBSR and mindfulness-based cognitive therapy (MBCT) [54]; students develop specific skills in their capacity to become nonjudgmentally aware of thoughts, feelings, and sensations and increase their capacity to replace automatic, habitual, and often judgmental reactions with more conscious and skillful responses
Mindfulness Training [42]	Universal, modified MBSR program, students aged 14–15, four 40-min group trainings one per week; training covers the concepts of awareness and acceptance, and practices include bodily awareness of contact points, mindfulness of breathing and finding an anchor point, awareness of sounds, understanding the transient nature of thoughts, and walking meditation

[1]https://mindfulnessinschools.org/what-is-b/b-curriculum/

[2]https://learning2breathe.org/

Table 1. Mindfulness school-based programs found promising/effective for internalized problem prevention.

teacher training [37]. There are several examples of promising interventions using the Internet, applied game or gamification interface for mental health, and meta-analysis shows a moderate effect of d = .55, favoring serious games over no intervention controls. Regarding the fact that this topic requires new chapter, just one illustration—excellent New Zealand example program, SPARX, interactive fantasy game using CBT approach—aims adolescents from 12 to 19 years with elevated depression symptoms, and it is goal-oriented and problem-solving. Each level module lasts 30 min and can be available online or at home computer [38]. Findings show positive impact on emotion regulation and depressive symptoms reduction, and there are several other international examples [37, 38].

2.3. Mindfulness interventions for internalized problem prevention

When thinking about new wave of approaches, mindfulness practice also enhances the very qualities and goals of education in the twenty-first century and is usually seen hand in hand with socio-emotional learning approach. Since of it focuses on the body and different approaches to mind, it is a good choice when addressing internalized problems. The application of mindfulness with children and adolescents has increased more recently. Regarding changing lifestyles and risks, it would be helpful if children could learn to stop their mind wandering and regulate attention and emotions, to deal with feelings of frustration, and to self-motivate. A review of the emerging body of research on mindfulness-based interventions with children and adolescents reveals that such interventions might be beneficial in many different ways [39]. Mindfulness is considered one of many contemplative practices and has become a very popular practice due to its various mental and physical health benefits [40]. It is said to have originated two and a half thousand years ago from the religious traditions of Buddhism. Around the late 1970s, Jon Kabat-Zinn introduced mindfulness to Western cultures as a secular health practice [41]. It is defined as the practice of "paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment" ([42], p. 145). Mindfulness is considered as "the self-regulation of attention so that it is maintained on immediate experience… characterized by curiosity, openness, and acceptance" [43]. From this perspective, mindfulness practice can be understood as the foundation and basic precondition for education [44]. Modern education abilities embrace not only good attention skills and emotional competence but also prosocial abilities such as responsiveness, kindness, high ethics standards, sensitivity, imagination, and as well as good problem-solving. They allow children to face forthcoming challenges of the progressing environment, preferably becoming thoughtful, kind, and dedicated people [45, 46].

There are clear indications now that mindfulness-based programs with children and youth within school setting are feasible and acceptable [39]. Many of the existing school-based mindfulness programs for mental health have been adapted from Mindfulness Based Stress Reduction (MBSR) to meet children's and adolescents' developmental needs and shorter attention spans [47, 48]. These programs include a number of mindfulness-based activities such as breath awareness, psycho-education components, body scans, sitting meditations, and mindful movement, among others [44, 49]. Lately, scientists have initiated studies of various short mindfulness-based interventions, from 1 to 4 weeks long, including mindful eating,

walking contemplation, and coloring, as well as combination of mindfulness and yoga activities. Findings suggest this is effective in diminishing emotional problems and problem behaviors in school settings [50–52]. Some of the promising/effective mindfulness school-based programs for internalized problems are presented in **Table 1**.

In terms of school-based mindfulness intervention effectiveness, these programs have been associated with decreases in stress levels [55–58], rumination, intrusive thoughts, emotional arousal [59, 60], and depression symptoms [53, 55, 57, 58, 61] along with increases in emotional well-being [62] and self-compassion among participants [57]. A study conducted by Britton et al. [47] on a sample of 100 elementary school students involved into Integrative Contemplative Pedagogy program has shown reduced suicidal ideations and affective disturbance among students after 6 weeks of everyday short meditation training (3–12 min per day). Studies have also confirmed that mindfulness-based interventions in schools lead to a reduction in symptoms of depression in minority children [63] and to a reduction in anxiety and increase of social skills in students with learning disorders [64].

Zenner and colleagues [44] have conducted a systematic review and meta-analysis to summarize data available on the effects of 24 studies of mindfulness-based trainings for children and youth in a school setting and report a significant medium effect size of d = .40 across all controlled studies and domains. In 2017, big meta-analysis of 24 studies (n = 3977) was led to examine specific moderators contributing to school-based mindfulness interventions for mental health in youth [65]. Overall, mindfulness interventions were found to be helpful, with small to moderate significant effects pre-post intervention compared to control groups; however, interventions that were delivered during late adolescence (15–18) and that consisted of combinations of various mindfulness activities had the largest effects on mental health and well-being outcomes.

3. Croatian example: Effects of socio-emotional learning on internalized problems

3.1. Research studies

The aim of this part of the chapter is to present two studies of empirical evaluation of social–emotional learning curriculum, Promoting Alternative Thinking Strategies (PATHS) [66], conducted in Croatian kindergartens [67] and elementary schools [68] in order to examine the effects on the level of internalized problems such as emotional withdrawal, depressive symptoms, and worry.

3.1.1. Preschool study

The preschool PATHS study involved a quasi-experimental design, evaluating the short-term outcomes of the preschool PATHS curriculum implemented in six buildings across three Croatian sites (Zagreb, the capital city of Rijeka, and the Region of Istria, Croatia). Within each building two groups were chosen, and twelve kindergarten groups were included in the

study. The impact of the PATHS program was tested within the sample of 443 children (aged 3–6) for whom their preschool teachers collected data during three time points within a 2-year period. The first measurement was within the usual practices, before implementation, while second was at the start of the program and third in the end. Forty-five percent of children in the sample were girls.

3.1.2. School study

The study relied on a randomized controlled design to evaluate the impact of PATHS. Originally, 30 schools were recruited with the help of local authorities in three abovementioned implementation sites in Croatia. Within each region, equivalent pairs of schools were coordinated according to area features, household financial status, and proportion of pupils getting free-of-charge meals, number of pupils in school and classroom, as well as overall marks. Within each pair, one school was intervention and other continued typical program. Within each building, two first classrooms were chosen for the program. Only ten children from whole classroom were randomly nominated for assessment. Since some teachers failed to complete assessments, final sample consisted of 568 children and 546 children (96% of the sample) had complete post-intervention assessments. Forty-seven percent of the school children participants were girls. At the beginning of this study, all children were 7 years old in average and in the middle of the first grade. At the end of the study, children were near the end of the second grade.

3.1.3. Measures

Both preschool and schoolteachers were assessing children with the same battery. Among nine rated child behaviors, two of them are related with internalized symptoms:

3.1.3.1. Emotion regulation

Emotion regulation was measured with seven items from the *Social Competence Scale* from Fast Track Project (http://www.fasttrackproject.org/techrept/s/sct/). Sample item was "accepts things not going her/his way." All items were rated on a 6-point Likert scale with response options ranging from almost never to usually (α = .89) [68, 69].

3.1.3.2. Withdrawn/depressed behavior

Withdrawn/depressed behavior was assessed with six commonly used items compiled for Head Start REDI [28–30]. Sample items were "avoids playing with other children" and "sad, unhappy." All items were rated on a 6-point Likert scale, with response options ranging from almost never to usually (α = .81).

3.2. Paths

PATHS is one of the most effective socio-emotional learning programs for children from preschool to middle school worldwide. It has been tested in multiple randomized controlled

trials and implemented in many different contexts with children of various backgrounds. Various research and independent studies show that PATHS program is a successful example of whole-school generalization, enhances classroom climate and significantly contributes to children's emotion recognition and self-regulation, improves relationships with others, and diminishes externalizing problems [70, 71].

3.3. Results in Croatia: effects of PATHS on internalized symptomatology

To test intervention effects, hierarchical linear models were estimated, nesting children within classrooms. In school study, analyses were conducted for subgroups of children within the sample. Each of the child behaviors included in this study was dichotomized to specify whether a child was above or below average in terms of her/his functioning at the pre-intervention assessment. Latent class analysis was applied to nine indicators to determine whether children were relatively high or low risk. In this analysis, 223 children had the highest probability of being in the most elevated risk group. Those children had highest likelihood for lower scores on prosocial behavior, control of emotions, and school-related performance. In the same time, the same kids had a highest chance for high results on problem list (inattentiveness, hyperactivity, opposition, aggression, difficulties with peers, and inhibited/sad behavior). Analysis showed that 335 children had maximum chance of being in the low-risk subclass, which was characterized by above average scores on the positive behaviors and below average scores on the negative behaviors.

In preschool study, analyses were done in two stages: the first stage aiming to see changes in intervention sample across time and the second stage to compare scores with comparison condition. The first stage of preschool analyses shows insignificant change score for emotional symptoms of −.14, $p < .0001$, $d = .41$; ICC = .02, p = ns. Second-stage analyses show differences among children who were in comparison and PATHS condition: there was statistically significant difference in rates of change for emotional symptoms, $\beta = -.33$, $p = < .05$, $d = .56$; ICC = .27, $p < .05$. The magnitude of this difference in rates of change was over one-half of one standard deviation. Results for school study are shown in **Table 2**.

In school study, the pre-intervention level of functioning on the outcome and child sex were included as covariates. Among the children who were relatively high risk, there were no statistically significant differences between intervention and control group children.

Among the children who were relatively low risk, there was a small to moderate effect for emotion regulation and a marginally statistically significant difference in withdrawn/depressed behavior but no changes for high-risk group. To examine the robustness of effects among the low-risk children, latent class analysis was used again to determine whether children exhibited any problems. In this analysis, 81 children had the highest probability of being in the low risk with social difficulties subgroup, which was characterized by below average scores on prosocial behavior and emotion regulation and above average scores on withdrawn/depressed behavior. The other 254 children had the highest probability of being in the low risk without social difficulties subgroup, which was characterized by above average scores on all the positive behaviors and below average scores on all the negative behaviors.

School study	Complete sample (N = 568)	High-risk children (n = 223)	All low-risk children (n = 335)	Low-risk children with social difficulties (n = 81)	Low-risk children without social difficulties (n = 254)
Emotion regulation	.18+	.06	.38**	.65**	.32*
Withdrawn behavior	−.09	.06	−.26+	−.52*	−.19

Legend:*level of significance p = <.05;
**level of significance p = <.01.

Table 2. School PATHS effects on emotion regulation and withdrawn behavior for the complete sample and subgroups of schoolchildren.

Problem in focus	Found to work	Short description of program
Depressive symptoms	Adolescents coping With stress	Fifteen sessions for group from three to ten participants, adapted from Coping with Depression Course[1], group CBT preventive intervention for adolescents in risk, managed by educated therapist
	Problem-solving for life	
	Penn Prevention Program/ Penn Resiliency Program	Universal, teacher-implemented classroom program[2], for 12–14 year olds, 8 sessions, focusing on life problem-solving skills, positive problem-solving orientation, and optimistic-thinking styles
		School based, facilitated by school counselor[3], 12 sessions, aimed at depression and anxiety symptom reduction, special accent on optimism, coping strategies and perspective taking, one of the most widely disseminated
Anxiety symptoms	FRIENDS Program/Friends for Life Program	Cognitive-behavioral approach for adolescents, delivered by school staff supported by trained graduate psychology student, 10 one and half hour sessions, teaching coping skills and problem-solving + parallel parent intervention, four sessions
Suicidal thoughts or behaviors	Signs of Suicide Prevention Program	Universal, school-based program for middle school and high school; central activities are raising awareness for depression and suicide signs and help seeking behavior[4]

[1]https://www.childtrends.org/programs/adolescent-coping-with-stress/
[2]https://www.childtrends.org/programs/problem-solving-for-life/
[3]https://ppc.sas.upenn.edu/research/resilience-children
[4]https://nrepp.samhsa.gov/ProgramProfile.aspx?id=85

Table 3. Prevention programs found promising/effective for internalized problems prevention.

Among the children who were relatively low risk with social difficulties, there were statistically significant differences on emotion regulation and withdrawn/depressed behavior. Intervention effects of this magnitude shown in **Table 3** would be considered moderate to large. Among the children who were low risk without social difficulties, there was a small effect on emotion regulation but no effect on withdrawn behavior.

3.4. Discussion of results

Both of the presented studies of PATHS curriculum in Croatia indicate participation of children in universal, social-emotional curriculum that promotes emotion recognition and

relationships with others and self-esteem and self-control can diminish emotional symptoms, withdrawal, depressed symptoms, and worry, even for young children from 3 to 6. Also, data clearly shows that the decrease of risks for development of internalized problems is not uniform for all children: benefits vary depending upon sets of negative behaviors or lack in social or learning skills.

Analyses conducted for subgroups of children show that effectiveness depends upon child's capacity and needs. For children that are low risk but seem to have smaller issues in relating to others and lower social skills as well as lower learning behaviors, it is plausible to conclude that mental health promotion intervention like PATHS is very useful. For that group of children that need additional but not clinical support, improvement of classroom climate, boost of social competencies, and focus on feelings, such classroom intervention gives promising results. For that subgroup, improvement of emotion regulation and decline in withdrawal happened within a year of program implementation. Our results for high-risk children subsample show that they need additional care and support, probably more attention within indicated prevention approach or even clinical support. Nevertheless, within comprehensive policy addressing mental and emotional well-being of children, Croatian example shows that universal strategies are helpful and should be considered when planning prevention of internalized symptoms.

4. Conclusion

This chapter focused on internalized problem prevention in academic setting, since they are integral part of every classroom. Teachers and even parents do not recognize them in exact amount; children and youth tend to hide them and avoid reporting they need help. Findings from literature clearly accent that schools have an important role in reducing internalized problems, starting early on with emotional well-being promotion and responding to first symptoms. Comprehensive whole-school approach to mental health and internalized problems could serve as a climate change since research shows that besides supporting relationships, skill-building approach is most promising. Effects of school prevention programs are small to moderate, but thinking strategically, comprehensive planning of interventions on all levels could relieve the burden on health care and social services.

More research is needed to identify effectiveness of various types of programs, but it seems that universal school prevention programs have small to moderate effects and there is evidence that mindfulness programs also reduce internalizing symptoms. Conclusions for internalized problem selective and indicated prevention are still mixed, some studies showing effects in reducing depressive symptoms and enhancing emotional regulation and coping skills, but other studies show effect only for some measures. Making general conclusions is hard since studies are usually focused on specific internalized problem, depression being most often nowadays. Answer to a public health problem has to be comprehensive. Combination of investments from early years, coming from universal approach such as socio-emotional learning and mindfulness-based programs, and then being followed with selective programs for those in elevated risk and indicated interventions for those showing first symptoms, seems promising public health strategy and a way forward.

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Conflict of interest

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Chapter 9

Health, Academic Achievement and School-Based Interventions

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Additional information is available at the end of the chapter

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Abstract

There is a statistically significant relationship between health and academic achievement. Research evidence shows that children who are healthy are at a low risk for school problems than students who are unhealthy. Students with good health tend to perform better in school than those with poor health. Problems that emanate from poor health include a higher probability of school failure, poor levels of concentration, grade retention and dropout. However, health is a complex and elusive concept and its definition is often shrouded by assumptions and limitations. Therefore, the relationship between health and student achievement is often complex. The concept of health has been evolving over time, cutting across multiple disciplines. Of late, there has been a focus on achieving not only health but total well-being. Schools have been challenged to promote student health by providing favourable environments, policies, support services and information-based interventions. Schools should develop integrated health interventions because of their proven effectiveness in promoting healthy lifestyles among students. This chapter critically examines the concept of health and establishes the connection between health and achievement. The chapter also proposes health interventions that are effective in influencing academic achievement.

Keywords: student health, academic achievement, health interventions

1. Introduction

The primary objective of education institutions is to achieve education standards. However, research evidence reveals a significant relationship between academic achievement and the health status of students. Health problems such as vision and oral health problems, asthma, teen pregnancy, malnutrition, obesity, chronic stress and inattention and hyperactivity disorders and

risk-taking behaviour such as aggression and violence, unsafe sexual activity, unhealthy eating, physical inactivity and substance use are associated with low scholastic performance [1]. Considering that health problems have a significant influence on the overall performance of students, there is a need to look at the various health determinants and how they affect students. Identifying health factors that impact student performance is essential because of the relationship between health and academic performance. This chapter therefore will analyse the complex relationship that exists between the various health problems and academic achievement.

To understand the relationship between health and academic achievement, it is worthwhile to understand the concept of health. Most school-based health intervention strategies have been informed by a limited perspective of health as a concept. Health intervention strategies have tended to focus on the so-called 'pathogenic' approach by emphasising on the treatment of diseases. This is evidenced by a proliferation of school-based clinics that focus mainly on treating diseases. However, the World Health Organisation (WHO) asserted that health is not merely the absence of diseases, but a complete state of well-being. To this effect, various theories and models have been postulated in trying to define health as a complex concept. One interesting theory is the theory of Salutogenesis postulated by Antonovsky in 1917 and later advanced by Lindstrom in 2010. The theory hypothesises that health is a continuum that focuses on the relationship between health, stress and coping [2]. The theory comprehends health holistically; that is, health is more than the absence of illness. This chapter looks at the concept of health from this broad view in establishing the link between the various aspects of health and scholastic performance.

The World Health Organisation in 1986 asserted health is created and lived by people within the settings of their everyday life; where they learn, work, play and love. This argument was also raised during the Bangkok Charter for Health Promotion where the setting-based approach to health promotion was advocated [3]. Therefore, schools need to come up with health intervention strategies and provide healthy environments for students. School health services, which comprise components such as health services, health education, healthy environment, physical activity programmes, counselling, psychology, social services, nutrition services, improving employee well-being and family-society involvement approaches, are said to contribute to the academic performance of students in various ways [4]. In this regard, the Institute of Medicine concluded that there is a need to '*strengthen schools as the heart of health*' [5]. School-based health interventions are essential in offering better outcomes in both health and academic achievement. In light of the need for school-based health interventions, this chapter examines the various health interventions that influence academic performance.

2. Methods

The search was done in three stages. Firstly, the researchers did an intuitive search on the Internet using keywords that include student health, academic achievement, health interventions, health promotion, universities and colleges. The search was done via the Health InterNetwork Access to Research Initiative (HINARI), PubMed, Scopus, MEDLINE and Google Scholar. The authors also did a manual search on specific peer-reviewed medical journals that focus on health promotion

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(Journal of School Health, Journal of American College Health, Health Promotion International, Journal of Health Communication and Health Education Research). Secondly, grey literature was identified by searching websites and organisations currently engaged in health promotion efforts such as the World Health Organisation, Centers for Disease Control and Prevention, Jed Foundation and Education Development Centre, the National Centre for the Dissemination of Disability Research, National Alliance on Mental Illness and the American Foundation for Suicide Prevention's College and the Washington-based Institute of Medicine. Lastly, the author reviewed reference lists within individual publications to ensure an exhaustive search. The articles were evaluated for their methodological rigour and quality of evidence, and authority.

3. A critical glance at the concept of health

Health is arguably one of society's most important values and has been prioritised as one of the key objectives of the sustainable development goals. Many people have regarded health as one of the most precious values in life. Health therefore should be protected and enhanced as much as possible. Achieving health is important because when people are healthy, their families, communities and countries benefit. Society should make the health of especially young people a priority because they are the future workers and leaders. There is need for an understanding of the various factors that influence health when addressing health concerns of society. However, health is a complex and elusive concept, and there has not been an absolute consensus on the definitions of health. It is one is the concepts which has often been taken for granted. One of the reasons why health is difficult to define is that it permeates different disciplines (e.g., medical sociology, health psychology and medical demography) and it is imbued with political, medical, social, economic and spiritual components.

Health is an old-age concept that has been evolving over time. The concept of health first appeared in Old English literature as *haelen* and the literal meaning was 'to heal'. The word appears in Middle English as *helthe*, referring to the sound status of an individual in body, mind and spirit. Between the seventeenth and nineteenth centuries, the words *health* and *restoration* and *hygiene* featured in the literature [6]. The word health resurfaced after the Second World War with the formation of the World Health Organisation in 1948, which defined health as 'a state of complete physical, mental, and social well-being and not merely the absence of disease of infirmity' [7].

However, the definition that was proposed by WHO in 1947 has come under a lot of criticism due to several reasons; chief among them being that health cannot be considered to be a state due to its dynamic nature, for instance, a person's health can change at any moment in time. A person can suddenly develop a headache at any time and they can heal a few minutes later. The definition also does not address the spiritual aspect of health. The spiritual aspect is also an important component of health because it incorporates five dimensions of health that are values and beliefs, sense of fulfilment, wholeness in life, human spiritual interaction and God or some form of controlling power. Another criticism stems from the fact that the issue of *well-being* is subjective and difficult to measure. It can also be argued that the definition views health as an end product, whereas health can be viewed as a means to an end in achieving

something valuable, for example, students want to be healthy so that they can pass examinations. Moreover, health should not be looked at from an individual perspective as suggested by the definition; health needs to be looked at from a community or societal level because it is highly influenced by family values and societal norms. All these criticisms point to the elusive nature of health as a concept and how it has been viewed from a limited perspective. There is therefore a need to view health from a broader lens, especially when it pertains to the younger generation living in today's complex world.

3.1. A broader view of health

There have been modifications on the original definition that was proposed by WHO in 1948. WHO made some modifications on the definition during its first International Conference on Health Promotion held in Ottawa, Canada, in 1986, which saw the drafting of the Ottawa Charter for Health Promotion. WHO redefined health from a broader perspective:

> *Health has been considered less as an abstract state and more as a means to an end which can be expressed in functional terms as a resource which permits people to lead an individually, socially, and economically productive life. Health is a resource for everyday life, not the object of living. It is a positive concept emphasizing social and personal resources as well as physical capabilities* [8].

This is a more helpful definition which resonates with recent theories that attempt to define health. One of the most interesting theories that offer helpful solutions in defining health is the theory of Salutogenesis that has been also evolving over time. The theory was postulated by Antonovsky in 1987 and later advanced by Lindström in 2010. The term Salutogenesis was coined by Antonovsky to describe health as a holistic concept. It posits that health is a continuum that focuses on the relationship between health, stress and coping. The theory comprehends health holistically; that is, health is more than the absence of illness. In the health promotion context, the term Salutogenesis is used to describe approaches which focus on factors that support human health and well-being, rather than those that focus on factors that cause disease. Fundamentally, the theory forms the opposite to the hitherto dominating concept of pathogenesis, which examines the causes of illness. The theory emphasises that quality of life or well-being is determined by various factors such as cure, protection, disease prevention, health education and health promotion. Lindstrom used the *Health in the River of Life* metaphor to argue that individuals should learn how to swim in the river of life. In other words, individuals should be equipped with requisite life skills so that they can thrive in the 'river of life'. Lindstrom also emphasises that quality of life or well-being is determined by various factors such as cure, protection and disease prevention [9].

The World Health Organisation proposes three dimensions of health, which are mental, physical and social health (see **Figure 1**). This view of health has been adopted by many professional organisations. For example, the American Occupational Therapy Association (AOTA) defines health as:

> *'...the absence of illness, but not necessarily disability, a balance of physical, mental and social wellbeing attained through socially valued and individually meaningful occupation; enhancement of capacities and opportunity to strive for individual potential; community cohesion and opportunity; and social integration, support and justice, all within and as part of sustainable ecology'* [10].

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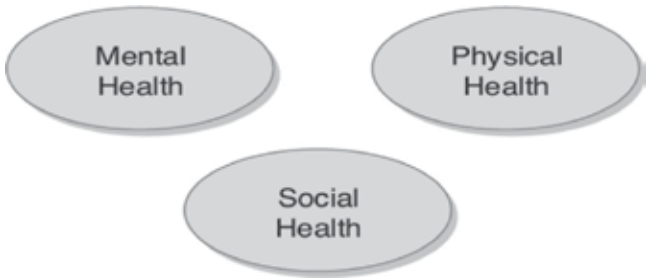

Figure 1. Dimensions of health.

3.2. Emphasis on wellness

It is interesting to note that the issue of well-being or wellness features a lot in the proposed definitions of health. It seems there is now more emphasis on wellness than health. However, the difference between health and wellness has not been adequately clarified in literature. In fact, the terms health and wellness have been viewed as near synonymous and have been used interchangeably in most instances. It is therefore important to provide clarity on the relationship between these concepts, especially considering the increasing popularity and use of the term wellness in designing school-based health interventions. Most school-based health promotion initiatives today often prefer to use the term wellness instead of health, hence the popularity of the term 'wellness centres' in schools and universities.

Wellness can be defined as a lifestyle that promotes health. This entails that for one to achieve total well-being, they have to lead a lifestyle that promotes physical, mental and social health. The Pacific Northwest Foundation believes that wellness is much more than just a state of physical health and it encompasses emotional stability, clear thinking, the ability to love, create, embrace change, exercise intuition and experience a continuing sense of spirituality [11]. This entails that health is an active process of becoming aware of and making choices towards a more successful existence. These choices mean that individuals have considered a variety of options and select those that seem to be in their best interest. Academic achievement and general success in life is therefore determined by each individual to be their personal collection of accomplishments for their life.

Wellness is multidimensional. A popular model adopted by many university, corporate and public health programmes encompasses various dimensions that include social, occupational, spiritual, physical, intellectual and emotional. The National Wellness Institute recognises eight 'dimensions', or essential life areas which collectively comprise the wellness (well-being) of all human beings. The eight dimensions of wellness proposed by The National Wellness Institute are:

- spiritual,
- emotional,
- intellectual,
- physical,

- cultural,
- occupational,
- social,
- environmental and
- precepts for wellness [12].

Some dimensions of health can be measurable at a specific point in time. For example, blood pressure, depression and sugar levels can be measured at specific intervals to determine someone's health. However, an unhealthy individual can achieve well-being. For example, someone with HIV, chronic cancer or diabetes can be well if they practise a healthy lifestyle. Conversely, an individual does not have to be well to be healthy. For example, an HIV-free individual can engage in unhealthy lifestyle such as smoking or excessive alcohol intake.

The issue of wellness is emphasised in the definition by WHO and in the Salutogenesis theory. Therefore, it is clear that wellness is an emerging concept within the health promotion context and it is an important attribute of health. It is also clear that the concept of health has been evolving over time. Previously, there has been a medical dichotomy separating health from illness, and health was seen from a traditional pathogenic approach. This view saw health as the absence of diseases or other infirmities. The World Health Organisation attempted to change this line of thinking by proposing that health is a complete state of well-being. However, as discussed previously in this chapter, this definition was also criticised, and as a result, WHO came up with a broader definition that has been authenticated by theory. This broader view of health from the definition proposed by WHO and the Salutogenesis theory by Antonovsky and Lindstrom will be helpful in determining the various health dimensions that affect students' academic achievement. As mentioned earlier on, it seems learning institutions are using a narrow approach in promoting health among student. Most schools especially in the developed world do not have comprehensive health promotion strategies and they tend to employ the 'pathogenic' approach which is more reactive than proactive. This is characterised by the presence of student clinics for the treatment of diseases, injuries and other forms of ailments. As discussed later in this chapter, there is a need to come up with school-based interventions that address the overall health and wellness of students. Moreover, these interventions should be more proactive in addressing students' health needs.

4. Academic achievement and health

Academic achievement, also referred as academic performance, is the outcome of education, the extent to which a student, teacher or institution has achieved their educational goals. Academic achievement represents performance outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments that include schools, colleges and universities. School systems mostly define cognitive goals that either apply across multiple subject areas such as critical thinking or include the acquisition

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of knowledge and understanding in a specific intellectual domain such as numeracy, literacy, science or history, among others. Academic achievement, therefore, should be considered to be a multifaceted construct covering multiple domains of learning [13].

Academic achievement is commonly measured by examinations or continuous assessment. There is, however, no general agreement on how it is best tested or which aspects are most important. Some of the yardsticks that have been used to measure academic achievement include procedural knowledge such as skills or declarative knowledge such as facts. Among the many criteria that indicate academic achievement, there are very general indicators such as knowledge acquired in an educational system, more curricular-based criteria such as grades or performance on an educational achievement test, and cumulative indicators of academic achievement such as educational degrees and certificates.

Individual differences in academic performance have been linked to differences in intelligence and personality. Students with higher mental ability as demonstrated by IQ tests and those who are higher in conscientiousness (linked to effort and achievement motivation) tend to achieve highly in academic settings. Although the primary goal of educational institutions is to achieve higher standards in terms of academic performance, research shows that academic achievement is influenced by multiple factors. Factors such as learning environments, parent's academic socialisation and extra-curricular activities have a positive relationship with academic performance. Health has been seen as one of the key factors that influence academic performance. The importance of health on academic achievement was emphasised by the Centers for Disease Control and Prevention (CDC) by stating that 'CDC recognizes that the academic success of … youth is strongly linked with their health. In turn, academic success is an excellent indicator for the overall well-being of youth, and is a primary predictor and determinant of adult health outcomes' [14].

Research evidence reveals that students with poor health have a higher probability of school failure, grade retention and dropout. Previous studies found that the health services provided at school can alleviate the problem of absenteeism, late-coming and undisciplined student behaviour, and increase graduation rate. However, the relationship between student health and academic success is complex because health is a broad concept which is complex to define. Previous research has found some significant relationship between specific attributes of health and academic achievement. For example, previous research found an association between nutrition and physical activity with higher academic performance [15]. Overweight and hypertension are associated with decreased cognitive function, and overweight is associated with poorer school performance [16]. In contrast, higher levels of physical activity have been associated with better cognitive function, such as enhanced concentration and memory [17]. Results of a randomised control trial carried out in 2011 demonstrated that overweight students randomised to a 13-week exercise program exhibited dose-response benefits of exercise on executive function and mathematics achievement as well as preliminary evidence of enhanced brain activity measured via functional magnetic resonance imaging (MRI) [18].

In a longitudinal study carried out in the United States of America, the findings revealed that after accounting for family characteristics, adolescents with poorer general health were found to

be less likely than healthier students to graduate from high school on time and attend college or post-secondary education [19]. The California's state education system published an extensive report linking academic achievement and health [20]. A study by researchers at the University of Washington found that Washington state schools with a lower prevalence of substance abuse also had higher scores on the Washington Assessment of Student Learning (WASL) [21].

This association between health and academic achievement was illustrated in more detail in a study that was carried out among our own Washington youth in 2009. The study examined the relationship using data collected from Washington state students who took the Healthy Youth Survey. The survey took place in classrooms and had questions about a variety of health factors and academic indicators, such as what grades the student usually gets in school. Students were classified as being at 'academic risk' if they said they usually get Cs, Ds or Fs in school. The study identified 13 key physical and mental health risk factors that were available in the Healthy Youth Survey and somewhat common among students (see **Table 1**). The results showed that the percentage of the students at academic risk was greater for students who reported having any of the 13 health risk factors in comparison to students without the health risks (see **Figure 1**). For example, about 22% of non-smoking students were at academic risk, but more than twice as many (57%) of students who smoke were at risk. About 20% of students who ate breakfast were at academic risk, but 34% of students who did *not* eat breakfast were at risk. For each specific risk factor, the difference in academic risk by health risk factor was statistically significant, including after adjusting for gender and socio-economic status [22].

Health Risk	Percent of 8th grade students with risk factor
Substance Abuse (any use in past 30 days)	
Cigarette smoking	6.1
Alcohol use	16.9
Marijuana use	7.3
Chronic Health Conditions	
Obesity (body mass index greater than 30)	10.4
Severe asthma (frequent symptoms that affect activities and sleep)	0.3
Poor Nutrition	
Not eating breakfast	33.9
Insufficient fruit and vegetable consumption (fewer than 5 per day)	70.6
Drinking 2 or more soda pops per day	15.8
Insufficient Physical Activity	
Insufficient exercise (vigorous or moderate activity)	17.6
Watching TV 3 or more hours on an average school day	31.2
Poor Mental Health	
Feeling unsafe at school	17.5
Depressed for at least 2 weeks in past year	23.5
Sleep Deprivation	
Fewer than 8 hours of sleep at night	42.8

Table 1. Health risks that may influence student achievement.

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Modern-day students who are involved in school and other extra-curricular activities experience a toll on their physical and mental health. Having a mental illness is a difficult thing to deal with, especially as a teen. Mental health disorders can affect social interactions, inability to screen out environmental stimuli (sounds, sights or smells which may be distracting to the student), inability to concentrate, lack of stamina, handling time pressures and multiple tasks, handling negative feedback and the response to change. Mental illness therefore has a great impact on academic achievement. It does not only affect emotional health but it is known to influence many domains of students' lives, including their social interactions and educational achievements. Mental illness can be linked to poor attendance, particularly frequent absences for vague, non-specific physical health problems. It has also caused difficulties with academic work such as social integration, adjustment to school, behaviour regulation, attention and concentration [23]. In a 2004 study, approximately 83% of students with emotional and behavioural disorders scored below the mean of the control group in reading, writing and math [24]. **Box 1** reveals a summary of results compiled by the National Centre for Mental Health Checkups. The results show that mental illness affects attendance, perceived competence and concentration [25].

Attendance: High-school students who screen positive for psychosocial dysfunction have three times the absentee and tardy rates of students not identified with psychosocial dysfunction.

Perceived competence: Students reporting high levels of psychosocial stress are more likely to perceive themselves as less academically competent.

Concentration: Students with greater depression symptoms are more likely to report difficulty concentrating in class and completing homework.

Anxiety: Anxiety disorders, which affect 31.9% of all adolescents and co-occur in approximately one-third of depressed youth, are associated with a reduced likelihood of attending college. People with a lifetime occurrence of social phobia are almost twice as likely to fail a grade or not finish high school as those who have never had the condition.

Depression: High depression scores have been associated with low academic achievement; high scholastic anxiety; increased school suspensions; and decreased ability or desire to complete homework, concentrate and attend class.

Suicidality: Adolescents who have attempted suicide in the previous 12 months show significantly lower levels of school performance and school connectedness than non-attempters. Students who perceive their academic performance as 'failing' are 3 times more likely to report suicidal thoughts and 10 times as likely to report suicide attempts than students who feel their performance is fine.

Substance use disorders: Substance abuse, including alcohol abuse in isolation, is significantly associated with termination of primary and secondary school, failure to enter college and termination of college.

Attention disorders: Attention problems are the principal predictor of diminished achievement relative to expectations on the basis of a young person's cognitive ability.

Box 1. Effects of mental illness on academic achievement.

A study by the Washington State Healthy Youth Survey carried out in 2006 found that the more health risks students had, the more likely it was that they also were at academic risk. The rate of increase in academic risk was very consistent; with each extra health risk added a similar difference, whether going from one to two risks or seven to eight risks (see **Figure 2**). Fewer than 10% of students with no health risk factors reported being at academic risk (having mostly Cs, Ds or Fs). About half of students with six health risk factors, and two-thirds or more of students with at least nine health risk factors were at academic risk [26].

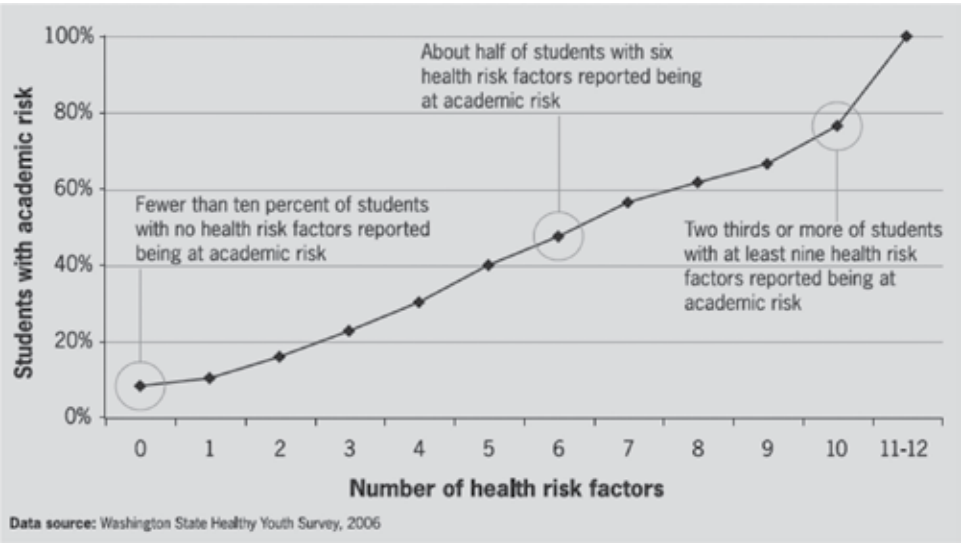

Figure 2. Number of risk factors and academic achievement.

5. Health interventions that influence academic achievement

The World Health Organisation observes that health is created and lived by people within the settings of their everyday life, where they learn, work, play and love. The Bangkok Charter for Health Promotion advocates setting-based approaches to health promotion. Schools therefore play a critical role in promoting the health and safety of young people and helping them establish lifelong healthy behaviours. School health programmes can play a vital role in reducing the prevalence of health risk behaviours among young people and have a positive effect on academic performance. Schools can be a context where children can learn and practise positive health behaviours within a health-promoting environment. In a May 2012 report, *Accelerating Progress in Obesity Prevention*, the Institute of Medicine evaluated obesity prevention strategies and concluded that we must 'strengthen schools as the heart of health' [5].

5.1. Health-promoting school policies, procedures and environments

Clearly, there are many possibilities for school-based health interventions. School staff and partners may gravitate towards classroom-based or individual-based health education because it is the traditional way to reach students at school. However, policies, procedures and 'environments' that promote healthy behaviours are also critical components for improving student health policy interventions (including changes in the school environment) can influence day-to-day norms of the school that will ultimately contribute toward behaviour change [27]. Examples of policies that may be implemented include the use of signpost to restrict smoking in some designated areas, restricting the availability of certain food products that are considered unhealthy and offering incentives to students to encourage them to lead healthy lifestyles.

5.2. Information-based solutions

Prevention is better than cure. Information has played a critical role in disease prevention and the cost of information-based solutions is much less compared to the cost of treating patients. Information is a useful resource in catalysing behaviour change among school children. Disseminating health information can improve knowledge transfer from health professionals to the student population, and helps them to maintain and improve their health. Schools can introduce health intervention strategies aimed increasing awareness on a number of health issues that include food and nutrition, sexual and reproductive health, alcohol and drug abuse, depression and anxiety, physical exercise among other key health topics. Schools should use a variety of media and channels to disseminate health information, including posters, websites, nurses and social media.

5.3. Health-promoting curriculum, instruction and training

Health education programmes can help students develop the knowledge, skills, attitudes and behaviours needed to adopt healthy behaviours. Educational interventions can also enhance knowledge and help-seeking among college students. Fitness and wellness courses have been seen as agents of change for modifying unhealthy lifestyles among college students. There is evidence that well-taught fitness and wellness classes have the potential to positively affect the attitudes and behaviours of the students that enrol in them. Educational modules are an important tool for health information dissemination and behaviour change. Conceptually based wellness courses, which are also referred to as lecture laboratories, have been designed to promote physical education and wellness among college students. The courses are an alternative to the traditional skill-based physical education courses. The courses consist of lectures and laboratory experiments. The lecture part of the course is designed to promote learning of conceptual information related to fitness and wellness and health behaviour change theory as well as learning of self-management skills that result in real-world application. The laboratory sessions are designed to provide students with hands on skills on matters related to wellness and physical exercises [28].

5.4. Supportive health services

Supportive health services are targeted interventions or support for selected students, as well as provision of a broad range of services that can influence health. For example, school nurses and counsellors refer students who currently smoke to cessation classes or other help for quitting. The Centers for Disease Control and Prevention observes that supportive services can have a high impact on individual students, but only for the selected students who would have been identified as students at risk. These services usually require relatively more staff resources to sustain. For example, individual counselling programmes for students at risk for substance abuse may effectively impact the behaviour of individual students, but may not impact the prevalence of substance abuse at the school as a whole, because they only reach a small number of students [29].

5.5. Integrated school-based interventions

As discussed earlier on in this article, health is a complex phenomenon that is influenced by multiple factors. Therefore, stand-alone interventions that focus on specific health problems may not be effective in addressing the overall health needs of students [30]. Many health promotion bodies that include the Jed Foundation and the National Centre for the Dissemination of Disability Research have advocated for integrated health intervention strategies. As an introduction to describing integrated school health interventions, the Centers for Disease Control and Prevention (CDC) notes on their Website:

> *Schools by themselves cannot—and should not be expected to—solve the nation's most serious health and social problems. Families, health care workers, the media, religious organizations, community organizations that serve youth, and young people themselves also must be systematically involved. However, schools could provide a critical facility in which many agencies might work together to maintain the well-being of young people* [31].

Intervention programmes that include more than one approach can create synergy, and eliminate unnecessary duplication of effort and wastage of resources (human and capital). The *Guide to Community Preventive Services*, which conducts rigorous reviews of health interventions, found strong evidence in support for the effectiveness of integrated health interventions. The review found a link between integrated interventions and reduction in violence and sexual risk behaviours in adolescents [32].

6. Conclusion

Research evidence reveals a complex relationship between health and academic achievement. Studies that have been carried out show a significant correlation between academic performance and health problems such as mental illness, depression and anxiety, vision and oral health problems, asthma, teen pregnancy, malnutrition, obesity, chronic stress, aggression and violence, unsafe sexual activity, unhealthy eating, physical inactivity and substance abuse. The effects of such health problems include poor retention, school failure, grade retention, school dropout, absenteeism and poor concentration. Research has also revealed that the more health risks students had, the more likely it was that they also were at academic risk. Schools and universities are in a unique position of educating students about life in general and more specifically about diseases. Schools should create enabling environments and policies that and support services promote student health individually and collectively. Comprehensive school health services, which comprise multiple interventions, are said to positively contribute to the academic performance of students.

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Chapter 10

The Role of Resilience and Psychological Well-Being in School Engagement and Perceived Academic Performance: An Exploratory Model to Improve Academic Achievement

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Abstract

The aim of the present study is to examine the relationship between resilience, subjective well-being and academic achievement (i.e., school engagement and perceived performance). To achieve this, a battery of instruments was applied to 945 Compulsory Secondary Education students from Basque Country (425 boys and 520 girls) of medium socio-cultural level and aged between 12 and 17 (M_{age} = 14.50, SD = 1.82). The study tests a structural model for analyzing the effects of resilience and subjective well-being on school engagement and perceived performance. The findings provide evidence in favor of the influence of resilience and subjective well-being as decisive psychological variables in the prediction of school engagement and perceived performance. Finally, the results of this study highlight the need to foster education of resilience and subjective well-being to improve academic achievement among adolescent students.

Keywords: resilience, subjective well-being, school engagement, academic achievement, adolescence

1. Introduction

Although resilience is an object of study in many different disciplines within the social and health sciences, there is currently no single definition of the term that has been unanimously accepted by the scientific community [1]. However, almost all definitions are built around

two key aspects: significant exposure to risk and positive adaptation [1, 2]. According to the American Psychiatric Association [3], resilience is the process of adapting well in the face of adversity, trauma, tragedy, threats or significant sources of stress.

From this eminently human-centered perspective, numerous definitions of resilience have been proposed in the field of psychology, with each being subject to the specificities of the various conceptual trends endorsed by their authors and hence the widely accepted need to clarify and specify the construct [4]. As so as it often happens with scientific terms, there is currently no consensus regarding the definition of resilience in research, although the majority of authors agree that it involves resistance to or a positive and effective way of coping with situations of risk and adversity [1].

Therefore, on the one hand, we have those definitions which view resilience as a process. In this sense, Masten [1] defined it as the capacity for or the result of successful adaptation despite challenging or threatening circumstances. Later, Luthar and Zigler [5] described resilience as a dynamic process which results in positive adaption within a context of severe adversity. These authors distinguished three main aspects to this construct: adversity, positive adaptation and the emotional, cognitive and sociocultural mechanisms which influence human development. Luthar et al. [6] defined resilience as a dynamic process encompassing positive adaptation in a context of significant adversity. In other words, the individual is exposed to a high-intensity risk and yet, at the same time, deploys a series of adaptive behaviors despite the impact of possible threats to their development process. Another similar definition was proposed by Masten [7] and refers to resilience as a type of phenomenon characterized by good results despite serious threats to adaptation or development. Subsequently, Luthar [8] defined resilience as the expression of positive adjustment despite the significant adversities of life, while Wyman et al. ([9], p., 308) stated that "resilience reflects a diverse set of processes that alter children's transactions with adverse life conditions to reduce negative effects and promote mastery of normative developmental tasks."

However, resilience has also been understood as the individual capacity or ability to survive and regain one's balance after experiencing certain traumatic events. Richardson et al. [10] suggested that resilience develops thanks to an intrinsic or extrinsic driving force that emerges from the processes of overcoming trauma. Based on this theoretical model [10, 11], Connor and Davidson [12] defined resilience as the set of personal qualities that enable a person to prosper in situations of adversity. In other studies, resilience has been defined as a synonym of vulnerability reduction [13], the ability to tolerate experiences of change and adversity [14], the ability to adapt to adversity [15], effective coping [16], a complex behavioral repertoire [17] and personal stability or recovery [18].

Nevertheless, despite these differing definitions, a series of common characteristics can be identified which relate resilience with human strengths, some kind of disturbance and subsequent growth, adaptive coping and positive results despite adversity. This study is based on the definition of resilience proposed by Connor and Davidson [12], who claimed that the phenomenon encompassed personal qualities that enable the individual to prosper despite exposure to adversity [7]. Based on Richardson's model [10, 11], these authors opt for a variable construct, rather than a static vision of what resilience means. Indeed, at an empirical level, it has been demonstrated that resilience is a multidimensional characteristic which

varies in accordance with context, time, age, sex and cultural origin, and may even emerge in different ways in the same individual, depending on their circumstances [19]. From this perspective, resilience is seen as referring to a pattern of positive adaptation, with resilient individuals demonstrating a resilient pattern or resilient qualities, which enable them to cope successfully with stress. In turn, this individual set of resilient qualities is itself immersed in a process of dynamic interaction with other intrinsic or environmental variables which influence the individual's ability to adapt to adverse situations.

As mentioned above, the increasingly popular salutogenic approach offers the opportunity to examine the role of resilience in the field of clinical psychology. As Ursano points out ([20], p., 274), "the study of response to trauma should include the study of resilience and health." In specific terms, the antecedents of Connor and Davidson's model [12] are subject to the efforts made by these two researchers to assess resilience as an index of health or well-being.

The Connor-Davidson Resilience Scale (CD-RISC) [21] was developed specifically to measure the effects of pharmacotherapy and other therapeutic intervention methods. The clinical improvement observed in the study was documented by the scale, with high scores in resilience being proportional to the global improvement experienced by the individual. According to Prince-Embury [22], these results are relevant because scores on the scale have been shown to be sensitive to real changes in subjects' psychological well-being, thus suggesting that high resilience levels are related to an improvement that goes beyond the mere alleviation of symptoms. They are also important because they indicate that resilience is subject to change. Thus, the study helped corroborate the fact that resilience is quantifiable, modifiable and can be improved through interventions [12, 23].

One of the variables that is related to both resilience and the academic field is psychological well-being. Psychological well-being can be divided into three basic components: (a) satisfaction with life; (b) positive affect; and (c) negative affect [24]. Thus, for a person to achieve high levels of subjective well-being, they need to feel satisfied with life, have a predominantly positive affectivity and a low level of negative affect. Thus, psychological well-being is purely evaluative and subjective, the most important element being how each individual assesses his or her own life [25].

The inclusion of the satisfaction with life concept as a key variable in psycho-educational studies is a positive development, since the manifestation of the feeling of well-being in relation to oneself can be considered a personal development milestone within the educational context [26]. Satisfaction with life has been identified as a cognitive component of subjective well-being and is expressed in the form of an individual's global judgment of their life [27]. As such, life satisfaction is the result of the comparisons made by the subject regarding the events of their life, against a standard established by themselves [28]. Satisfaction with life is therefore conceived as a resulting variable that assesses the self-perception of global satisfaction.

As regards positive/negative affect, a person's position on the psychological well-being scale is a result of their position in two independent dimensions: positive affect and negative affect [29]. Thus, an individual will have a high level of psychological well-being to the extent to which positive affect predominates over the negative affect. These two dimensions are independent from each other, making it impossible to predict a subject's score in the negative

dimension on the basis of their score in the positive affect one and vice versa. The most recent study found [30] corroborates this, since satisfaction with life was observed to correlate significantly with both positive and negative affect, with all correlations being moderately strong, while positive and negative affect were not found to be significantly correlated with each other, thus indicating that they are independent constructs.

Subjective well-being, commonly called "happiness," is affected by a number of psychological factors, including resilience. Scientific research has found that, firstly, resilience is positively associated with satisfaction with life and, secondly, that it is negatively associated with negative affect and positively associated with positive affect [31]. It is also known that resilient people who progress toward their goals have higher levels of positive affect and satisfaction with life [32]. In other words, those individuals who cope with and adapt better to stressful situations and adversity feel better about themselves and are happier than their non-resilient counterparts.

In broad terms, subjective well-being provides a measure of how good we feel about ourselves and how happy we are. Although we are dealing here with a concept that is difficult to delimit, most authors agree that the following elements should, at least, be taken into account: its subjective nature, which is rooted in each individual's own experience; its global dimension, since it encompasses an assessment or judgment about all aspects of life; and the need to include positive measures, since its nature goes beyond the mere absence of negative factors. It is therefore important to consider the effect of resilience on two major dimensions: the cognitive and the emotional or affective dimension.

A positive relationship has been observed between resilience and satisfaction with life, with those evincing a resilient pattern tending to believe in their own ability to overcome adverse situations, which translates into a greater sense of well-being [33]. Indeed, resilience has been consistently identified as a particularly relevant variable for satisfaction with life in diverse studies which report a positive, concurrent relationship between resilience and this construct. In other words, sufficient empirical evidence exists to confirm the beneficial effect of resilience on satisfaction with life. Indeed, longitudinal studies have verified that resilience during the first phase of life strongly predicts satisfaction with life during the second phase [32, 34]. Resilience has also been found to correlate positively with satisfaction with life and negatively with depression, through the mediator mechanism known as the cognitive triad (positive cognitions about oneself, the world and the future) [31].

The empirical evidence found in this field confirms diverse theoretical models which provide specific information about the association between resilience and well-being indicators. In this sense, resilience has been found to play a mediator role in the relationship between positive affect and satisfaction with life, suggesting that people who feel happy have higher levels of satisfaction not only because they feel better, but also because they have developed psychological resources such as resilience in order to live better [35]. Empirical conformation has also been provided for another model in which resilience serves as a predictor variable of the cognitive-evaluative component of subjective well-being, that is, the more resilient a person is, the more satisfied they feel with life [36]. It has also been proposed that the link between resilience and satisfaction with life is strongly mediated by the affective aspect of subjective well-being [37].

Thus, one of the psychological traits that foster satisfaction with life is the individual capacity to overcome adversity and grow despite it. It seems that those who adapt better to stressful situations and more easily to adversity are also those who feel most satisfied with their lives, unlike their non-resilient counterparts.

A large number of studies report a strong link between psychological resilience and positive emotional states, finding that individuals with a resilient profile experience more positive emotions in stressful situations than less resilient subjects, even though they experience similar levels of negative emotions. This is because they have a greater capacity to overcome adversity and grow [38]. A diverse range of methodologies (self-reports, observation and longitudinal studies) have been used to demonstrate that resilient people are characterized by having positive affect, with findings indicating that these individuals possess an enthusiastic and energetic attitude to life, as well as curiosity and openness to new experiences [39, 40]. They also tend to deploy positive emotions in order to effectively cope with adverse situations, including humor [7, 19], relaxation [41] and optimistic thought [42]. Folkman and Moskowitz [43] argue that attaching a positive meaning to the events of everyday life and having a problem-centered coping style may help generate positive emotions in adverse situations. In other words, resilience has been found to facilitate positive affect and alleviate negative affect.

There is also support, however, for a relationship in the opposite direction, with positive emotional states leading to higher levels of resilience in the future [44]. This means that resilience is partly due also to the appearance of positive emotions, since when faced with a stressful event, the balance between positive and negative emotions has an impact on how the individual copes with adversity [38]. In the review conducted by Salovey et al. [45] on the effects of positive emotions, one of the aspects analyzed was related to the immune system, since being optimistic and having positive emotions provides the body with resources for coping with health problems, fosters the development of resilience and may motivate healthy behavior. In other words, positive emotional states may facilitate healthy behavioral practices, providing individuals with the resilient capacity they need to cope with the possibility of having or developing serious health problems. These same authors point out the existence of empirical findings that are consistent with the association between positive emotional states and an increase in the availability of psychological resources such as resilience.

Tugade et al. [16] argue along the same lines when they state that positive emotions are not simply a product of resilient traits but also play a very important role in resilient people's capacity to recover from stressful events. Positive emotions broaden cognitive and behavioral repertoires, playing a reparatory role in situations which generate negative emotions. This theoretical perspective suggests that the ability to feel positive emotions constitutes an essential part of the mechanisms which protect against adversity. Moving further along in this direction, the theoretical work carried out by Greco et al. [46] suggests that positive emotions are a resource which fosters the development of a resilient process during childhood.

Finally, the research conducted by Ong et al. [47] suggests that resilience generates other adaptive assets, catalyzing or triggering a cascade of positive experiences. In comparison with people who have low resilience levels, highly resilient individuals have a greater capacity to react to situations and are more disposed to view daily events in a positive light. These authors later

added the observation that positive emotions constitute a basic building block for resilience [47]. The results of their research indicate that feeling positive emotions fosters the ability to adequately recover from circumstances of daily stress. Swaminath and Rao [48] argue something similar in their theoretical review of studies which have contributed to identifying the tangible effects of positive emotions, highlighting the influence of positive affect on cognitive flexibility and the construction of psychological resources such as resilience, optimism and creativity.

In any case, the findings of the aforementioned studies suggest a relationship between the aspects of resilience and the positive dimension of emotionality. As for the direction of this relationship, it is clear that resilient people are characterized by their ability to feel positive emotions when faced with situations of risk or adversity. Equally, positive affect has been identified by empirical studies as one of the factors, which fosters resilience. In short, one may assume that resilience is a good indicator of affective balance, which implies feeling more positive and fewer negative emotions, although this relationship has hardly been explored at all to date.

Although the usefulness of resilience in school contexts has been widely recognized [49], the application of a resilience-based approach within educational research is unusual [50]. Consequently, prior research analyzing the relationship between resilience and school engagement is scarce [51], although with the emergence of positive psychology a number of studies have linked resilience to other educational factors and variables such as the presence of a motivational climate in the classroom [52], the use of diverse motivational and emotion regulation strategies and academic performance among adolescents [53]. Therefore, and although it has not yet been fully established that resilience is indeed a stable predictor of a higher level of school engagement, a positive correlation can be hypothesized between the two variables, with students who respond in a more resilient manner to stressors in the school context being more likely to react in an adaptive fashion to the school itself and their academic work. They are also more likely to participate more in school life and dedicate more time to learning tasks than their non-resilient counterparts.

We found only two studies which refer to the effect of resilience on school engagement. The first one was conducted from a community perspective and reports that certain contextual factors associated with resilience (cultural adherence and commitment to the community) affect school engagement, suggesting that greater school engagement may be the result of efforts by the school to improve certain resilient aspects of the environment [54]. The second study is a recent publication that links resilience with school engagement [51] and aims to identify the external and internal factors that predict resilience in a sample of students in a socially disadvantaged situation, observing a positive relationship between the two study variables. It has also been found that non-resilient students are more impacted by contextual risk variables (neighborhood, school climate or risky friendships), with resilience softening the negative effect of said contextual factors on academic performance [53]. Other authors have observed too that students with better academic results score higher for certain characteristics associated with resilience [55]. Similarly, it is worth highlighting the existence of a large body of research that, when studying "academic resilience," defines the construct as performance, with resilient students being seen as those who achieve good academic results [56].

Finally, and from the perspective of psychopedagogic guidance rather than scientific research, Skinner and Pitzer [57] propose a perspective on school engagement that emphasizes its role in organizing the daily school experiences of children and youth, as well as their cumulative learning, long-term achievement and eventual academic success. The proposed intervention is enriched by the inclusion of concepts such as "daily resilience," which focuses on the analysis of how students respond to mistakes, difficulties or failures at school. The authors conclude that the same personal and interpersonal resources that promote engagement may shape students' reactions to challenges and obstacles, with academic coping being an especially important bridge back to reengagement.

Only a few studies to date have focused on the impact of satisfaction with life and emotions on indicators of school adjustment, and there is a pressing need for more empirical evidence regarding the relationship between the indicators of personal well-being and educational variables [58]. Nevertheless, it is a well-accepted fact that students' perception of their own well-being is better the more engaged they are with their school [59]. In this sense, prior research suggests that subjective well-being is a strength related to adaptive results during adolescence, including positive school experiences [60]. Based on the importance of simultaneously analyzing all three components of subjective well-being [61], Heffner and Antaramian's study [62] demonstrated that both satisfaction with life and affective states predict adaptive functioning and even flourishing at school, represented by the following indexes: school engagement and academic performance.

If we look at the cognitive component of subjective well-being separately, we see that it has been consistently linked to school adaptation indicators such as perceived academic ability, positive attitudes toward school, school engagement and the value of the importance of school [63]. There are also theoretical approaches which support the connection between academic performance and satisfaction with life [64]. As regards the affective component of subjective well-being, longitudinal studies have linked negative emotions with non-adaptive results at school and school failure [65]. In relation to the positive affect indicator of subjective well-being, evidence exists, which points to positive emotions being associated with school success [62].

In addition to the information reported regarding each of the study variables and their interrelations, evidence also exists of the indirect effect of contextual variables on satisfaction with life, with school engagement as a mediating variable of the said effect [66].

Most prior research has focused on analyzing the relationship between these variables, either in a bivariate fashion or in short-reaching descriptive methodologies. More advanced research methods are required that are capable of establishing relationships of influence between the different variables in order to enable the testing of predefined explanatory theoretical models. One such research method is structural equation modeling (SEM). Taking all the relationships between all the variables outlined above into consideration, a hypothesized theoretical model was developed according to which resilience directly predicts subjective well-being and indirectly predicts school engagement and perceived academic performance levels through subjective well-being (see **Figure 1**).

Figure 1. Proposed theoretical structural model.

2. Method

2.1. Participants

Participants were chosen from among secondary school students attending schools in the Autonomous Region of the Basque Country (ARBC). The sample group comprised 945 adolescent students (425 boys and 520 girls; M_{age} = 14.50, SD = 1.82; range 12–17) from a mid-level socio-cultural context. The students were distributed throughout the different school years as follows: Year 1 of Compulsory Secondary Education (CSE) (25.2%); Year 2 of CSE (18.7%); Year 3 of CSE (18.7%); Year 4 of CSE (16.1%); and the 2-year Spanish Baccalaureate (21.9%).

2.2. Variables and measurement instruments

Resilience was evaluated using the *CD-RISC 10 Resilience Scale* [67]. The 10 items of this abbreviated version of the Connor-Davidson Resilience Scale [12] are scored on a 5-point Likert-type scale (higher scores reflecting greater resilience until 40). The reliability and validity of the CD-RISC 10 to be adequate in one large sample of adolescents were found [69]. In this study, the internal consistency coefficient obtained was α = 0.75.

The Spanish version of the *Satisfaction With Life Scale* (SWLS) by Diener, Emmons, Larsen and Griffin [28, 68] was used to evaluate *satisfaction with life.* This scale measures global cognitive judgments of satisfaction with one's life on a 7-point Likert-type scale. The internal consistency coefficient obtained for the sample used in the present study was α = 0.82. The minimum score is set at 5, while the maximum score is 35 points. The authors have also established the following rating ranges for a better interpretation of their results: from 31 to 25 = extremely satisfied; from 26 to 30 = satisfied; from 21 to 25 = slightly satisfied; 20 = neither satisfied nor dissatisfied; from 15 to 19 = slightly dissatisfied; from 10 to 14 = dissatisfied; from 4 to 9 = extremely dissatisfied. This questionnaire has been implemented successfully in various studies with populations of adolescents [66, 69].

Affect balance was measured using Bradburn's *Affect Balance Scale* [29]. The scale comprises 18 items to which responses are given on a 4-point Likert-type scale. The scale has shown adequate reliability and validity in a population of adolescents [24]. The Cronbach's alpha reliability coefficients obtained with our sample were positive affect (0.78) and negative affect (0.78). The score obtained by a subject is within a theoretical range between 9 and 36 points for each positive or negative scale.

School engagement was evaluated using the *School Engagement Measure* (SEM) by Fredericks, Blumenfeld, Friedel and Paris [70, 71]. The measure consists of 19 items to which participants respond on a 5-point Likert-type scale. Based on these 19 items, the authors obtain 3 factors which measure behavioral (with 4 items), emotional (5 items) and cognitive engagement (7 items), which are the 3 measures used for this study. The reliability assessment resulted in adequate internal consistency indexes for all three factors. With the sample group used in this study, the internal consistency for the scale was $\alpha = 0.72$ for behavioral engagement, $\alpha = 0.70$ for emotional engagement and $\alpha = 0.78$ for cognitive engagement. The possible score in the behavioral dimension ranges from 4 to 20, in the emotional dimension from 5 to 25 and in the cognitive one from 7 to 35 [71].

Perceived academic performance was evaluated using the *Brief School Adjustment Scale* (EBAE-10) by Moral de la Rubia et al. [72]. This multidimensional questionnaire comprises 10 items with 6 response options, grouped into 3 indicators of school adjustment: problems with school integration, academic performance and academic expectations. For the purposes of this study, only the *academic performance* subscale was used, referring to participants' perceptions of their own performance as students. The subscale comprises three items, including "I get good grades" and "I think I'm a good student." The internal consistency of the subscale was $\alpha = 0.77$. The total score ranges from 3 to 18 and a higher score indicates a higher level of academic performance.

2.3. Procedure

A number of schools were randomly chosen from a list of all schools in the Autonomous Region of the Basque Country (ARBC), and different year groups within each school were selected in accordance with the interests of the study. The battery of questionnaires was administered to participants class by class during school hours. Throughout the process, care was taken to ensure that all participation was strictly voluntary, and the anonymity of the responses given was protected in order to reduce the social desirability bias. The single blind criterion was used, with students being unaware of the purpose of the study. The study complied with the ethical values established for psychological research and assessment and respected the basic principles laid out in the American Psychology Association's (APA's) ethics code and in current regulations (informed consent and the right to information, protection of personal data and confidentiality guarantees, non-discrimination, non-remuneration and the right to withdraw from the study at any time).

2.4. Data analysis

Missing values (2.1%) were inferred using the expectation maximization (EM) algorithm and the Markov chain Monte Carlo (MCMC), offered by the LISREL 8.8 program. Extreme values (1.3%) were eliminated using the SAS program. To ensure normality, the bootstrap method was applied, as offered by the AMOS 24 program.

A Pearson correlation analysis was conducted between the study variables with the aim of determining any possible connections between them and to verify the non-existence of multicollinearity. A descriptive analysis was also carried out of the means and standard deviations of all the study variables. Both the descriptive statistics and the correlation coefficients were

calculated using the SPSS 22 program. To test the structural regression model we used the structural equation modeling (SEM) technique, provided by the AMOS 24 program. In the first step, the measurement model is analyzed to check that each of the latent variables is represented by its indicators. In the second step, the analyses for testing the structural model are carried out using the maximum likelihood (ML) procedure.

3. Results

3.1. Measurement model

The measurement model included four latent variables (*resilience, subjective well-being*, *school engagement* and *perceived academic performance*) whose indicators, in the case of resilience and perceived academic performance, were the items on the questionnaire administered. As for the variables *subjective well-being* (satisfaction with life, positive affect and negative affect) and *school engagement* (cognitive engagement, behavioral engagement and emotional engagement), the indicators were the parcels of the different scales. The analysis of the measurement model (see **Table 1**) revealed an acceptable fit: $\chi^2_{(129)} = 491.471$, $p < 0.001$; CFI = 0.921; TLI = 0.906; SRMR = 0.050; RMSEA = 0.054 (90% CI = 0.049–0.060). All factor loadings of the latent variable indicators were significant ($p < 0.01$), which implies that all latent factors are represented by their corresponding indicators.

3.2. Theoretical model analysis

Once the measurement model had been analyzed, the global fit of the proposed theoretical model (**Figure 1**) was estimated. This model proposes that *resilience* is positively related to *subjective well-being* which, in turn, has predictive power for *school engagement* and *perceived academic performance*, thus playing a mediator role between resilience and the two indicators of school adjustment.

The complete mediation model (**Figure 2**) postulates that resilience is positively related to subjective well-being, which has predictive power for both indicators of school adjustment, thus playing a mediator role between resilience and school engagement and perceived academic performance. An initial analysis of the resulting parameters revealed that the model fit the empirical data in an acceptable manner, ($\chi^2_{(131)} = 665.196$, $p < 0.001$; GFI = 0.928; CFI = 0.883; TLI = 0.864; SRMR = 0.057; RMSEA = 0.066; RMSEA confidence interval 90% = 0.049–0.060).

Model	$\chi^2_{(df)}$	CFI	TLI	SRMR	$RMSEA_{(CI)}$	$ECVI_{(CI)}$
M_1	$665.196_{(131)}$	0.883	0.864	0.057	$0.066_{(0.049–0.060)}$	$0.608_{(0.540–0.683)}$

Note: CFI and TLI > 0.90 (acceptable fit); RMSEA and SRMR 0.05 ≥ 0.08 (acceptable fit).

Table 1. Goodness of fit parameters for the complete mediation model (M_1).

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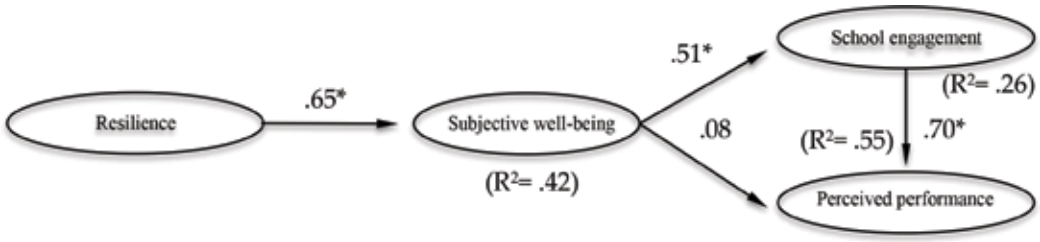

Figure 2. Standardized solution of the complete mediation model.

3.3. Direct and indirect effects between the study variables

When the regression coefficients of the proposed model were analyzed separately, it was found that all the direct pathways proposed were significant at a level of $p < 0.01$, with the exception of the *subjective well-being-perceived academic performance* pair ($\beta = 0.080$, $p > 0.0$). Specifically, *resilience* was found to have a predictive power of 65% for *subjective well-being*. As regards the indicators of school adjustment, *subjective well-being* was found to directly determine *school engagement* ($\beta = 0.510$, $p > 0.01$), which in turn predicted *perceived academic performance* ($\beta = 0.697$, $p > 0.01$).

As regards the indirect effects on both indicators of school adjustment (*school engagement* and *perceived academic performance*), for which the proportion of variance explained was 26% for *school engagement* and 55% for *perceived academic performance*, the results indicate that *resilience* has an indirect effect on *school engagement*, mediated by the level of *subjective well-being*. Furthermore, if *perceived academic performance* is added to this last pathway, then *subjective well-being* and *school engagement* act simultaneously as mediator variables between *perceived academic performance* and *resilience* ($\beta = 0.355$, $p > 0.01$).

4. Discussion of the results

As we had hypothesized, during compulsory secondary education, resilience predicts subjective well-being directly and school engagement and perceived academic performance indirectly. It is therefore clear that perceiving oneself as being able to cope successfully with adverse situations has a significant impact on young people's personal and school-related adaptation. Thus, the results of this study confirm that postulated by prior research [16]. The idea that subjective well-being is present in people who are capable of successfully coping with the challenges and problems of life are a reasonable one. However, it was necessary to demonstrate this idea among the adolescent population and indeed, the results obtained here do just that.

The findings reported by studies focusing on the satisfaction with life construct support both the formulation of the hypothesis regarding its dependence on resilience and the results

obtained in this regard here. Empirical evidence exists of the role played by resilience as a predictor variable which has a positive effect on the cognitive component of subjective well-being [36]. Similarly, it has been suggested that resilience catalyzes or triggers a cascade of positive emotions in situations of stress [38], and it is therefore likely that there is also a dependent relationship between resilience and the affective component of subjective well-being.

Consequently, the results of this present study demonstrate that, as we expected, resilience has a direct, positive influence on subjective well-being, measured through satisfaction with life and emotional experience. It is important to highlight the fact that, as found in other studies also [73], resilience has a strong predictive power for positive affect, followed by satisfaction with life and, finally, negative affect. Consistently with that reported by previous studies, we can therefore confirm the idea that people's perceptions of their own capacity to overcome adversity are one of the key aspects which determine their feeling of personal well-being [33]. Thus, it can be concluded that a stronger perception of one's ability to cope with challenges and risks leads to a more positive assessment of one's life so far and prompts more positive and fewer negative emotions. As such, resilience influences personal adaptation during adolescence.

The relationship between resilience and school engagement has been analyzed by only a few studies, all of which coincide in identifying a positive relationship between the two variables [54]. At the same time, other studies confirm the close links between resilience and other educational variables which, like school engagement, are indicators of school adjustment [52]. However, no studies exist which focus on the influence of resilience on school engagement from the three-dimensional perspective adopted here. In this sense, the relationships analyzed in the regression model and the results obtained therefore make a novel contribution to this particular field of study. The results reported here show that the indirect predictive power of resilience for school engagement is significant, with high levels of resilience prompting individuals to become more engaged in school activities, probably because they see themselves as being more capable of coping with the adverse situations that may arise in the school context, thanks to their higher level of resilience [65] and their greater degree of subjective well-being. When adolescent students feel more able to cope with adversity, they feel happier and more satisfied with life, and both of these facets prompt them to engage more in school activities (behavioral engagement), identify more with the school (emotional engagement) and invest more in the learning process (cognitive engagement).

Another finding worth highlighting is the direct influence of psychological well-being on school engagement. This finding partly confirms that reported in previous studies, such as the one by Heffner and Antaramian [62], in which the authors argue that components of subjective psychological well-being (satisfaction with life and affective states) predict adaptive functioning at school, represented by the school engagement and school performance indexes. While the structural model tested in this study highlights the direct influence of subjective well-being, it only does so in relation to school engagement, not perceived academic performance, which it influences indirectly through school engagement. In other words, students with higher levels of psychological well-being also feel more engaged at school and consequently have a better perception of their academic performance as a result of this engagement.

The structural model that was empirically tested in this study revealed resilience and subjective well-being to be decisive psychological variables for predicting both school engagement and perceived academic performance. The fact that students' resilience and subjective well-being are factors which explain part of the variation observed in school engagement (indirectly in the first case and directly in the second) reaffirms the importance of focusing on these variables in educational contexts [69]. However, it also provides important insights into how to act: for students who feel less engaged at school, preventive education and psychological intervention in the school environment should focus on fostering resilience, the achievement of greater satisfaction with life and actions designed to increase positive affect. Only in this way will we help students become more engaged in the school context, which will in turn undoubtedly help improve their academic results.

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Chapter 11

Academic Self-Efficacy, Approach to Learning and Academic Achievement

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Additional information is available at the end of the chapter

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Abstract

In this chapter, we focused on an analysis of relationship between academic self-efficacy (ASE), approach to learning (deep – DA and surface – SA), heteronomous (HAA) and autonomous evaluation (AAA) of academic achievement of adolescents. The purpose of this study is to examine if ASE and approach to learning (DA, SA) predict AAA and HAA of adolescents and if AAA is effective to the ASE. The sample consisted of 457 adolescents (268 girls and 189 boys). We used Morgan-Jinks Student Efficacy Scale. We measured academic achievement by grade point average. Autonomous evaluation of academic achievement was measured by perceived self-evaluation of academic achievement. Approach to learning we measured with The Revised Study Process Questionnaire. Our assumption about the correlation of all variables monitored (only with exception of the surface approach to learning) was confirmed. We have identified that academic self-efficacy, similarly as the preferred approach to learning (deep or surface), constitute an important predictor of heteronomous evaluation of academic achievement, and also that HAA is a significant predictor of AAA, while AAA is an important predictor of ASE in the age cohort of adolescents.

Keywords: heteronomous evaluation of academic achievement (HAA) autonomous evaluation of academic achievement (AAA), academic self-efficacy (ASE), deep approach to learning (DA), surface approach to learning (SA), health

1. Introduction

1.1. School success and academic achievement of adolescents

Adolescence is an extremely important period in the development and socialisation of a person that provides an individual with many life changes and challenges. Many aspects embodied in a school environment, where an adolescent spends significant time, are of protective nature linked with experiencing and behaviour of an adolescent at later stages. School success is one

of them. School success provides a basis for adolescents' subsequent socialisation into adulthood and is an important predictor of many facets in adolescents' life paths. Increased income, health and happiness are only some of the many rewards that await the academically high achievers [1]. The National Youth Risk Behaviour Survey [2] shows that young people (from 9th to 12th grade) who do not have signs of the health risk behaviour have received higher grades than those students in the same age who have manifested some level of the health risk behaviour. In the professional literature [3–6] school success, in the broadest perspective, is perceived as meeting requirements of the society concerning the personality of a pupil/student implemented through a school. Some researches (e.g., see [6]) discuss links between school success and social as well as emotional learning and indicate the fact that in recent years all nations globally face unacceptably high levels of school violence, bullying, truancy, suicides among adolescents and other forms of negative behaviour. According to the authors [6], personal well-being and good relations in a classroom are directly linked with school success. Supporting personal well-being not only decrease the number of cases of depression in childhood, but also enhance school success of students.

Academic achievement is an outcome of the performance that indicates what level of personal and educational goals a student has achieved at school. Schools are primarily focused on cognitive goals (e.g., knowledge, critical thinking) or intellectual domain (e.g., numeracy, literacy, history and science), but academic achievement is a construct with more different domains of learning [7]. In a narrow point of view, academic achievement is the outcome of education as it indicates the extent to which the student, teacher, curricular and indeed the educational institution has achieved the predetermined educational goals [8]. Slavík [9] understood academic achievement as a process of recognising a student's level of knowledge, working and learning activities.

School success in terms of assessment of educational achievements (acquired knowledge, skills and competences) is analysed in the literature also from the perspective of two approaches: heteronomous and autonomous (e.g., see [6, 10]). The heteronomous evaluation of academic achievements (HAA) is thus an evaluation of educational results "from the outside," made primarily by a teacher or other actors in the educational process. A school evaluation expressed with a grade is one of methods of the heteronomous evaluation by a teacher and still remains the most common approach to learning outcomes aiming at the greatest possible objectiveness [6]. In the context of objectivity of the heteronomous evaluation as such (in its diverse forms), we would like to note that in order to evaluate a student's performance, a teacher requires high levels of competences. As one of the most significant characteristics of the heteronomous evaluation as a predictor of school success, in accordance with studies by Lent et al. [11] and Lukášová [5], we consider the method applied to assess education at schools. Evaluation and classification are important parts of the educational process. They provide a student with a feedback and inform about the degree of task completion. A classification serves as an expression of assessment in appropriate grades. Evaluation and classification have motivational and informational components both for a pupil/student and his/her parents and teachers [12]. The heteronomous evaluation of academic achievements by a teacher is linked not only with a student's performance in standard tests for the relevant school subject and year of study, but also with a teacher's consideration for a student, his or her performance and

qualities and thus also with assigning attributes of personality and reasoning linked with a student's performance. Grade point averages (GPA) and standardised test scores have long been considered benchmarks for judging students' academic achievement/success [13–15]. However, equally important are internal characteristics (e.g., self-efficacy, self-evaluation and motivation) that are highly related to academic achievement/success [16–22]. According to Astin's Inputs-Environments-Outcomes model (in Ref. [23]), academic successes based on outcomes are viewed as functions of three sets of elements: (1) inputs (family, demographic characteristics and social experiences of students); (2) environment (people, programs, policies, cultures and experiences of students encounter in college/campus); (3) outcomes (knowledge, skills, competencies, beliefs, attitudes, values, personality characteristics and behaviours as they exist after school). York et al. [24] also argue that the academic success is a multidimensional concept comprising the following dimensions: attainment of learning objectives, acquisition of desired skills and competencies, persistence, school satisfaction, academic achievement and career success (post-college performance).

The autonomous evaluation of academic achievement, in contrast to the heteronomous evaluation, is an expression of a comparison between achieved results and assumed objectives, values or criteria made by a student himself or herself, and thus this is an evaluation "from the inside". The autonomous evaluation is an important factor for experiencing school satisfaction and psychological well-being of a student in school and has a significant motivational component for further acquisition of knowledge, skills and competences with the school environment. It is obvious that the autonomous evaluation of academic achievement is an internal characteristic that is highly related to academic success. College students often make informal evaluations of their own course performance and previous research has shown that the accuracy of these self-evaluations is correlated positively with an actual course achievement [25]. We can associate the autonomous evaluation of academic achievement with a concept of self-assessment. A student's self-assessment can promote an intrinsic motivation, internally controlled effort, mastery of goal orientation and more meaningful learning. A student's self-assessment generally involves learners making judgements about their achievements and the outcomes of their learning [26]. Self-assessment is cyclical process [26, 27] and it is formed as a combination of three sub-processes: self-monitoring, self-evaluation and identification and implementation of instructional correctives as needed [27]. Self-assessment plays a significant role in developing self-perceptions that lead to a greater motivation. It is well established that a student's engagement depends upon student's self-efficacy beliefs [28].

1.2. Academic self-efficacy in context of academic achievement and cognitive health of adolescents

Self-efficacy is a significant element of the self-regulatory human structure. It develops based on personal experiences linked with own successes, but also with observing other people and reflections on their performance and achievements. Self-efficacy is defined as beliefs in one's capabilities to organise and execute the courses of action required to produce a given attainment. Self-efficacy beliefs are self-perceptions of capability influencing how people think, feel, motivate themselves and act [16]. Self-efficacy seems to be crucial in both stages of the self-regulation of health behaviour [29]. High self-efficacy, in addition to higher academic achievement and greater

dedication to work, fosters elimination of unwanted emotional reactions and those students with higher academic self-efficacy experience less stress in school than those students, who doubt in their efficacy and abilities [16].

Within an academic context, self-efficacy is frequently described in terms of academic self-efficacy, which defines a learner's judgements about one's ability to successfully attain educational goals [30]. From the perspective of existing researches, self-efficacy as a significant element of self-regulatory personality is linked with academic achievement [19–21, 31]. A total of 38 research studies found the positive relationship between the self-efficacy and the academic achievements [32].

Academic self-efficacy is a construct which motivates a student's learning through the use of such self-regulatory processes as goal setting, self-monitoring, self-evaluation and strategy use. Past research has consistently shown that students' beliefs about their abilities to successfully perform academic tasks (i.e., academic self-efficacy) predict their actual achievement levels in school [16, 20, 33].

Two decades of research have clearly established the validity of self-efficacy as a predictor of students' motivation and learning [18]. Perceived self-efficacy is positively correlated with a rate at which a student solves tasks in school (arithmetic tasks in mathematics) [34]. Self-efficacy beliefs also affect the self-evaluation and autonomous evaluation standards which students use to judge the outcomes of their self-monitoring (in our research study as AAA). Self-efficacy beliefs also motivate students' use of learning strategies [35]. Self-efficacy of students and their self-confidence associated with learning and performance are crucial for their educational achievement [18]. High academic performance is linked with increased self-confidence and presumably it enhances students to accept greater responsibility for successful completion of tasks [36]. Some authors believe that students with higher self-efficacy achieve higher levels; because they are able to deal with cognitive demands more efficiently [37], attempt to focus on master goals [38], perceive their learning as challenges/tasks that are interesting and valuable and apply reasonable learning strategies [39]. Academic self-efficacy strongly related to performance and adjustment, both directly on academic performance and indirectly through expectations and coping perceptions (challenge-threat evaluations) on classroom performance, stress, health and overall satisfaction and commitment to remain in school [19]. Academic self-efficacy and stress are negatively correlated [21] and academic self-efficacy has also been linked to important nonacademic variables, such as depression and prosocial behaviour [30].

Throughout the school year, students receive a continuous feedback from teachers concerning their school performance. Most commonly this feedback includes grades in a form of aforementioned heteronomous assessment. Having higher self-efficacy students work harder on their educational tasks; they are not afraid of difficult tasks and perceive them as challenges, generally, they are successful and consider eventual failures as accidental or temporary, they use higher cognitive processes, work on their tasks more persistently, longer and more consciously [16, 18, 39] in comparison with students, who have doubts about their abilities and competences and who attribute own successes to sheer luck and experience difficulties in achieving higher educational levels and end up with lower levels of self-efficacy [40].

1.3. Deep and surface approach to learning in context of academic achievement of adolescents

Surface approach to learning is the tacit acceptance of information and memorization as isolated and unlinked facts. It leads to superficial retention of material for examinations and not promotes understanding or long-term retentions of knowledge and information. Biggs [41] argues that the motive (surface motive) that plays a key role in the surface approach is a fear of failure, a student fears that he or she will fail tests or exams, will not learn a given subject on time or will not be able to learn it at all, and thus his or her main motivation is to pass a test or an exam successfully with the minimum effort. A strategy (surface strategy) in the surface approach to learning should be understood as an orientation on an objective set, namely passing the exam. Students with the surface approach to learning are guided rather by external than internal motivations towards learning; they do not distinguish elementary and advanced parts of the curriculum. They understand the curriculum as isolated and mutually unrelated pieces of information, which they are unable to combine and reasonably analyse or synthesise [42, 43]. The problem with their learning is that they do not know how to work with deeper mental operations or choose their learning style (or define which learning style they prefer), and traditional education strengthens this learning strategy among students. As a consequence they learn only formal structures of the curriculum and soon forget even that [44]. The surface learning strategy is a survival technique: a student is simply trying to pass the course with minimal learning [45].

Marton and Säljö [46] first introduced the idea of deep learning. An important deep motive is a genuine internal interest in the curriculum, the subject, when a student searches for relations and logically considers and analyses the studied subject [41, 47]. A deep strategy is to understand the meaning of the curriculum maximally and try to acquire the most comprehensive knowledge and information. Students characterised by this learning strategy apply their knowledge in practice and generally manifest internal motivations towards learning [48]. During the process of acquiring the knowledge, such students divide pieces of information into significant, insignificant, core, additional, develop a structure of the content of the curriculum and apply deeper mental processes [42, 49, 50].

The researchers observed a significant correlation between the deep approach to learning, better academic achievement, high internal motivation, better performance in school [48], self-reflection [51] and higher levels of student self-reported intellectual and personal development [52]. The deep approach to learning has the greatest impact on academic achievement of a student and his or her general success in school. Students who express high academic expectations prefer the deep approach to learning. It seems obvious that application of the surface approach to learning does not support academic achievement of a student. Vrugt and Oort [53] tested a model of efficient self-regulated learning and concluded that using metacognition results in application of the deep approach to learning and consequently in high academic achievement of a student.

In the 3P model, factors on student's side (prior knowledge, ability and their preferred approaches to learning), teaching context (the nature of the content being taught, methods of teaching and assessment, the institutional climate and procedures and so on), on-task approaches to learning

and the learning outcomes, mutually interact, forming a dynamic system, and all of them affects learning of student [47].

In our research, we focused on identification of relation between two intrapsychic factors on a student's side (academic self-efficacy and learning approach) and their academic achievement (heteronomous evaluation of academic achievement and the autonomous evaluation of academic achievement). We assume that the heteronomous evaluation (expressed by GPA and given by a teacher/teachers) significantly affects the autonomous evaluation of academic achievement (expressed in own believes of a student about the knowledge, skills or competence he or she acquired during a school year including own values, priorities and objectives related to learning and education). We assume that academic self-efficacy and approach to learning are significant predictors of heteronomous and autonomous evaluation of academic achievement of adolescents.

2. Methods and procedures

The sample consisted of 457 adolescents studying at secondary schools in the Slovak Republic (268 girls, 189 boys) aged from 15 to 18 years (mean age 16.24). We provide data collected at the end of the 2nd grade in public high schools throughout the nation (end of school year 2015/2016). Students' participation in the research was voluntary (the research battery was administrated personally in 18 high schools). Before administration of research methods, every group of students were given a complete explanation of the research study.

Academic self-efficacy was measured by The Morgan-Jinks Student Efficacy Scale [17], which was designed to acquire information about student efficacy beliefs that is related to school success. The scale consists of 30 items with 3 subscales: talent (15 items), context (9 items) and effort (6 items). All the items are designed using a four-interval scale (from 1 = really agree, 2 = kind of agree, 3 = kind of disagree and 4 = really disagree.). The score for academic self-efficacy was calculated by summing up the scores for the 30 items, after reversing the scores for 9 items (4, 6, 15, 17, 19, 21, 23, 25 and 28). Scores for general academic self-efficacy range from minimum 30 to maximum 120, scores for the talent subscale ranges from minimum 15 to maximum 60, scores for the context subscale ranges from minimum 9 to maximum 36 and scores for the effort subscale range from minimum 6 to maximum 24. The reliability of the scale was Cronbach's alpha = 0.687. The reliability of subscales was: talent: Cronbach's alpha = 0.720, context: Cronbach's alpha = 0.601 and effort: Cronbach's alpha = 0.402.

Heteronomous evaluation of academic achievement (HAA) we measured by GPA in whole study subjects in the end of school year 2015/2016. In the Slovak Republic a student's achievements in individual subjects are measured using the following grades: 1 = excellent, 2 = very good, 3 = good, 4 = sufficient and 5 = poor/unsatisfactory, while the final evaluation in a given subject included in the school report at the end of each school year results from an average of many grades given regularly in relation with achieved results (a teacher can take/takes into account also attributes other than only marks given during the school year). The resulting GPA reflects an average academic achievement calculated on the basis of all end-year grades at a school report (minimum 1, maximum 5).

Autonomous evaluation of academic achievement (AAA) we measured by perceived self-evaluation of academic achievement (expressed by self-perceived quality level of knowledge and skill in whole study subjects in end of school year 2015/2016). The adolescents subjectively rated their success at school at 6-point scale: from excellent to absolutely unsatisfactory. The score for AAA ranges from minimum 1 to maximum 6. The scale was developed by the authors of research study.

Approach to learning (two main scales: deep – DA and surface – SA) we measured by The Revised Study Process Questionnaire (R-SPQ-2F [47], Slovak version [43], four subscales: deep motive (DM), deep strategy (DS), surface motive (SM) and surface strategy (SS). Each of the subscales consisted of five items. The final version of the questionnaire therefore has two main scales deep approach (DA) and surface approach (SA) with four subscales. It is rated on a 5-point Likert scale (1 = never, 2 = occasionally, 3 = sometimes, 4 = usually and 5 = always). The score for the deep approach to learning ranges from minimum 10 to maximum 50, the score for the deep motive subscale ranges from minimum 5 to maximum 25, the score for the deep strategy subscale ranges from minimum 5 to maximum 25, the score for the surface approach to learning ranges from minimum 10 to maximum 50, the score for the surface motive subscale ranges from minimum 5 to maximum 25 and the score for the surface strategy subscale ranges from minimum 5 to maximum 25. The reliability of main scales was: deep approach: Cronbach's alpha = 0.658, surface approach to learning: Cronbach's alpha = 0.683. The reliability of subscales was: deep motive: Cronbach's alpha = 0.616, deep strategy: Cronbach's alpha = 0.567, surface motive: Cronbach's alpha = 0.549 and surface strategy: Cronbach's alpha = 0.548.

For identification of significance of the relationship between research variables, we used Pearson's correlation coefficient. For identification of significant relationship between a dependent variable (HAA, AAA) and independent variables (predictors), we used linear regression analysis. The statistical significance criterion for our research study is 5% ($p \leq 0.05$). For all data analysis, we used Statistical Package for the Social Sciences (SPSS 20.0).

3. Research findings

3.1. Academic self-efficacy, approach to learning, heteronomous and autonomous evaluation of academic achievement: descriptive statistics and correlation analysis

The basic descriptive indicators of all variables considered in our study are presented in **Table 1**.

On the basis of the identified mean of the ASE, we have found out that adolescents in our study achieved a higher academic self-efficacy than the median of this variable is (also talent and effort). In the research variable deep approach to learning is the mean value below the median (also deep motive and deep strategy); for the surface approach to learning the mean value is almost equal to median (also surface motive and surface strategy). Academic achievements evaluated by teachers (HAA) and by adolescents (AAA) are better than the median for the both variables is.

From the perspective of academic self-efficacy (ASE) and its factors (talent, context and effort), we have identified significant relations between this variable and (**Table 2**):

N = 457	Min.	Max.	Mean	Std. Dev.	Med.*
Academic self-efficacy (ASE)	36	106	61.23	7.69	75
Talent (ASE-T)	15	60	29.50	5.73	37.50
Context (ASE-C)	15	36	23.99	3.29	22.50
Effort (ASE-E)	6	12	7.73	1.44	13
Deep approach to learning (DA)	10	45	27.33	5.78	30
Deep motive (DM)	5	24	14.13	3.33	15
Deep strategy (DS)	5	22	13.20	3.08	15
Surface approach to learning (SA)	13	47	30.91	5.49	30
Surface motive (SM)	5	23	15.29	3.18	15
Surface strategy (SS)	7	25	15.61	3.18	15
Heteronomous academic achievement (HAA)	1	2.75	1.57	0.43	3
Autonomous evaluation of academic achievement (AAA)	1	6	2.36	0.86	3.5

*Median as quantile value of variable in research method.

Table 1. Academic self-efficacy, approach to learning strategy, heteronomous and autonomous academic achievement: descriptive statistics.

- Deep approach to learning ($p < 0.001$), and from the perspective of individual factors combined in the deep approach to learning among adolescents (deep motive and deep strategy), both these factors significantly correlate with ASE, talent and effort. We have recorded no significant correlation with the context factor. We have identified that the higher academic self-efficacy an adolescent has, the more he or she applies the deep approach to learning.
- Heteronomous evaluation of academic achievement ($p < 0.001$), and all three factors combined in the academic self-efficacy (talent, context, effort) strongly correlate with HAA. We have observed that the higher academic self-efficacy an adolescent has, the better the results of his or her education expressed in GPA at the end of a school year are.
- Autonomous evaluation of academic achievement ($p < 0.001$), and all three factors combined in the academic self-efficacy (talent, context and effort) strongly correlate with AAA. We thus conclude that the higher the academic self-efficacy of an adolescent is, the better the subjective evaluation of achieved academic results, based on assessment of acquired information, skills and competences in individual subject, is as well (they perceive a significantly greater set of information, skills and competences in a given school year).

When it comes to mutual relations of the heteronomous evaluation of academic achievement (GPA), we have found out that it significantly correlates, in addition to academic self-efficacy (and its three factors: talent, context and effort), also with other variables (the only exception is the surface strategy subscale), while the better is the assessment of a student at the end of a school year (as expressed in GPA), the more a student prefers the deep approach to learning (including both factors: deep motive and deep strategy) and the less he or she prefers the surface approach to learning (with factors only at the level of surface motive).

N = 457		ASE	Talent	Context	Effort	DA	DM	DS	SA	SM	SS	HAA	AAA
ASE	Pearson	—											
	Sig.	—											
Talent	Pearson	0.885***	—										
	Sig.	0.000	—										
Context	Pearson	0.547***	0.131**	—									
	Sig.	0.000	0.005	—									
Effort	Pearson	0.568***	0.448***	0.110*	—								
	Sig.	0.000	0.000	0.019	—								
DA	Pearson	−0.285***	−0.263***	−0.078	−0.300***	—							
	Sig.	0.000	0.000	0.097	0.000	—							
DM	Pearson	−0.375***	−0.368***	−0.086	−0.340***	0.910***	—						
	Sig.	0.000	0.000	0.067	0.000	0.000	—						
DS	Pearson	−0.130**	−0.095*	−0.053	−0.196***	0.894***	0.629***	—					
	Sig.	0.005	0.042	0.256	0.000	0.000	0.000	—					
SA	Pearson	0.016	0.016	−0.004	0.028	−0.307***	−0.255***	−0.301***	—				
	Sig.	0.739	0.729	0.930	0.548	0.000	0.000	0.000	—				
SM	Pearson	0.042	0.024	0.012	0.104*	−0.346***	−0.277***	−0.350***	0.862***	—			
	Sig.	0.368	0.612	0.805	0.026	0.000	0.000	0.000	0.000	—			
SS	Pearson	−0.015	0.004	−0.019	−0.055	−0.184***	−0.163***	−0.170***	0.863***	0.489***	—		
	Sig.	0.746	0.928	0.691	0.238	0.000	0.000	0.000	0.000	0.000	—		
HAA	Pearson	0.406***	0.402***	0.132**	0.267***	−0.161**	−0.176***	−0.113*	0.143**	0.171***	0.076	—	
	Sig.	0.000	0.000	0.005	0.000	0.001	0.000	0.016	0.002	0.000	0.106	—	
AAA	Pearson	0.426***	0.451***	0.109*	0.230***	−0.171***	−0.201***	−0.103*	0.105*	0.097*	0.084	0.671***	—
	Sig.	0.000	0.000	0.020	0.000	0.000	0.000	0.027	0.025	0.037	0.073	0.000	—

*p < 0.05.
**p < 0.01.
***p < 0.001.

Table 2. Academic self-efficacy, learning strategy and academic achievement: correlation analysis.

Within the analysis of mutual relations between heteronomous evaluation of academic achievement and autonomous evaluation of academic achievement we have identified a significant correlation ($p < 0.001$).

3.2. Academic self-efficacy and learning strategy as predictors of heteronomous academic achievement

In the first step of our research we determined participants' heteronomous evaluation of academic achievement by the academic self-efficacy (and factors of ASE), deep approach to learning (and factors of DA) and surface approach to learning (and factors of SA) as our independent variables. All independent variables are included into the presage factors in students '3P' model of teaching and learning [47]. We note that these independent variables are not all "internal" factors on the side of a student which influence learning and education process, but our intention is to identify their predictive effect to heteronomous (in second step autonomous) evaluation of academic achievement of adolescents.

Findings focused on the academic self-efficacy (ASE) and factors of ASE as predictors of heteronomous evaluation of academic achievement are shown in **Table 3**. We found out that a student's academic self-efficacy significantly predicts the heteronomous evaluation of academic achievement, variance in factors of ASE shows that only two factors: talent and effort are meaningful predictors. Academic self-efficacy explains 16.5% of the variability of heteronomous evaluation of academic achievement.

Findings related to preferred deep approach to learning (and factors of DA: deep motive and deep strategy) as a predictor of heteronomous evaluation of academic achievement are shown in **Table 4**. We note that preferred deep approach to learning significantly predicts the heteronomous evaluation of academic achievement (variance in factors of DA shows that only one factor: deep motive is a meaningful predictor). But the deep approach to learning explains only 2.6% of the variability of heteronomous evaluation of academic achievement.

According to **Table 5**, we identified that the preferred surface approach to learning significantly predicts the heteronomous evaluation of academic achievement (variance in factors of SA shows that only one factor: surface motive is a meaningful predictor). But the surface

Variable	R	R^2	F	B	Beta	t
ASE	0.406	0.165	89.770^{***}	0.023	0.406	9.475^{***}
ASE: Talent	0.420	0.177	32.395^{***}	0.026	0.346	7.219^{***}
ASE: Context				0.010	0.075	1.738
ASE: Effort				0.031	0.104	2.180^{*}

$^{*}p < 0.05$.
$^{**}p < 0.01$.
$^{***}p < 0.001$.

Table 3. Academic self-efficacy (and factors of ASE) as predictor of heteronomous evaluation of academic achievement (HAA).

approach to learning explains only 2.0% of the variability of heteronomous evaluation of academic achievement.

3.3. Academic self-efficacy, learning strategy and heteronomous evaluation of academic achievement as predictors of autonomous academic achievement

In the second step of our research we determined participants' autonomous evaluation of academic achievement by the academic self-efficacy (and factors of ASE), approach to learning (deep and surface and factors of DA and SA) and heteronomous evaluation of academic of achievement.

Findings related to academic self-efficacy and factors of ASE as predictors of autonomous evaluation of academic achievement are shown in **Table 6**. We found out that a student's academic self-efficacy significantly predicts the autonomous evaluation of academic achievement. Academic self-efficacy explains 18.2% of the variability of autonomous evaluation of academic achievement. Variance in factors of ASE shows that only one factor: talent is a meaningful predictor.

On the base of findings represented in **Table 7**, we note that preferred deep approach to learning significantly predicts the autonomous evaluation of academic achievement (variance in factors of DA shows that only one factor: deep motive is a meaningful predictor). The deep approach to learning explains only 2.9% of the variability of autonomous evaluation of academic achievement.

Variable	R	R^2	F	B	Beta	t
DA	0.161	0.026	12.139***	−0.012	0.003	−3.484***
DM	0.176	0.031	7.256***	−0.022	−0.174	−2.928**
DS				0.000	−0.003	−0.052

*p < 0.05.
**p < 0.01.
***p < 0.001.

Table 4. Deep approach to learning (and factors of DA) as predictor of heteronomous evaluation of academic achievement (HAA).

Variable	R	R^2	F	B	Beta	t
SA	0.143	0.020	9.511**	0.011	0.143	3.084**
SM	0.172	0.029	6.892***	0.024	0.177	3.333***
SS				−0.001	−0.011	−0.202

*p < 0.05.
**p < 0.01.
***p < 0.001.

Table 5. Surface approach to learning (and factors of SA) as predictor of heteronomous evaluation of academic achievement (HAA) regression analysis.

According to research findings in **Table 8**, we identified that preferred surface approach to learning significantly predicts the heteronomous evaluation of academic achievement, but the surface approach to learning explains only 1.1% of the variability of autonomous evaluation of academic achievement.

Findings related to heteronomous evaluation of academic achievement as a predictor of autonomous evaluation of academic achievement are shown in **Table 9**. The heteronomous evaluation of academic achievement (the average of the marks, rating by teachers, in all subjects in the end-year report: as GPA) is a strong predictor of the autonomous evaluation of academic achievement. The heteronomous evaluation of academic achievement explains 45.00% of the variability of autonomous evaluation of academic achievement. The final model tested through individual steps of impact of independent variables of our research on the autonomous evaluation

Variable	R	R^2	F	B	Beta	t
ASE	0.426	0.182	100.919***	.048	0.426	10.046***
ASE: Talent	0.455	0.207	39.437***	0.065	0.431	9.165***
ASE: Context				0.013	0.049	1.162
ASE: Effort				0.019	0.032	0.681

*p < 0.05.
**p < 0.01.
***p < 0.001.

Table 6. Academic self-efficacy (and factors of ASE) as predictor of autonomous academic achievement (AAA).

Variable	R	R^2	F	B	Beta	t
DA	0.171	0.029	13.688***	−0.026	−0.171	−3.700***
DM	0.203	0.041	9.793***	−0.059	−0.225	−3.810***
DS				0.011	0.038	0.646

*p < 0.05.
**p < 0.01.
***p < 0.001.

Table 7. Deep approach to learning (and factors of DA) as predictor of autonomous academic achievement (AAA).

Variable	R	R^2	F	B	Beta	t
SA	0.105	0.011	5.082*	0.017	0.105	2.254*
SM	0.106	0.011	2.577	0.020	0.074	1.384
SS				0.013	0.048	0.893

*p < 0.05.
**p < 0.01.
***p < 0.001.

Table 8. Surface approach to learning (and factors of SA) as predictor of autonomous academic achievement (AAA).

of academic achievement is presented in **Table 10**. The academic self-efficacy of adolescents and the heteronomous evaluation of academic achievement by teachers were shown as best/strongest predictors of autonomous evaluation of academic achievement.

In the last step of our research, we determined participants' academic self-efficacy (and factors of ASE) by autonomous academic achievement of the academic as our independent variable.

The autonomous evaluation of academic achievement is a strong predictor of the academic self-efficacy of students in adolescence (and all factors of ASE, too, **Table 11**). The autonomous

Variable	R	R^2	F	B	Beta	t
AAA	0.671	0.450	371.694***	1.352	0.671	19.279***

*p < 0.05.
**p < 0.01.
***p < 0.001.

Table 9. Heteronomous evaluation of academic achievement (HAA) as predictor of autonomous academic achievement (AAA).

	Variable	R	R^2	F	B	Beta	t
Step 1	ASE	0.426	0.182	100.919***	0.048	0.426	10.046***
Step 2	ASE	0.438	0.192	35.812***	0.047	0.418	9.453***
	DA				−0.004	−0.024	−0.512
	SA				0.014	0.091	2.050*
Step 3	ASE	0.692	.479	103.732***	0.020	0.179	4.642***
	DA				−0.003	−0.021	−0.558
	SA				0.002	0.011	0.307
	HAA				1.196	0.593	15.771***

*p < 0.05.
**p < 0.01.
***p < 0.001.

Table 10. Autonomous academic achievement (dependent variable): final model.

Variable	R	R^2	F	B	Beta	t
ASE	0.426	0.182	100.919***	3.782	0.426	10.046***
ASE: talent	0.451	0.204	116.423***	2.985	0.451	10.790***
ASE: context	0.109	0.012	5.486*	0.416	0.109	2.342*
ASE: effort	0.230	0.053	25.427***	0.382	0.230	5.042***

*p < 0.05.
**p < 0.01.
***p < 0.001.

Table 11. Autonomous academic achievement (AAA) as predictor of academic self-efficacy (ASE, factors of ASE).

evaluation of academic achievement explains 18.2% of the variability of academic self-efficacy of adolescents.

4. Discussion and conclusion

Figure 1 presents a model of impact of academic self-efficacy and approach to learning on heteronomous or autonomous assessment of academic achievement we have developed based on results of our research. In this study, we have identified mutual relations between variables (relying on the model by Biggs et al. [47]) and impacts of selected educational factors depending on a student (namely an academic self-efficacy of a student and an approach to learning he or she prefers) on the academic achievement which, in our opinion, should be perceived from two perspectives: heteronomous evaluation of academic achievement and autonomous evaluation of academic achievement. We assumed that heteronomous evaluation expressed in grades given by a teacher/teachers as a consequence of achieved learning results significantly affects the autonomous evaluation of academic achievement (expressed in a student's own beliefs about knowledge, skills or competences acquired during the school year taking into account own assessment, priorities and objectives associated with learning and education).

Our assumption about the correlation between all examined variables was confirmed in accordance with the model by Biggs et al. [47], and our findings also confirm conclusions of studies performed by Floyd et al. [45]. The only exception was a characterological variable of "presage students factors": surface approach to learning, where we observed no significant correlation with the academic self-efficacy. Looking for mutual relations of the academic self-efficacy (and its subscales) and preferred approach to learning (deep and surface and their respective

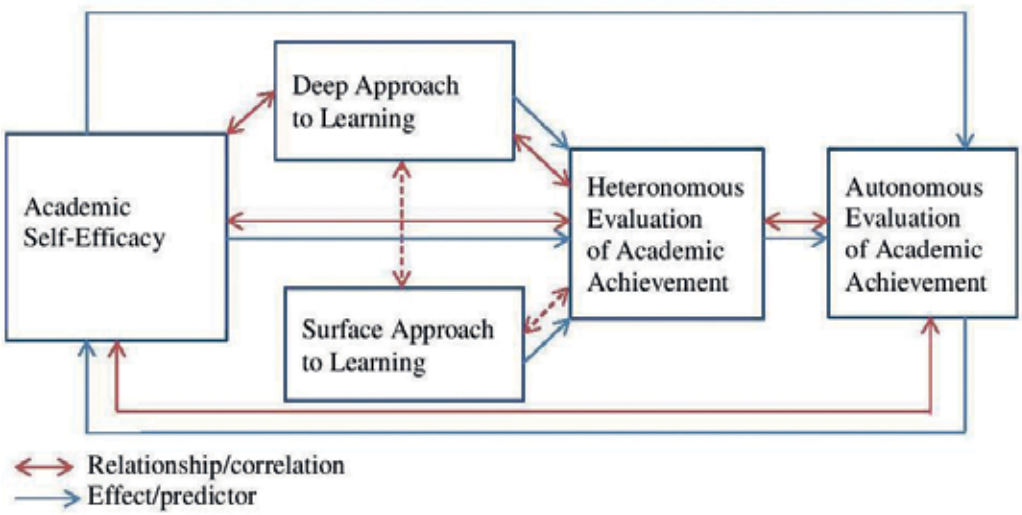

Figure 1. Model of impact of academic self-efficacy, approach to learning on heteronomous and autonomous evaluation of academic achievement of adolescents.

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subscales related to motivation and strategy: except for the surface strategy subscale) with academic achievement (heteronomous and autonomous) we have reported significant correlations. We are convinced that verified relations between academic self-efficacy, approach to learning and academic achievement are important for health cognitive functions of adolescents and promote health behaviour (similarly [2, 16, 19, 29]).

In relation to the variables that constitute a group of the so-called presage students factors we have identified that both academic self-efficacy and preferred approach to learning (deep or surface) are significant predictors of heteronomous evaluation of academic achievement, as evaluated from the outside: that is the output evaluation of academic achievements in learning subjects with a grade provided by teachers on a school certificate at the end of each school year. The conclusion that academic self-efficacy influences academic achievement was confirmed also by numerous other researchers [16, 20, 21].

We have recorded a significant predicative correlation of heteronomous evaluation of academic achievement (measured by GPA) on autonomous evaluation of academic achievement that serves as an expression of students' perception of acquired knowledge, skills and competences within school subjects (their educational progress). Furthermore, we have found out that autonomous evaluation of academic achievement is a significant predictor of academic self-efficacy: and the more positively students evaluate the level of acquired knowledge, skills and competences, the higher their academic self-efficacy is. Similarly, Stankov [54] also concludes that there is a real difference between our actual ability to solve problems in a study (study subjects) and what we think our ability level in a particular domain is. People also think that they are good (self-concept) in some study subject (e.g., in English) and they are bad in other (e.g., in mathematics) and may be afraid (anxious) when solving problems in the study subject in which are bad. When shown bad study subject problems our self-efficacy is also affected to some extent by what we believe our strengths and weaknesses are and by our previous experiences with similar problems. Obviously, what we believe about ourselves does matter when we are engaged in academic pursuits and it may play an important role in, for example, the selection of the academic discipline for study and in career choice. Self-confidence is related to our self-beliefs and it is also related to cognitive performance.

The implication is that researchers and teachers should be looking for students beliefs about their educational capabilities, because they are important components of motivation and of academic achievement. Based on our research findings as well as on a previously published study [10], we conclude that when students believe in their success in a given school subject (e.g., Slovak language, English language, Mathematics or any other subject) or generally believe in their good academic achievements, they demonstrate high levels of academic self-efficacy. The self-efficacy beliefs are important as through them the learning processes, motivations, passion and selectiveness regulates the individual's use in different areas [55]. An important factor, however, in this process is the heteronomous evaluation by a teacher that affects autonomous evaluation of academic achievement on a student's side as a part of his or her metacognition process.

A teacher plays an important role in providing opportunities for students to be successful. Our study implies that the impact of educational factors depending on a student, particularly the

factor of academic self-efficacy of a student and the selection of preferred approach to learning combined with heteronomous and autonomous evaluation contributes to the general school success. Each teacher who provides a student with heteronomous evaluation should take into account that this evaluation significantly affects both student's autonomous evaluation and his or her self-efficacy. Therefore, a teacher should not focus on failures of a student or areas, where a student does not excel and should not stress them in his or her evaluation. Such assessment decreases self-evaluation related to academic achievement, leads to lower self-efficacy perceived by a student and thus creates a kind of vicious circle. A teacher providing heteronomous evaluation should concentrate primarily on a student's strengths, stimulate his or her development and highlight individual and personal potential of a student followed by positive feedback, evaluation and praise. As a consequence a teacher should act with a view to increase a student's self-efficacy and work on enhancing his or her self-confidence. A positive evaluation by a teacher stimulates also better autonomous evaluation of a student's own achievements, which, in turn, positively influences high academic self-efficacy. Furthermore, the high academic self-efficacy results in preferences for deep approach to learning. Through this mechanism a student is more successful in school. This is, therefore, a single dynamic complex of impacts of factors that result in school success of adolescents. We believe that a positive gradation of this dynamic complex that constitutes a part of the general school success of adolescents is a foundation of a student's deep faith in his or her own strengths. This, in turn, significantly affects student's further professional orientation and predetermines his or her future choices.

5. Limitations

We realise that the limit for full generalisation of research findings is that the research sample was not a random sample. The participation of the students in adolescent age in the research was voluntary. On the other side we administrated research methods in 18 high schools in all regions of Slovakia and only 3 addressed students did not participate in the research. The limit for the in-depth analysis of descriptive indicators of our research is that research methods are used experimentally in Slovakia and there are no relevant norms for the Slovak population of adolescents. On the other hand we find out good reliability of used research methods.

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Chapter 12

From Comfort Zone to Reality: A Community Engagement to Enhance Student's Academic Performance

Welcome Mswazi Kubeka

Additional information is available at the end of the chapter

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Abstract

The involvement of universities in communities is not a new phenomenon, as they have been known to engage their surrounding communities by expanding knowledge beyond the institutional confinements. This paper reports on the feedback received from the learners detailing their perceptions of the community engagement work done by the UJ Learning Development through academic study skills workshops to improve the learners' academic performance. A quantitative approach was used to collect data by means of a feedback questionnaire. The feedback questionnaire was divided into two parts, namely, the biographical details of the participants and the participants' perceptions of the academic study skills workshops they had attended. The questionnaire was administered to a target population of 302 learners at Ikamva Youth (Ivory Park and Ebony Park branches). Sixty participants were randomly selected from both grade 10 and grade 11 strata; in the last stratum, all the thirty grade 12 participants were considered. The main findings are that the majority of participants indicated that they do apply the skills learnt from the workshops while learning material and content from other subjects. They also indicated that their academic performance had improved from the time they started applying the study skills.

Keywords: community engagement, academic performance, study skills, study habits, integrated and embedded skills

1. Introduction

Community engagement is one of the pillars of the vision of the University of Johannesburg (UJ) as a transformed higher education institution. The involvement of universities in communities

is not a new phenomenon since they have been known in engaging with their communities by expanding knowledge beyond the confinement of institutions. Osman and Peterson [1] state that universities should move away from their ivory tower image to engage the communities in order to promote academic programmes, which are responsive to the needs of the surrounding communities. UJ articulated its community engagement in terms of service learning, community-based research, organised outreach and experiential learning. According to the relevant UJ Policy [2], these community engagement initiatives are clarified as follows:

- Service learning—a form of community engagement, which entails teaching and learning, which is directed at specific community needs, is curriculated and awards academic credits to students [2].
- Community-based research—a form of community engagement that focuses on research projects in order to make a significant contribution to a community in the form of services, products and/or new knowledge and skills transfer.
- Organised outreach—activities, which are organised by the students or employees of the institution and conducted outside the academic programmes, with the purpose of addressing the interests and needs of the communities [2].
- Experiential learning—a process and a method of education through types of learning activities, which afford the students an opportunity to engage directly with the phenomenon being studied and to reflect on the experience of such engagement.

For the purpose of this paper, the concept of community engagement was used to encompass all the forms mentioned above. The University of Johannesburg sees community engagement as initiatives and processes in which the knowledge capital and resources of the institution are utilised in partnerships with the community in order to address the development needs of the target community [2]. Such initiatives and processes are offered to the interest groups by the institution with no financial request [2].

Ikamva Youth (IY) is a non-profit organisation (NPO) established in 2003 with branches in five provinces in South Africa. It operates in the Western Cape, Gauteng, KwaZulu-Natal, North-West and Eastern Cape. This NPO focuses on learners from disadvantaged communities with the sole purpose of equipping them with the knowledge, skills, networks and resources needed to access tertiary education and/or potential opportunities of employment after matriculation [3]. It is aimed at increasing the population's skill level, growing the national knowledge base and replicating the success of this programme in other communities [3]. The learners enrol at IY when they are promoted to grades between 9 and 12 [4]. The number of grade 12 learners, who can access higher education institutions and/or employment-based learning opportunities after matriculation, is a factor, which determines the success of the programme [3, 4, 43].

The IY model draws its volunteers from a growing pool of students from the nearby universities and professionals from local companies [4]. Its sustainability is driven by former learners studying at the surrounding institutions of higher education, who return to the organisation to offer tutoring [4]. This model provides the additional advantage of allowing former IY learners to be agents of change and transition from beneficiary to benefactor [3]. In South

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Africa, the majority of youth encounter several socioeconomic obstacles, which perpetuate disadvantage and exacerbate the situation in most township and informal settlements, where schools produce substandard academic performance for most learners. The IY offers seven programmes, namely, supplementary tutoring; homework sessions; career guidance; mentoring; computer literacy and access; media, image and expression; and health and leadership [3]. The organisation comprises three branches in the Gauteng Province, respectively, in Midrand, Ebony Park and Ivory Park. It also has a branch in Mamelodi, City of Tshwane.

UJ launched this partnership with both Ivory Park and Ebony Park branches of Ikamva Youth as a contribution to efforts geared towards addressing the needs of the twenty-first century youth by empowering the learners in these centres with academic study skills. A detailed schedule was developed, and an agreement was entered into with the coordinators of the two branches to facilitate study skills workshops, such as setting goals, time management, note making and examination preparation strategies for the grade 10–12 students on weekends (Saturdays).

In South Africa, a great deal of studies have been conducted on community engagement, but few locally based studies have been conducted on how the acquisition of academic study skills could contribute to learner academic performance. The study conducted by Garikai [5] concluded that the determinant of academic performance for students is a factor of variables such as the distance travelled to school, student gender, age, language spoken at home, education status of parents and nutrition levels.

The research question, which guided the research design and the qualitative analysis, is as follows: What are the learners' perceptions of the contribution of academic study skills towards their academic performance. The purpose of this paper is to report on the feedback received from the learners in order to positively influence or improve future community engagement initiatives.

2. Literature review

The Higher Education Quality Committee (HEQC) of South Africa defines community engagement as an initiative and process through which the expertise of institutions in the areas of teaching and research is applied to address issues relevant to the communities [6]. Community engagement finds expression varying forms, ranging from informal and relatively unstructured activities to formal and structured academic programmes addressing particular needs [6]. According to Wright et al. [7], community engagement is a collaboration between institutions of higher education and their larger communities for mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity. The definition of community engagement as provided by Dharamsi et al. [8] describes activities undertaken with community members, which result in greater social responsibility towards and awareness of the needs of vulnerable populations. In the South African context, the vulnerable people can be said to be those who are less disadvantaged and residing in black townships and informal settlements.

There is a great deal of potential through community engagement due to its ability to create and sustain change for the greater good [9]. As a result, it is imperative to develop community engagement programmes, which will benefit the disadvantaged communities at large. Sustainable community engagement relationships should be built with these communities.

In this paper, the concept of study habits encompasses subtopics such as study attitudes, study methods and study skills. The following is a brief description of the concepts study habits, study attitudes, study methods and study skills:

- Study habits denote the degree to which the student engages in regular acts of studying characterised by appropriate study routines occurring in an environment, which is conducive to studying [10]. Whereas [11] see study habits as learning tendencies, which enable students to work privately.
- Study attitudes according to [12] refer to predispositions, which students have developed towards private reading, with time, and offer great possibilities for successful achievement in studies.
- Study method is the knowledge and application of effective study skills or techniques by students [10].
- Study skills are the potential for action, while study behaviours are the action [13].

For the purpose of this study, the focus is on study skills. Different studies have been conducted on the correlation of study habits and academic achievement. A study conducted by Anwar [14] found that the academic achievement of the students with good study habits differed significantly from those with bad habits. Another study conducted by Tinto [15] also found that good study habit was associated with high-level academic achievement and that boys had better study habits than girls. In their studies, [16] also found that day scholars have better study habits than hostel dwellers, while female students have more concentration span, better study habits and higher academic achievement than their male counterparts.

The notion of 'one size fits all' is no longer applicable as far as learner academic study skills development is concerned due to the learning style diversity. There are various approaches to the development of academic study skills, including:

- Embedding, where there is no direct reference to the development of transferable skills, and the emphasis is solely on the development of technical 'know-how'.
- Bolt on, in which skills are developed independently from the core discipline to enable the explicit development of the students' transferable skills.
- Integrated academic study skills are developed and taught explicitly within the core discipline with an emphasis on the technical abilities of the learners to apply the transferable skills [17].

If the provision of skills development is to incorporate knowledge and understanding, analysis, creativity and evaluation, then integrating academic study skills into learners study

material is the only viable option [18]. Cottrell [19] argues that learning development and skills enhancement do not thrive, when they are divorced from the students' overall teaching and learning experience. Furthermore, Burns and Sinfield [20] are of the opinion that, for skills teaching to be effective, it must be well anchored and contextualised within the subject specialism. These points are also supported by [21], who argues that students benefit from the integration of learning development strategies into their core curriculum; hence embedding skills ensure that there is a meaningful application in students' relevant subjects. Study skills may be most beneficial when instruction occurs within the content area classroom [22].

In this study, the researcher integrated the study skills into learners' content areas by applying [23] the following principles: (a) modelling the strategy, (b) explaining why the strategy works, (c) showing how the strategy may be used in other contexts and (d) providing opportunities for practice. For instance, in the workshop session on 'note making', the researcher taught the learners the skill of making their notes in various ways, including mind mapping and annotating. In these instances, the researcher used the students' study material and provided them with an opportunity to practice these skills. This is in line with the views that teaching active note making to students may enable them to gain a voice and take ownership of ideas and concepts in powerful ways [20, 24].

As indicated, though the knowledge and application of effective study skills and study behaviours have long been associated with overall academic achievement, these skills and behaviours often need to be explicitly taught to students [25]. Some authors argue that when taught to students, the following academic skills can improve their academic performance in several ways:

- Goal setting—goals direct the student's attention to the task. They also keep the student focused. Goals increase persistence [26].
- Time management—students will be able to manage their time wisely and overcome procrastination and not wait until the last minute to work. They will also be able to prioritise tasks and time [27].
- Note making—students will be able to find the main idea of a passage [28].
- Examination preparation—the students will develop an awareness of the types of questions often used in examination papers, which will help them to prepare adequately.

The partnership with the Ikamva Youth (Ivory Park and Ebony Park branches) is based on Freire's [29] theoretical framework, which stipulates that dialogue is the primordial concept and a point of departure from which an examination of the process of achieving authentic partnership can be conducted. In a dialogue approach, everyone participates as equals. It is based on the understanding that the designed academic study skills schedule intended for learners was a negotiated agreement with all partners involved.

This study is also based on Tintos' theory of student departure, which emphasises that the key to college students' persistence resides in the integration of both the students' academic performance and their social lives [15, 42]. In cases where students are unable to connect

with other academic or social subsystems, there is a highly likelihood that such students may leave the institution [14]. In expanding this theory during the Regional Symposia on Student Success held in South Africa, Tinto stated that access to higher education without support is not opportunity. Tinto further mentioned that any improvement in the student success rates requires intentional and structured action, which is systematic and coordinated in nature and involves many people across campus [30].

3. Research methodology

The study used a quantitative approach, and data was collected through a feedback questionnaire or form. Part one of the feedback questionnaire gathered data on learner's biographical details, including gender, age and grade. Part two of the feedback questionnaire requested learners to:

- Indicate the workshops they have attended.
- Indicate which skills they have applied among those that they had learnt in the workshops.
- Indicate if their academic performance has improved from the moment they started applying the skills learnt in the workshop.
- Give their views on the workshops.

The feedback questionnaire was administered to a target population of 302 learners at Ikamva Youth (Ivory Park and Ebony Park branches). Before administering the feedback questionnaire to the sample, a pilot study was conducted with a selected number of students who do not form part of the target population, in order to measure its quality and appropriateness, and redesign it for clarity. This pilot sample of students did not experience any difficulties in understanding the questions.

A stratified random sampling technique was used to select the sample in such a way that identified subgroups (according to grades) were represented in the sample [31]. Sixty participants were randomly selected from the grade 10 and grade 11 stratum, except for the last stratum (grade 12 learners), where only thirty respondents were represented. There were therefore 150 randomly selected participants in total (50% of the total population of 302).

According to Opie [32] ethics has to do with the prevention of any harm or wrongdoing against others and the promotion of good faith, respect and fairness. The anonymity of all participants was upheld in the data collection instrument, and the researcher informed the respondents that they could withdraw participation at any time without penalty and that their information would remain confidential. Since the participants' were minors, consent forms were completed and signed by their parents or guardians, who gave permission for the learners' participation. Permission to conduct the study was also granted by the Ikamva Youth (Ebony Park and Ivory Park branches).

4. Results and discussions

This section presents the participants' biographical detail as well as their perceptions about the contribution of academic study skills towards their academic performance. Part one (biographical information) and part two (three closed-ended questions) are presented descriptively in the form of frequencies count, percentages and mean. The open-ended question in part two was qualitatively presented.

Part one: biographical information presentation

The profiles of the participants in terms of gender, current grades and their ages are presented below.

The data presented in **Table 1** shows that most learners who participated in this study are females (57%) and the males (43%) are few. These results are in line with the fact that there are more females than males in South Africa. Fifty percent of the respondents are in grade 11, and only 10% are in grade 12. The profile of the respondents also shows that the majority (53%) of them are within the age of 14 and 16 years. The concern is that some of the participants are above the age of 19 years (7%). In South Africa, learners are expected to start their basic schooling at the age of seven in order to complete their final grade 12 at the age of 18 [33].

Part two: Learners' results on the workshops

In part two, three (3) closed-ended questions and one (1) open-ended question were asked.

4.1. Close-ended questions

The purpose of Question 1 in **Table 2** was to determine the workshops that each of the participants attended. The following are the close-ended question results:

The participants' responses in **Table 2** show that the least attended workshop session was on goal setting (16%). This signifies that learners are not aware that goals are the building blocks

Biographical variable	Description	Frequency	Percentage
Gender	Male	131	43
	Female	171	57
Learners' grades	10	120	40
	11	152	50
	12	30	10
Participants' ages	14–16 years	160	53
	17–18 years	122	40
	19 years and more	20	7

Table 1. Biographical details of the participants.

Question 1: Which of the following workshops have you attended?				
Workshop	**Frequency**	**Percentage**	**Mean**	**Remarks**
Goal setting	24	16	6	Accepted
Time management	34	23	8.5	Accepted
Note making	32	21	8	Accepted
Examination preparations	60	40	15	Accepted
Total	**150**	**100**		

Table 2. Indication of the workshops attended by the participants. Mean ≥ 2.50 is accepted and Mean < 2.50 is rejected.

of success and learning, as they may assist a learner to stay focused and accomplish his/her personal and academic desires. Locke and Latham [26] state that goals direct our attention to the task at hand. The researcher is also of the opinion that goals are guides for action and may serve as a source of motivation.

The data also shows that participants are struggling with time management, the second workshop with the least attendance (21%). Time management is one of the most determinant factors of student academic success. The researcher has the opinion that unnecessary disruptions such as being in the company of friends all the time could be avoided if learners were able to allocate sufficient and realistic time to study. One of the benefits that learners will enjoy when they are able to manage their time will be being able to overcome procrastination and avoid waiting until the last minute [27]. The highest attended workshop session was on examination preparation with 40% of participants. The researcher has the opinion that if learners are well prepared for examinations, they will be able to manage the feelings of anxiety and tension, which learners normally experience before and after examinations.

Authors such as Turner et al. [34] posit that examination anxiety and tension could lead to the development of interfering thoughts, which could undermine a learners' ability to recall previously learned material and prevent learners from focusing on the examination tasks at hand. Deb et al. [35] confirm that the association between examination-related anxiety and tension with psychiatric problems. He notes that because the coping abilities of learners vary from one learner to another, learners with poor coping capabilities become prone to anxiety and fear of academic failure. The two models, which explain the negative effects of anxiety, are the Interference model and the learning deficit model. According to Sansgiry et al. [36], in the interference model, anxious learners are distracted due to task irrelevant to and negative thoughts about examinations, whereas the learning deficit model proposes that it is the learners' ineffective study habits during examination preparation that causes high levels of anxiety.

Question two in **Table 3** was asked in order to find out if the learners are applying the skills learned during the workshops in their respective learning subjects.

The results presented in **Table 3** give rise to a concern that most participants' indicated to have applied the skills learnt in two of the workshops sessions, namely, examination preparation (45%) and time management (27%). The concern is based on the researchers' opinion that

Question 2: Which of the skills you learnt in the workshop have you applied?				
Workshop	**Frequency**	**Percentage**	**Mean**	**Remarks**
Goal setting	18	12	4.5	Accepted
Time management	40	27	10	Accepted
Note making	24	16	6	Accepted
Examination preparations	68	45	15	Accepted
Total	**150**	**100**		

Table 3. Application of the skills learned. Mean ≥ 2.50 is accepted and Mean < 2.50 is rejected.

the application of all the presented academic study skills by learners in their learning content contributes to positive academic success. The researcher's position is supported by [24], who argues that the knowledge and application of effective study skill and study behaviours have long been associated with overall academic achievement. These effective study skills and study behaviours, however, often need to be taught explicitly to students.

The purpose of Question 3 in **Table 4** was to determine whether the participants' performance has improved from the time they started applying the skills learnt in the workshops.

Table 4 shows that the majority (87%) of the participants are of the opinion that their academic performance has improved because they applied the skills learned in the workshops in their academic work. The researcher agrees with the assumption that because learner academic performance is a factor of various variables, other academic support inputs could be added as a contributory factor. In his study, Garikai [5] concluded that the determinant factor of academic performance for students is a factor of variables such as the distance travelled to school, age of students, sex, language spoken at home, education status of parents and nutrition levels. This is summarised in this empirical model, which stipulated as, PERF = f {AGE, SEX, DIST, LANG, PARENT, NUTR}. In as much as empirical studies show that learners' academic performance is a factor of various variables, the researcher concluded based on the positive feedback given by the learners who participated in this academic support sessions that academic support also contributed to their academic performance. Hence, it is justifiable for the researcher to argue that this empirical model can be expanded to include academic support (AS), to read as, PERF = f {AGE, SEX, DIST, LANG, PARENT, NUTR, AS}.

Question 3: Has your academic performance improved since applying the skills learned in the workshops?				
Scale	**Frequency**	**Percentage**	**Mean**	**Remarks**
Yes	130	87	65	Acceptable
No	20	13	10	Acceptable
Total	**150**	**100**		

Table 4. Indication of learners' academic improvement. Mean ≥ 2.50 is accepted and Mean < 2.50 is rejected.

Embedding academic study skills in the learners learning content may also contribute positively to their academic performance. It is against this background that [19] posits that skill enhancement initiatives do not thrive if they are divorced from the students' overall teaching and learning experience. Hence, for skills teaching to be effective, it must be well anchored and contextualised within the subject. The researcher is also of the opinion that students who possess strong academic study skills are likely to achieve academically.

4.2. Open-ended questions

The researcher used the following procedures in analysing the open-ended question responses.

After collecting the data gathered from the participants, the researcher organised and worked to make sense of the data in three stages, namely, data condensation, data display and draw conclusion [37].

Stage 1: data condensation

According to Miles and Huberman [37], data condensation is a process through which data is selected, summarised, labelled and coded. Data condensation enabled the researcher to select the data chunks to code and labels, which are suitable for the data, developing categories and themes in the process. As a researcher, I read, further read and re-read the transcripts until the data have been fully absorbed.

Thereafter, the data was coded manually. Saldanha [38] argues that manual coding is regarded as a precoding strategy which is suitable for novice coders.

Stage 2: data display

Data was displayed to indicate the relationship between concepts and coded information.

Stage *3: draw conclusion*

Based on the themes that emerged, conclusions were drawn to interpret the respondents' responses.

The themes that emerged based on the participants' responses are presented below verbatim, namely:

Theme 1: ability to manage time

The participants' responses foregrounded time management as one of the most important skills. The participants were able to see the benefits of managing time, as shown in the following responses: '… this workshops help us a lot because now I can manage my time'. Another participant added '… they helped me a lot and now I know that I should be committed in my school work and avoid to waste my time with friend…'. Another participant stated, 'they do help, but the problem is that I am just being lazy and I do not do my school work on time …'.

It can be seen from these responses that the participants' perceptions of the workshops are that they are beneficial and can help them use their time wisely. This is supported by Bailey and Onwuegbuzie [27] who confirm that the benefit of time management is that learners will know how to prioritise time.

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Theme 2: confidence in taking examinations

Another theme that emerged from the data is 'confidence in taking examinations'. The participants' responses indicate that exam preparation is also a crucial academic study skill, which learners should be taught. From the verbatim responses from some of the participants' responses, there is a perception from participants that one of the benefits of examination preparations is that it could boost their confidence in taking examination. One of the participants stated, 'the workshop have helped me with the method on how to approach exams'. Another participant indicated that 'when answering questions in the exams … I did not panic so I make less mistakes'. Sharing their positive views about this workshops, another participant pointed out that 'I have gained a lot and helped during exams … I would like if one day this workshop to be done at my school'. This later participant indicated that he/she would appreciate if this kind of workshops could be extended to his/her school, given that the participants at this NPO (Ikamva Youth) were from various secondary schools around Ebony Park and Ivory Park areas.

Theme 3: improvements in academic performance

Many researchers have indicated that teaching academic study skills by integrating and embedding these study skills into their curriculum may contribute to learners' academic success. Authors such as Bloxham [21] are of the opinion that study skills are most beneficial when instruction occurs within the content area classroom. Integrating academic study skills into the learners' study material is the only viable option, and for skills teaching to be effective, it must be well anchored and contextualised within the subject specialism [18, 19]. In line with assertions, one participant pointed out, 'Since I have attended the workshop I have improved my history'. Another participant said 'I think I have learnt more and I have improved even my marks in mathematics have improved … I have applied these skills and they are working'. Another participant further emphasised, 'they are inspiring, pity my marks have changed a bit'. Lastly, another participant said, 'it has impacted on my studies positively … I would like to attend again'.

It can be inferred that there is a positive correlation between the learners' academic improvement and their self-perception. Self-perception according to [39] is an awareness and perception about oneself in achievement situations. Bong and Skaalvik [40] define self-concept as students' overall feelings of doing well or poorly in a given subject area. In this study, self-perception and self-concept are used interchangeably. In the same vein, [41] opined that learners with high academic self-perception outperform their counterparts academically and master their schoolwork with ease.

5. Conclusions

This study sets out to determine whether the academic study skills workshops offered at IY contributed to academic achievement. The empirical evidence gather in the study showed that the least attended workshops by the learners were goal setting, time management and note making. Even though time management was one of the least attended workshops, the respondents' perception in this regard is positive, as some of the learners claimed to have seen the benefits of using their times wisely. The results showed that learners' academic performance

could improve with appropriate academic support. Study skills workshops can minimise student failure rates, especially when students take advantage of the learning opportunities offered to them. Though this study showed that the results of the majority of the learners have improved as a result of the workshops, several other learners have not applied the study skills learned from goal setting and note making workshops.

Finally, the results of this study mean that in order for academic study skills to contribute to learners' academic performance, they should be integrated and embedded in learners' subject content.

6. Recommendation

This study recommends that attendance and participation into the academic study skills should be made mandatory for all the learners at the Ikamva Youth in both Ebony Park and Ivory Park branches. This will ensure that all learners benefit enormously from this programme.

7. Limitations of the study

- This study focused only on the learners who attend the Ikamva Youth (Ebony Park and Ivory Park branches) programmes, whereas learners who are doing similar grades in the neighbouring secondary schools were not considered.
- Again, the study was not able to test other variables, which may be contributing to the academic performance of learners, specifically supplementary tutoring which is one of the programmes offered at Ikamva Youth (Ivory Park and Ebony Park branches).

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Chapter 13

Physical Activity Practice, Sleeping Habits and Academic Achievement

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Additional information is available at the end of the chapter

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Abstract

There is a wide body of research that has identified the strong links between health behaviors and academic achievement. The media and official agencies strive to convey to schoolchildren and the public the need to show healthy lifestyles. However, it is striking that sleep habits have been considered in few occasions within healthy behaviors to be developed and promoted. Schools should encourage their students to be active because the effect of physical exercise will promote sleep and will positively affect the performance of academic tasks. Then, it is necessary to revitalize and establish the subject of Physical Education and Sport practice properly where the students can meet a minimum of 150 minutes of moderate-to-vigorous exercise per week. This approach will have a direct impact on the school children's performance and health. Therefore, the key question is to decide whether educational centers must promote active lifestyles where sleep and exercise will be promoting or maintain schools where the body and body intelligence remain an irrelevant matter.

Keywords: academic performance, health, childhood, adolescence, sleep habits, exercise

1. Introduction

Many variables impinge on college students' academic success. What do children and adolescents need to be academically successful? How children's and adolescent's health is related to academic achievement? Are physical activity practice and sleep habits components of children's and adolescent's health? Moreover, how these components affect the academic performance? are some of the key questions that this chapter tries to account for.

The available research has reported that increasing the physical activity practice is beneficial for children's and adolescent's health and education [1–4]. Thus, schools must focus their

attention on implementing physical activity interventions (e.g., increasing the number of physical education hours per week) with the aim to improve the pupils' health as well as to reduce the obesity levels among adolescents. Nevertheless, the physical education is considered a second layer in the educational process due to the concern of educative policies about reaching the adequate standards of academic achievements among students. Then, the educative policies establish the reduction and, in some cases, the elimination of physical education classes. The traditional education research considers that pupils should employ the time studying the theoretical subjects instead on spending time doing physical activities [5–9].

However, the recent research supports that physical activity practice is related with improvements in cognitive and memory functions of the brain [10]. In fact, the increase of physical activity may improve the school performance and academic achievements in children and adolescents [11]. For instance, it seems to exist a positive relationship between motor competence (achieved through physical activity practice) and academic performance [12]. Specifically, in the female students, the academic achievement was associated with the practice of vigorous physical activity, whereas in male students the academic achievement was associated with a greater extent with fitness [13]. Overall, the evidence supports that the practice of physical activity leads to improvements on both cognitive and academic performance [14, 15].

On the other hand, regular sleep is fundamental on health and growth of children and adolescents. Thus, the lack of sleep and sleep deprivation is associated with adverse physical and psychological consequences. The scientific research indicates that a good sleep quality is not only fundamental in determining a good health state, but it is also a main component for a good quality of life and academic performance [16]. For instance, it has been found that children and teenagers who suffer from circadian misalignment (i.e., insufficient sleep during the weekdays and oversleeping on weekends) have a lower academic, cognitive and sport performance than those who rest more regularly and with better sleep quality [3].

1.1. Health and education

There are a lot of researches that have showed the strong links between health behaviors, psychosocial behaviors and academic achievement [17]. International organizations, such as the World Health Organization, in their different proposals have stressed the need for schools to be the core of health promotion, which should be translated into curricular improvements proposed to develop healthy habits, and the involvement of families and social agents to support these initiatives. The objective is the development of skills and competences that favor the health of students and a better adaptation to life [18].

At present, studies that have analyzed the relationships between healthy behaviors and academic performance have increased markedly. However, what is referenced when talking about health and healthy behaviors? Health is a state of complete emotional and physical well-being. This concept during the school age has been focused on those who favor good nutrition; do not use tobacco, alcohol or drugs; do not show violent behaviors; practice safe sex and do not practice physical activity [19].

The media and official agencies strive to convey to schoolchildren and the public the need to show healthy lifestyles. As was pointed out by Sánchez [20], the effectiveness of these messages is determined, at least partially, by the direct cost and benefits of these behaviors to citizens. According to the results obtained, their effectiveness is put into question due to the obesity and sedentary pandemic situation in Western societies among the youngest [21]; increased consume of tobacco, alcohol and drugs among adolescents [22, 23]; increased cases of violence and bullying in schools [24, 25]; the increase of pregnant adolescents [17] or the increase of sedentarism of children and adolescents from different cultural backgrounds [26]. These issues affect the lives of children and adolescents and, therefore, have an impact on the decline of their academic performance [27]. It is striking that sleep habits have been considered in few occasions within healthy behaviors to be developed and promoted [27, 28]. In fact, it is well known that adolescents, who sleep less than 7 hours daily, have a higher risk of fail and drop out [29].

In sum, the scientific research has studied the main aspects of this chapter (i.e., physical activity, sleeping habits and academic achievement) in isolated conditions. However, there are few reviews of available research that relate either physical activity or academic achievement or sleep habits with physical activity practices or sleep habits with academic achievement [27]. Thus, the purpose of this chapter was to describe the relationships among these three variables and specifically how to practice physical activity and how sleep well affect the academic achievement of students throughout their academic life. Three areas of scientific literature have been analyzed to allow a better understanding of this problem: (i) literature about the relationships between physical activity practice and academic achievement; (ii) literature dealing with the relationships between sleep habits and academic achievement and (iii) literature reporting the effects of physical activity practice and sleep well on the health and academic achievement.

2. Physical activity and academic achievement

During the past 10 years, the effect of physical activity on academic achievement has become a more important topic with a growing number of scientific works published about this issue [30, 31]. Throughout this section, we (i) discuss the influence of physical activity upon academic achievement; (ii) analyze which psychophysiological effects of physical activity support that association and (iii) raise some recommendations of physical practice when aiming to improve the academic achievement. The academic performance can reflect several factors influencing the school success. For instance, Rasberry et al. [32] employed three categories: (a) cognitive skills and attitudes, (b) academic behaviors and (c) academic achievement. In this section, we focus our attention on the academic achievement defined as the test scores in subjects such as mathematics, reading, language art, social sciences and any other formal assessment regarding school areas or subjects.

2.1. More studying and less doing sports?

At a first glance, parents are concerned about the academic achievement of their children. Then, they may think that the involvement in physical activities could hamper the forthcoming

academic achievement, given that physical activity practice involves a great deal of effort and time. Hence, the time that boys and girls spend practicing physical activity results in a reduction of time dedicated to academic activities (i.e., studying, doing homework, reading, etc.). However, this does not seem to be applied to extracurricular activities like sports or extracurricular physical education. The scientific research has provided consistent evidence that time away from the sedentary study in favor of physical activities does not decrease the academic achievement [33, 34]. Some studies have proved that an increase for the amount of time dedicated towards physical activities (such as physical education or sport-related activities) does not impair the academic performance [35]. Furthermore, even when redistributing curriculum time in favor of aerobic physical activities, far from hinder, it improves the academic achievement of children [36]. Regarding the effort-demanding argument, one might think that the involvement in sports trainings could also lead to fatigue among children and adolescents. In fact, sedentary time (contrary to sports-related activities) is related to lower scores in academic tests (reading fluency, reading comprehension, arithmetic) [37]. Indeed, time spending for watching TV, playing videogames or interacting with mobile devices and social networks hinder the academic achievement [32]. In sum, scientific literature points towards a positive association between physical activity involvement and academic achievement among students from 4 to 18 years.

2.2. Physical activity and academic performance

2.2.1. Cross-sectional studies

A first group of cross-sectional studies informs about relationships of physical activity habits with the academic scores [38]. In this sense, self-reported time spent on physical activity is directly related (and screen time inversely) to higher scores among children aged between 11 and 18 years [39, 40]. Another research employing objectively measured tests has also found positive relationships between physical activity and academic achievement. For instance, the work by Dwyer et al. [41], which involved 7961 participants from 7 to 15 years, informed how academic achievement (5-point scale) was positively related (in all ages and in both sex) with cardiorespiratory endurance (i.e., 1.6 km run), muscular force (e.g., sit-ups) and time of physical activity. In another study where physical activity was monitored, lower academic performance (all domains: language, reading, spelling, writing and numeracy) was strongly related to higher levels of sedentary time among children (9–11 years old). In contrast, moderate-to-vigorous physical activity was related with writing and numeracy scores. Haapala et al. [42] reported that pupil between 6 and 8 years showed positive relationships between levels of physical activities (measured with accelerometers) and reading and arithmetic skills. Interestingly, the combination of lower levels of moderate-to-vigorous physical activity with high sedentary time was related to poorer reading skills (fluency and comprehension) in boys.

In another similar study, clear associations between moderate-to-vigorous physical activity and academic performance were not found among 10-year-old children [43]. In addition, academic achievement was positively correlated to both aerobic fitness (i.e., intermittent running field test) and motor skills measured with a battery of three test (i.e., catching with one hand, throwing at a wall target and shuttle run test). Along these lines, motor skill performance

seems to be directly related to academic achievement. For instance, poorer motor performance (i.e., shuttle run, balance and box and block tests) was associated with worse academic reading and arithmetic skills in children (6–8 years). More recently, Ruiz et al. [44] explored the relationships between academic achievements (expressed as the final mark of the participants across the academic year, in a 10-based scale) and the motor coordination (Test SportComp of motor coordination [45]) among youth students (11–16 years old). Their results showed weak, but consistent, positive relationships between 4 of 5 motor coordination tests and academic performances.

2.2.2. Longitudinal and intervention studies

Other studies have been focused on the effect of intervention in physical activity on academic achievement and/or that relationship across the time. For instance, Bezold et al. [46] published a vast longitudinal study with 83,111 children enrolled in grades 6–8 in the first year of the study. For 5 years, fitness scores (determined by three tests: aerobic capacity, pushup and curl-up tests) and academic performance (measured following Mathematics and English Language Arts test scores) were monitored. Both boys and girls who experienced a substantial increase in fitness resulted in an improvement in academic ranking by 0.36–0.38 percentiles compared with the reference group. In addition, in boys and girls, a substantial decrease in fitness was associated with significant decline in academic performance compared with the reference group. Then, pupils who increase their fitness also improved their academic achievement, whereas pupils who decreased their fitness worsened their scores. In another longitudinal study [47], the physical activity of fifth and seventh grade children was assessed (i.e., aerobic capacity, upper body strength and endurance, body composition, abdominal strength and endurance, flexibility and trunk extensor strength and flexibility) to detect children in the healthy fitness zone or children in the needs improvement zone. After 2 years, pupils who stayed in the healthy fitness zone had higher scores (in all academic domains: mathematics, reading, science and social studies) than those who remained in the needs improvement zone. The children who moved between healthy fitness zone and needs improvement zone (in any direction) obtained in between academic scores, indicating a longitudinal effect of fitness on academic achievement.

Donnelly et al. [48] carried out an intervention of 90 minutes of moderate-to-vigorous physical activity for 2 years with children from grades second and third. Children who received the intervention experimented improvements in all the academic domains: reading, composite, mathematics and spelling scores across the 3 years' baseline with respect to control schools. Other studies have investigated the effect of increasing physical activity among school-aged children. Despite some contradictory results [27, 49], the systematic review of intervention studies supports that physical activity is positively associate with the academic achievement [50].

2.2.3. Meta-analysis and systematic reviews

Stronger evidence of the benefits of physical activity on academic achievement arises from systematic reviews and meta-analyses [31, 32, 51–57]. In this sense, one of the first meta-analysis about cognitive functions reported a 0.25 of average effect size of physical activity cognitive functions [51]. Another meta-analysis [50] found that chronic physical activity interventions

had a significant small-to-moderate effect on cognition (effect size of 0.46) in youth (school age). Also, positive effects of physical activity interventions on cognition were identified when compared to no treatment (0.80). Other study [51], focused on secondary school (13–18 years old), revealed that most of the studies reviewed showed positive associations between moderate-to-vigorous physical activity and academic performance. Likewise, it has been reported that physical activity (all the types analyzed: resistance/circuit training, physical education programs, aerobic training), and regardless the methodology of study, has a significant effect (average of effect size of 0.32) on cognitive functions (measured as perceptual skills, academic readiness, achievement, math and verbal test) of school-aged children (aged 4–18 years).

A common concern expressed in the systematic reviews is the low methodological quality of part of the published works [41, 58]. Yet, when the risk of bias of existing studies is neatly assessed, positive associations between physical activity and academic achievement are found in all three cross-sectional, randomly controlled trials and longitudinal studies [47, 59]. In sum, a positive association between physical exercise programs and academic performance has been reported consistently by recent systematic reviews and meta-analyses [53].

2.3. Underlying processes of the effect of physical activity on academic achievement

As was previously seen, the available research has previously confirmed the plausible relationships between physical activity and the academic achievement. The next question to address would be what are the mediating factors among them? In other words, where does the effect of physical activity on academic achievement come from? To respond these questions, we consider the hypothetical model of factors proposed by Donnelly et al. [38] (**Figure 1**).

2.3.1. Cognitive functions

As Erickson et al. [60] claimed, higher fit and more active preadolescent children show more efficient patterns of brain activity and superior cognitive performance and scholastic achievement.

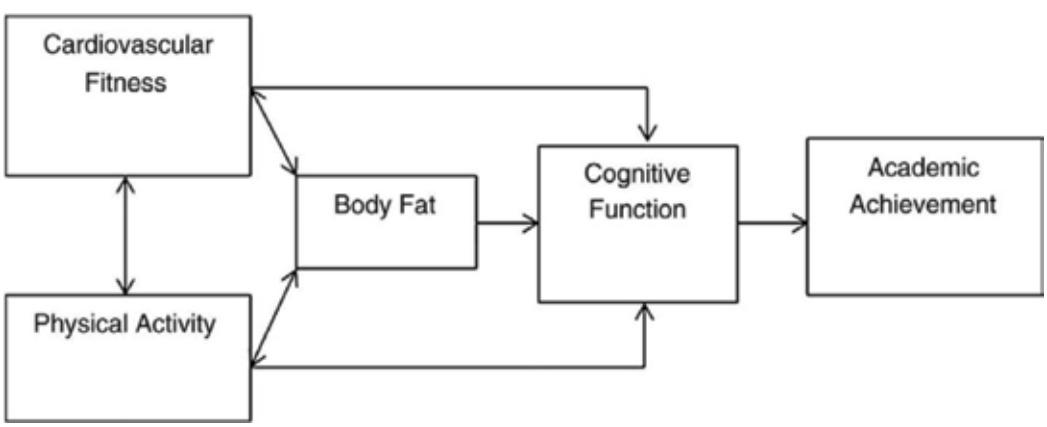

Figure 1. Hypothetical model of factors associated with improved academic achievement (from Donnelly and Lambourne [5]).

Several mechanisms underpin the effects of physical activity on cognitive functions during childhood and young adulthood: increased synaptic plasticity, cerebral circulation (blood volume), hippocampal neurogenesis, increases in neurochemicals (e.g., norepinephrine and dopamine), greater white matter integrity, upregulation of growth factors, efficiency of the prefrontal and parietal cortices and structural changes in the hippocampus and cerebellum [60–62]. These findings suggest that physical activity influences baseline electrocortical function and, thus, it might affect cognitive operations. In fact, a growing body of literature, including fMRI (functional magnetic resonance imaging) and ERP (event-related potential) studies, indicates that physical activity interventions produce improvements in brain function accompanied by improvements in executive functions [62].

For example, research indicates that when practicing moderate-to-vigorous aerobic exercises, prefrontal cortex and parietal/posterior cingulate cortex are activated to sustain the activity. These are relevant neural networks involved in complex cognitive functions, such as reading comprehension or mathematical calculations, which may support the positive relationships between both activities (i.e., physical and cognitive) [57]. More recently, neurophysiological-based studies pointed towards new connections between cognitive and motor functions, as the relationships of activation between prefrontal cortex and collateral cerebellum. This latter area is believed to play an important role not only in control and adaptation of movements but also in cognitive functions. In other words, improving the functioning of certain neural networks through physical exercise may benefit the academic performance.

2.3.2. Cardiovascular fitness

The review done by Chu et al. [63] highlighted positive associations between cardiorespiratory fitness and the academic achievement (total academic scores). Cardiorespiratory fitness has been consistently reported to exhibit a positive association with mathematics, social and science studies, spelling and language arts scores in both children and adolescents. Specifically, up to date, the available research is scarce when studying the relationships between cardiorespiratory adaptations and the academic achievement. For instance, cardiovascular performance (measured as maximal workload during cycloergometer exercise) does not seem to be associated with reading or arithmetic skills [64]. Another study supported the lack of relationship between cardiovascular capacity (heart rate) and the academic performance [65]. That is, cardiorespiratory fitness seems to improve the academic achievement by means of neurophysiological mediating effects rather than cardiorespiratory adaptations. For instance, children with higher cardiorespiratory fitness exhibited larger event-related brain potentials (ERBp), which are involved in neurocognitive process like cognitive operations [60]. Other associations among fitness measures like muscular strength, muscular endurance or flexibility with the academic achievement are unclear. They seem to have a positive relationship, but remains weak or unrelated when adjusted for potential mediators (i.e., socio-demographic factors, body mass index (BMI), etc.) [57, 60, 66].

Finally, the body of research suggests that other types of low-intensity trainings like practice motor skills may improve the cognitive performance. For instance, coordination training in adults (aimed to improve the efficiency of complex body movements) was associated with

better attentional control in visual search tasks [63]. The authors argued that those effects can be mediated by changes in brain functioning (i.e., frontal and parietal cortex), although research among children has not been conducted so far. In conclusion, positive relationships and associations between executive functions and physical activity have been found in terms of: (a) moderate-to-vigorous physical activity, (b) aerobic fitness and (c) motor skills [62].

2.3.3. Body fat

Obesity during school-age period has been proved to have detrimental effects on academic performance [5, 60]. However, high percentage of body fat does not hamper, by itself, the likelihood of academic success. In a recent study over 11,192 kindergartens, achievement scores were significantly lower in overweight children than in no overweight children in standardized tests of mathematics and reading. However, this association was no longer significant after the adjustment to race/ethnicity and socioeconomic status [9]. In another study upon 36,870 adolescents, it has been shown that physical activity can attenuate or even counteract negative association of fatness on academic achievement. In particular, fit adolescents (both high and low fatness) had higher odds for attaining high academic scores (in language and mathematics) than high fatness unfit counterparts. Also, low fatness adolescents were not more likely to reach higher scores in language than their high fatness fit peers [54]. Thus, physical activity seems to strongly mediate between obesity and academic achievement. Although the evidence of this mediator effect is limited, a promising research in this topic is envisaged [60]. Furthermore, as some researchers consider [67] that the association between elevated body mass index and decreased academic achievement was dependent on the extent to which obesity was stigmatized in the school.

3. Sleeping habits and health and human performance

Sleep constitutes a basic need, with durations between 8 and 9 hours depending on the age, that has direct effects on the human health and then on the human performances developed daily [68, 69]. The importance of this behavior is crucial in all the age stages, but with special relevance during childhood and adolescence [70]. The available research has widely investigated this issue under different perspectives such as healthy approaches, healthy programs, physiological needs, social influence, sleep and lifestyle, sleep disorders, sleep deprivation or sleep loss and academic performance [71–75]. The latest area has received greater analysis for children, adolescents, educators, parents and pediatrics due to the important effect on academic performances during the primary and secondary school and the university studies [71, 72, 76, 77]. The next sections of the chapter will try to go in depth about the key aspects that should be known and considered when studying the importance of sleep habits and health, the importance of sleep habits and academic performance in children and adolescents, the relationships between sleep habits and obesity and the importance of healthy programs to educate the children into positive sleep habits.

3.1. Sleep habits and health

Sleep is an active, repetitive and reversible state that promotes the development of physical, cognitive, affective and behavioral aspects. Sleep is necessary to maintain all the brain

functions affecting the good state of human memory, learning/memory capacity, the brain's optimal function or the neurobehavioral function [78–81]. Therefore, sleep habits are one of the most important daily routines that must be correctly done [82]. The absence, loss or deprivation of sleep has a direct effect on health problems [83–85]. However, when these disorders or inadequate sleep habits occur during the childhood or the adolescence, the academic performance and the physical and physiological development are highly compromised [86–88].

Nowadays, sleep loss is one of the problems that the people should face daily. Usually, it is preferable to sacrifice some of the time dedicated to sleep hoping that this time will not have a negative impact during our daily activities such as studying, working, etc. [83]. However, this behavior has a direct and negative effect on physical (fatigue), neurocognitive (impairment in learning and memory) and psychomotor performances (impairment in psychomotor activities) [89].

3.2. Sleep habits and academic performance in children and adolescents

Specifically, the importance of sleep loss increases during the childhood and the adolescence due to the important role that plays in learning capacity, school performance and memory consolidation [72, 73, 81]. During the school and college stages, the students cope with sleep problems, such as sleep deprivation or sleep restriction, which produces a poor sleep quality and then academic problems [73]. The specific literature refers to a mean of 9 hours per night of sleep as a good requirement; however, 45% of the students sleep less than 8 hours per night and around 20–50% considers that they have sleepiness during the day [77, 78, 80]. The reasons of this time sleep reduction can be an interaction of intrinsic (e.g., physical and physiological changes induced by the puberty) or extrinsic (e.g., school schedules, extracurricular activities, family lifestyle, etc.) factors that lead to go late to bed with the daily routines unchanged [90].

The consequence of this sleep loss is the sleepiness that the children and adolescents reflect during the day [68]. This fact reduces some neurobehavioral aspects of learning and memory, such as reduced alertness and decision-making, or difficulties when performing complex tasks (i.e., that require the use of the prefrontal cortex) during planning, integrative processes or abstract thinking [80, 91]. According to this rationale, the sleep loss appears during the stages from school to the university affecting the learning process and the academic performance in the different lessons (i.e., practice, laboratories, theory or exams) received by the students [84, 85, 88].

3.2.1. The importance of sleep-wake cycle and the delayed phase preference

The physiological explanations of sleep loss are the changes that occur during the sleep-wake cycle caused by going to bed late and waking up early in the morning. The sleep-wake cycle is composed of two opposing processes: the circadian rhythm (described as a natural clock synchronized with the external time and regulates the wakefulness) and the homeostatic drive for sleep (process that increases sleepiness with the accumulated time awake and decreases when sleeping) [79]. The changes of this cycle appear with greater intensity during the adolescence with changes in the students' chronotype due to the delayed phase preference [80]. This delay is not only social, cultural or psychological [79, 81] and is affected by biological

processes associated to the puberty (biological factors that slow down the circadian oscillation process and the homeostatic drive for sleep) [81]. The importance of sleep-wake cycle can be associated to the cognitive performance in youth students. Kirby et al. [69] explained that it depends on the time of the day where the accumulation of drive for sleep process increases or decreases the sleep pressure. This mainly occurs during the waking up hours, early in the morning, after eating or with a high sleep debt.

3.2.2. The relationships between sleep and learning-memory processes

As was previously described, the sleep-wake cycle modifies the cognitive performances according to the sleep loss. This process affects the learning and memory processes during the academic activities. Specifically, the memory can be divided into: (i) the procedural/non-declarative memory (i.e., knowing how to do a skill or solve a problem) that involves the visual, motor or verbal domains and is gained during the rapid eye movement (REM) sleep and (ii) the declarative memory (i.e., knowing that) that links to the related conscious collection of information and is restored in the no rapid eye movement (NREM) sleep. Both sleep phases (i.e., REM and NREM) are crucial for the learning and memory processes performed during the academic activities. Thus, the sleep deprivation or sleep loss is the great enemy for children and adolescent during the learning stages [65, 68].

In order to summarize the effects of sleep loss and the sleep-wake cycle on the academic performance, we can point out the following key issues [69]: (i) the attention and working memory are more affected by the circadian rhythm (synchronicity effects of optimal performance in specific moments of the day) than the procedural memory [69]; (ii) the optimal performances for executive functions are later in the day [86] and (iii) the sleep debt contributes to learning difficulties on concentration, memory, complex thinking or planning tasks [83]. Accordingly, the schedules established for schools, colleges and universities may impose an early starting time that impairs the students' abilities to perform at their best level due to their sleep loss and the sleep debts accumulated along the week [68].

3.2.3. Sleep loss and academic performance

The correlations between sleep loss and academic performance have been largely studied using self-reported surveys, grade point average (GPA), parents' or teachers' reports or the analysis of school behaviors [65, 68]. The main conclusion obtained in this research area is that the children's fatigue associated to poor sleep (i.e., quality of sleep) is the best predictor of lower school/college/university performances [70, 71, 73]. Thus, this fact shows a tendency of those students to fall asleep during school time, lose their concentration easily and not focus their attention on the relevant information. More specifically, during the sleep loss, the prefrontal cortex and its neural activity highly affect the divergent thinking, language speech, memory, decision-making, attention, mood, learning processes, critical thinking, creativity or performing complex tasks [66].

The available studies have showed this negative relationship between sleep and academic performance in primary and secondary schools [78] as well as at the university level [76]. The authors referred that the sleepiness produced by the poor quality of sleep impairs the above-mentioned,

learning, cognitive and neurobehavioral function [65, 68]. Regarding to this relationship, some factors should be controlled for when trying to identify the reasons of this sleep loss and then the poor performance. According to the scientific research [69, 70], some aspects may modify the sleep schedules in both the intrinsic and extrinsic factors. On the one hand, the intrinsic factors can be affected by the students' level of stress due to academic pressure [65, 72, 78] or close schedules [69, 75] that induce to a high-pressure level of tension, anxiety and feelings of stress that disrupt or modify the circadian rhythms [65, 81]. On the other hand, the extrinsic factors can be associated to the high number of hours after the school doing extracurricular activities [72, 73]; the social factors that modify the schedules such as the adolescent life, the campus life or love relationships [74, 76]; the use of afternoon naps [75]; the importance of time watching TV, internet or playing videogames [78]; the influence of the sleep debts during the course (e.g., more fatigue during the second semester) [75] or the weekday or weekend day routines (i.e., the weekend may make up the sleep lost accumulated during the week, but dramatic changes can occur in the sleep-wake cycle if the students increase dramatically the number of hours of sleep) [77].

In addition, the sleep behavior during the childhood and adolescence should maintain an adequate number of hours of sleep and good quality of sleep to avoid a chronic pattern of sleep that would have a negative impact on cognitive, performance, learning, neurobehavioral and mood aspects [73, 76].

3.2.4. Sleep loss and physical performance

The influence of sleep loss and physical/psychomotor performance has been studied in different contexts. When analyzing the psychomotor performance at the school, the studies [83, 84] did not report significant effects of sleep deprivation on motor performances of students. In fact, the only relative significant results were identified with more than 30 hours of sleep deprivation on endurance, agility, balance, strength and speed [83, 84]. However, if we consider the academic activities of physical education subject at the school, the number of hours per week and the intensity of its activities may explain the non-significant results due to the low impact performance developed during the lessons.

On the other hand, if we analyze the athletes' context, where they must perform at their highest level, the studies are showing an important effect of sleep loss and physical performance [87]. The athletes can only perform at their optimal level when the sleep habits are hygienic and favorable [87]. It is suggested that the athlete should sleep around 8–9 hours per night to recover and repair their tissues after trainings and competitions. To do so, both sleep phases (REM and NREM) must be covered to have the adequate psychological, hormonal (e.g., growth hormone secretion) and glucose metabolism processes [85]. Additionally, the sleep deprivation in athletes may result in an imbalance of the autonomous nervous system, the immune system and the cognitive function and then simulate the overtraining syndrome symptoms [88, 89]. In fact, sleep deprivation may create a disturbance of the athlete's sleep-wake cycle independent of the fatigue process suffered by trainings and competitions [85], suggesting that the athletes perform better the complex skills early in the day than gross motor skills (better performances late in the day) due to the circadian rhythm alertness [85, 89].

3.3. Sleep habits and obesity

One of the intriguing relationships of sleep habits and health is the research findings of sleep patterns and obesity. The scientific research has raised the importance of sedentary lifestyle in overweight and obesity. Insufficient sleep plays a critical role in children with overweight and predicts body mass index (BMI) when the students also do sedentary activities [92]. The mechanism associated to the lack of sleep is the level of hormones regulating the body appetite due to a decrease of leptin secretion and an increase of the ghrelin [92]. This mechanism creates an imbalance of both hormones increasing the feelings of hungry and the need to intake foods and then the incidence of overweight and obesity, coronary heart disease, type 2 diabetes or hypertension [73, 78, 92]. Additionally, this relationship appears to have another influence on obese/overweight student's physical growth, the reduction in height [73, 78, 92]. The main body of research of different countries [92] showed negative correlations between sleep deprivation and BMI and positive correlations with height [78, 92]. This result has a gender effect with female students having less sleep deprivation and environmental pressure than their male mates, reflecting a greater prevalence of obesity in male students with less sleep [92].

3.3.1. Sleep breathing disorders

Some studies also related the students facing with sleep breathing disorders, such as obstructive sleep apnea (OSA) or insomnia, to poor academic performances [65, 68]. These disorders include difficulties to maintain sleep, snoring, insomnia or waking up early in the morning. Then, these students have more problems to perform correctly at the school due to the sleep debt that limits the attention, working memory or learning processes [92]. In fact, these students need to have a nap to adjust their sleep requirements; however, this behavior modifies the sleep-wake cycle and then their neurocognitive and behavioral domains and the increase of BMI [65, 68, 92]. Therefore, from an educational point of view, the students with sleep breathing disorders should be considered when planning specific sleep educational programs.

4. Sleep and exercise well during the growing years

In this chapter, the associations of two health behaviors, such as physical activity and sleep habits with academic achievement of students, have been explored. This analysis allows us to state that there are many more relationships among them than could be thought in a first instance [27].

It should be said that if you want to lead a healthy and satisfying life, you should start sleeping well and practice physical activity. The lack of sleep is related to a whole set of diseases that are not conducive to the health of individuals independently of the age of the student. On the other hand, it has been widely demonstrated that good sleep is a key aspect to personal performance. The scientific research has demonstrated the relationships among sleep loss, academic outcomes and school drop-out in adolescent students. The exams encourage adolescents to significantly reduce sleep, drink energetic drinks [85] and adopt sedentary attitudes that may favor the possibility of higher levels of anxiety and stress on the students

reducing their performances. Indeed, if sleep is a vital element on the students' health, the regular practice of physical exercise is also a key factor. The scientific research has demonstrated that physical activity improves sleep and then the cardiovascular system, allowing to a better sleep quality. In addition, Flueckiger et al. [27] consider that sleep predicts better achievement than physical activity (i.e., students with higher overall sleep quality had better academic achievement).

Schools should encourage their students to be active and they should self-promote it for many reasons. Specifically, as has been widely commented, the effect of physical exercise will promote sleep and will have a direct impact on the performance of academic tasks. It is necessary to revitalize and put the Physical Education and Sports subject in the correct place that deserves during the school age [2, 12]. This approach requires that the students can have a minimum of 150 minutes of moderate-to-vigorous exercise per week, as this physical activity will have a direct impact on the performance of schoolchildren and their health. Marshall and Hardman [96] claimed that physical education is in a perilous position in all continental regions of the world. However, the problems of status, curricula, implementation, time allocation, financial support, human resources, teacher preparation and attitude of headteachers, parents and other teachers increase the skepticism about its future.

The key question is to decide: what do we need in the education of children and adolescents. Then, we must decide between two educational options, the first one focused on educational centers where active lifestyles are promoted, and sleep and exercise are present; or the second one focused on active schools in which the general behavior of their members is manifested in healthy behaviors and healthy attitudes, and active school environments, and that favor an embodied educational work and the performance of the students.

5. Concluding remarks

Based on this extensive body of research, some suggestions can be outlined to optimize the effect of physical activity and sleep habits on the academic achievement. Researches findings suggest positive benefits of physical activity throughout a wide range of academic ages, from kindergarten [11] until college [51, 93]. Scientific literature suggests uneven effects as a function of the age, remarking greater effect of physical activity on academic performance in primary school (6–13 years old) in comparison with adolescents (14–18 years old). Thus, students should be encouraged to practice physical activities in early periods of primary school to maximize the potential benefits over the academic achievement [55, 94].

The meta-analysis done by Fedewa and Ahn [95] examined different interventions on children's cognitive outcomes (mathematics, science, reading, English/language, art achievement, grade point average and intellectual quotient). The results showed that, unlike resistance/circuit training and their combinations, aerobic training, physical education program and perceptual motor training (in that order) significantly affected the academic achievement [46]. Other authors stated that there is still no clear evidence regarding which programs are more effective for cognitive performance. The aerobic and motor skills programs (both combined with cognitive engaging) seem to be the most efficient ones [31]. In the same terms, other studies confirm

that the aerobic capacity confers the greatest effect on academic achievement [47]. There is strong evidence that supports the positive association between both cardiorespiratory fitness and physical fitness (classified into clusters) with academic achievement, whereas the relationship between strength and flexibility remains unclear [59]. Regarding intensity, while there are some researches that relate the practice of moderate physical activity with positive academic benefits, the practice of vigorous and moderate-to-vigorous levels of physical activity has been found to provide greater positive effects on the academic achievement [14].

On the other hand, the frequency is a key issue when controlling for physical activity and academic performance. The effect of physical activity has been proved to report significantly higher benefits when provided three and two times per week (i.e., better improvements with a frequency of three times per week). Moreover, it has been identified a positive correlation between the improvement of academic performances and attending three or more physical education classes per week was positively correlated with improved academic school performances [96]. Accordingly, we highly recommend the practice of aerobic fitness and motor skills training, with a minimum intensity of moderate-to-vigorous and with a frequency of 3 days per week, as the optimal physical activity plan for enhancing academic achievement.

On the other hand, sleep hygiene programs can be implemented to improve the students' health and the effect of sleep quality on the academic performance. The educational stakeholders should implement the sleep hygiene programs focused on the importance of sleep habits and their relationships with academic performance [15, 30, 32, 40]. To do so, the families should establish balanced schedules that combine academic and leisure activities; the children/adolescents should establish a sleep pattern, going to bed early avoiding TV or leisure activities during the week nights and educators and pediatrics should give tips and feedbacks (e.g., avoid afternoon naps, restrict caffeine, do not go to bed immediately after high demanding exercise and sleep without excessive noise and light) for quality sleep advices with annual health examinations [15, 30, 32]. The implementation of these sleep programs would do more than be informative on the importance of sleep hygiene on health and academic performance [40]. It is necessary to teach schoolchildren to sleep well and promote a long-term perspective of the benefits of physical exercise. Therefore, schools should consider their schedules to adjust them to the moments of the day where greater academic and physical performance is possible [82].

Summarizing, the health-promoting school literature shows its potential to improve students' development, both academically and health related. The current chapter adds up to this effort by elaborating on the specific relations of sleep and exercise habits on the academic performance. There is another behavior that significantly affects the adolescents' psychosocial and academic development, such as bullying and compulsive internet use, and not just more traditional healthy topics with strong ties to physical health, such as smoking or alcohol use.

Unfortunately, much is still unknown about the effects that improving health behaviors might have on students' school performances. Indeed, it was justified the need for further research on this topic. Research on mechanisms behind the associations between these health behaviors and school performance is scarce and not conclusive. Therefore, further studies on the explanatory factors are required.

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Chapter 14

Physical Activity, Aerobic Fitness and Academic Achievement

Adilson Marques, Charles Hillman and Luís Sardinha

Additional information is available at the end of the chapter

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Abstract

There is a growing body of literature investigating the relationship between physical activity (PA) and cardiorespiratory fitness (CRF) with academic achievement (AA). This chapter presents new evidence on the relationship between PA, CRF and AA. Studies have shown no association or inconsistent association between objectively measured PA and AA. Nonetheless, despite inconsistent results, it may be concluded that, at a minimum, PA is not detrimental to AA. In comparison, results from studies employing self-reported PA have shown a positive association with AA. The results of these studies are more consistent with reports stemming from many different countries across the world. Similarly, CRF has also evidenced a positive association with AA, suggesting that increasing CRF is important for children and adolescents' health, and further cognitive development and AA. Thus, promoting PA and improving CRF are important for maximizing children and adolescents' health and AA. Because students spend much of their daily lives in school, school-based PA may result in improvements in AA.

Keywords: education, school-age children, academic performance, exercise

1. Introduction

Education is an elementary human right and an important factor of development. In most countries, school education is mandatory to ensure that children gain knowledge and competence to prepare for autonomous living in adulthood. Education must facilitate a healthy process, which includes preparation in the development of physical, cognitive and social abilities. Although education is of importance, merely being school-educated may not be enough for success. In an increasingly competitive society, it is important to have an early foundation for academic achievement (AA). AA is strongly linked with positive outcomes that are valued by

society, such as being admitted to university, stable and upwardly mobile employment and steady income. AA can be defined as the extent to which students achieved their short- or long-term outcomes. In school systems, AA is related with the acquisition of knowledge and competences in several or particular domains, such as literacy, science, numeracy, history, language, or even physical, among others.

Because AA is important, it is necessary to understand the factors that may relate and modify it. Among these factors are a complex interaction of socioeconomic status, family education, parental involvement and several other socio-demographic factors [1]. In spite of the complex interaction, health is an important moderating factor in students' capacity for learning and AA [2]. Healthy students learn better and several studies have supported that health behaviors are closely related with AA [3, 4]. Therefore, improving students' health has the potential to improve AA.

Health is associated with physical activity (PA) and cardiorespiratory fitness (CRF) [5]. Regular practice of PA and a healthy CRF in school-age children are associated with health benefits, including improved bone mineral density, cardiovascular risk profiles, cardiorespiratory and muscular fitness, mental and brain health and body composition [5]. In addition to the benefits on physical and mental health, studies in neuroscience have shown that PA and CRF are also related to brain structure and function, via thickness of gray matter in specific cortical regions and integrity of white matter tracts that support executive function [6], and through alterations in brain plasticity that change the structure of the neuron and strengthening its signaling capability [7]. PA and CRF also contribute to improve attention, memory and learning [8]. Accordingly, it is expected that this positive role of PA and CRF on brain structure, function, plasticity and cognition might translate to an improvement in AA [6].

Because of the importance of school education and AA in society, policy-makers and school administrators have increasingly eliminated opportunities for PA in order to make additional time available for formal didactic topics [9]. In reaction, researchers have investigated the relationship between PA, CRF and AA, based on the premise that PA and CRF are beneficial, or at the very least are not harmful, to AA. The research addressing PA and AA dates back to at least 1967, when researchers began studying the relationship between PA and AA in school-age children [10]. Since then, a growing body of literature has examined the relationship between PA and CRF with AA in children and adolescents [11, 12]. The aim of this chapter is to present new evidence of the relationship between PA, CRF and AA; as well as a basic understanding of the potential mechanisms underlying the relationship between health factors such as PA and CRF with learning and AA.

2. Physical activity and academic achievement

PA is a complex behavior that can be defined as any bodily movement produced by skeletal muscles that requires energy expenditure [13]. As a complex behavior, there are several methods to assess PA. The most common are objective measures and self-report measures.

In the process of PA data collection, self-reported measures tend to overestimate PA when compared with objective measures. On the other hand, objective measures fail to fully capture children's PA, and might not characterize the movement patterns of some activities [14]. As such, it is recommended that researchers are aware that PA values are often considerably different, and therefore the two different methodologies should be considered different constructs. Thus, by separating investigations of objectively measured PA and self-reported PA, associations with AA may be better understood and clarified.

2.1. Objectively measured physical activity and academic achievement

Most people, especially young people, are unable to reliably assess their PA levels [15]. Thus, the use of electronic devices to measure PA is prevailing the use of self-reported questionnaires and diaries. Among the electronic devices to objectively measure PA, pedometers and accelerometers are now widely used within the research community to conduct population-level studies to assess health and performance (note that these devices are also widely used by the general population given their integration into smart phones and watches). Such devices allow for accurate data collection in the research setting without the risk of self-report bias, but they lack the ability to provide information of the type or context of PA. For studies of the relationship between PA and AA, researchers have mainly favored accelerometers to develop a more complete picture of PA in the participant's normal environment [4, 16–18].

In the United States, LeBlanc et al. [19] carried out a study aimed at investigating whether PA, adiposity and AA were correlated. They reported that neither moderate-to-vigorous PA nor sedentary time were associated with AA across different academic courses. Other research by Lambourne et al. [20] with younger students evaluated how objective PA and CRF were related to AA. This study improved upon limitations of previous research by controlling demographic factors including socioeconomic variables and accounting for separate measures of PA and CRF. Neither PA nor CRF were associated directly with reading and spelling performance. However, PA was directly associated with mathematics achievement, as well as indirectly through CRF. This observation is consistent with research on the relation between PA and CRF as well as on the relation between CRF, cognitive function and AA [21]. A third study in the United States, aimed at evaluating linear or non-linear relations between PA/CRF and AA in three academic subject areas concluded that objective PA was not significantly correlated with AA, as described by linear or non-linear trajectories [16].

Results of studies from other countries further show no association or inconsistent associations between PA and AA. For example, a study with adolescent students in Sweden concluded that vigorous PA was associated with AA in girls, but not in boys [22]. This study suggests that there is a threshold level of PA required to produce positive effects on AA, and that higher levels of intensity meet this threshold. In Finland, a study that examined associations between objectively measured and self-reported PA observed that objectively measured PA is not associated with students' AA [23]. In Netherlands, another study provided null results [24]. Overall, no significant association was observed between objectively measure PA and AA.

More recently, similar results were observed by Pindus et al. [17] in the United States. No significant associations were found between moderate-to-vigorous PA and aspects of cognition that assessed inhibition and working memory, or AA. Furthermore, adjustments for CRF did not moderate the association between PA and either cognitive or AA outcomes. In Australia, Maher et al. [18] observed that AA was largely unrelated with moderate-to-vigorous PA, even when the analysis adjusted for potentially confounding socio-demographic factors. A weak but positive relationship was observed in specific domains of writing and numeracy. However, greater amounts of sedentary time were consistently, and more strongly, related to higher AA.

Apart from these results that have indicated null associations between objective PA and AA, there are several studies that suggest otherwise. Specifically, an intervention study in the United States, aimed at evaluating whether implementing curricular PA positively influenced students' reading and mathematics achievement noted that objectively measured PA enhanced cognitive outcomes [25]. Curricular PA had a positive effect on students' reading and mathematics scores. Results from the Avon Longitudinal Study of Parents and Children found that higher amounts of moderate-to-vigorous PA at 11 years old was associated with better AA across academic subjects at 13 and 16 years [26]. Given that most of the PA was characterized as light intensity, when considered in the analysis, higher intensity PA contributed to increased AA.

Perhaps the absence of a relationship between objectively measured PA and AA observed in many studies may be related with the fact that researchers do not distinguish between PA intensity levels. Most studies that failed to find a significant relationship did not separate moderate-to-vigorous PA, instead favoring total volume of PA regardless of intensity level [17, 18, 23, 24]. Furthermore, the inconsistency of findings in studies may also be explained by the procedures used to assess accelerometer data. For instance, PA was measured during seven consecutive days by Syvaoja et al. [23], whereas LeBlanc et al. [19] and Kwak et al. [22] measured PA for 3 and 4 days, respectively. Nonetheless, despite inconsistencies among studies, it can be concluded that PA is not detrimental to AA, suggesting that time spent engaged in PA does not detract from academic outcomes.

Summary: Results from literature showed inconsistent results for objectively measured PA. Thus, the relationship between objectively measured PA and AA is not yet conclusive, although it is generally accepted.

2.2. Self-report physical activity and academic achievement

Self-report PA is an indirect form of assessing PA, requiring individuals to subjectively recall their behaviors via structured interviews, journals or various (more structured) questionnaires. Most studies that examined the relationship between PA and AA used questionnaires, which is the most popular self-report method. However, although objective measures are more reliable [14], the devices to assess PA only capture the movement. Self-report instruments can capture the context and the behavior, which may be important to understand the complexity of PA behavior.

Similar to the general relationship observed between objectively measure PA and AA, there are some studies that did not report significant relationship between subjective PA and AA. For example, a study from the United Kingdom failed to observe a correlation between participation in PA and AA in secondary school students [27]. The authors recommended additional emphasis upon external factors, such as age, sex and type of school, since these factors might play a mediating role in the relationship. However, in an investigation with students from Hong Kong, a place in which AA and success are strongly emphasized, PA level was related neither to school conduct nor AA [28]. This study was particularly interested in understanding the role of gender in the relation of PA on AA. Boys with a higher level of PA demonstrated slightly lower school conduct grades, while more active girls received markedly poorer conduct grades. Culturally, physically active girls are seen as less well-behaved students than corresponding active boys [28]. However, despite PA being culturally related to negative school conduct, it did not affect AA. Two other studies, from Finland [29] and Iran [30] also demonstrated that self-reported PA engagement was not related to AA.

Although some studies demonstrate a null association between PA and AA, most studies that use self-reported PA have shown a positive association. The results of these studies are consistent and it is important to mention that the findings are disseminated from different countries, including Australia [31], Iceland [32], the United States [33, 34], Spain [35], South Korea [36], Finland [23, 37], Chile [38, 39] and China [40].

Most studies that analyze the association between PA and AA have employed cross-sectional designs, and as such causality of the observed relationships cannot be concluded. Therefore, researchers have recommended longitudinal studies to clarify the relationship between PA and AA [23]. One study, in the United States, was designed to determine the contribution of PA to AA from kindergarten to fifth grade [34]. Results showed that parent reported PA engagement of their children was significantly related with better AA among boys and girls. In another longitudinal study between third and fifth grades in Finland, Haapala et al. [37] observed that higher levels of PA during recess and physically active school transportation were associated with better reading fluency, and engagement in any organized sport was related to better arithmetic skills. Such findings suggest that certain types of PA improve AA among children. Furthermore, Haapala et al. [37] was the first study to reveal the direct association of PA during recess with AA. Nevertheless, the results of earlier studies suggest that PA during recess enhances attention, concentration and on-task behavior, which may improve AA in students [12]. The fact that PA was self-reported was helpful to acknowledge the context in which the PA occurs.

Although PA is positively related with AA in most studies [4], it is possible that too much time spent in PA may compete with homework time, becoming detrimental for AA. This was demonstrated in two different studies [23, 35]. Morales et al. [35], with a sample of Spanish students, observed a significant linear correlation between PA and AA. Results from a second-order polynomial regression showed that a certain amount of weekly PA might prove optimal for AA. More than the optimal amount may decrease AA. Results from a Korean study demonstrate that PA was positively correlated with AA; however, when students engaged in five or more times/week of PA the correlation was reversed [36]. A similar curvilinear relationship

between PA and AA was also demonstrated by Syvaoja et al. [23] in Finnish students. These results indicated that PA was positively related with AA, but some of the most active children spent time in PA at the expense of time devoted to homework, and thus having a negative effect on AA. It seems clear that for some students there is a trade-off between time spent engaged in PA and other activities more directly related to AA. Those activities may include doing homework and participating in extra-curricular activities.

The importance of intensity is also highlighted in self-reported PA research, similar to studies of objectively measured PA [22, 26]. PA enhanced AA, but higher measures of AA were observed for vigorous PA and team sports [33, 36]. Besides those findings, two studies from Chile showed that students who reported ≤2 h/week of PA had significantly lower AA than those reporting ≥4 h/week [38, 39]. Despite the results supporting the importance of higher PA intensity for AA, there is also evidence, at least in some contexts, that minimal-intensity PA, such as walking, is positively associated with AA [40].

Although there are studies that suggest a certain threshold of intensity [22, 26, 33, 36, 40] or time required for PA to have a productive effect on AA [38, 39], it is important to bear in mind that the main aims of PA promotion are to improve health and prevent chronic disease [41]. Improving AA should be considered among these outcomes. Thus, interpretations of dose-response relationship between PA and AA can be extremely complex because of the several factors that affect students' AA [38].

Summary: In general, studies report positive associations for the relationship between self-reported PA and AA. Results demonstrate that PA and AA have a curvilinear relationship. The most active children and adolescents sometimes practice PA at the expense of time devoted to homework, having a negative relationship with AA.

2.3. School-based physical activity and academic achievement

Even though the benefits of PA for children's health and the importance of physical education (PE) in increasing PA are well established, the allocation of PE time has been diminishing in recent years across several countries [9]. The reduction in PE time is mostly due to the pressures placed on children, parents and school administrators to improve AA, because there is a perception that time spent on non-academic courses, such as PE, has a negative impact on the children's AA [42]. Thus, the allocation of time toward PE and other PA opportunities in the school settings are being replaced with additional academic time in an effort to increase children's AA. Despite this trend, there is no evidence to indicate that AA improves if children's PA opportunities are minimized. In fact, there is a growing body of research focused on the association between school-based PA, including PE, and AA among school-aged youth [12, 43].

Results of cross-sectional studies support a beneficial relationship between PE or school-based PA and AA [44–46]. Such findings suggest that having more PE classes per week might positively correlate with AA. However, there are also findings that did not demonstrate any correlation between school-based PA and AA [47]. Although the results from this study were not significant, it is noteworthy that time spent in PE class did not negatively affect AA.

Two longitudinal studies, aimed at examined the association between time spent in PE and AA followed children for 5 years [34, 48]. The results of these studies were inconsistent regarding

the relationship between PE and AA. Carlson et al. [48] observed that girls with the highest exposure to PE (70–300 min/week), compared to those with the lowest exposure (0–35 min/week), showed benefits in AA. However, no association was observed between PE and AA among boys. Alternatively, in another investigation [34], PE was not significantly related to AA. It seems that PE as it is implemented in schools does not improve or impair AA. It may be related with the amount of time that students engage in PA, and the PA intensity in PE classes. Usually students' spend less than 50% of the class in moderate-to-vigorous PA in classes [49].

From intervention studies, a significant beneficial effect of PE or school-based PA on AA was observed [50–53]. Increasing the number and intensity of PE sessions had a positive effect on AA [50]. Two additional PA sessions designed to be engaging, enjoyable, health promoting and non-competitive improved children's AA [51], and two high intensity interval training sessions also improve cognitive and mental health among students [52]. In other interventions, no significant effect of the intervention was observed on AA [47, 54, 55]. About 10–15 min of class time devoted to PA, 90 min/week of active educational lessons or 55 min/week of PA across the curriculum did not increase AA, but also did not compromise it either [54, 55].

The positive association between PE and AA is of importance, because the reduction of PE time that has been observed [9], and the argument to support the decision to reduce PE time, is mostly based on the erroneous belief that reducing PE and increasing the other disciplines' allocation time will improve the students' AA. Although some studies did not show a significant association between school-based PA time and AA [34, 54], these studies indicated that PE and school-based PA did not significantly detract from AA.

In sum, there is evidence of a positive relationship of PE and school-based PA with AA. There is also evidence that increasing PE or school-based PA time had no deleterious effect on students' AA. Considering that education to foster AA typically takes place in sedentary environments, children spend a large amount of time sitting in classrooms to receive their education. This traditional learning model contributes to the reduction of PA opportunities at school. However, because PE and school-based PA may positively affect learning and AA, and may impact positively on many other important health outcomes (e.g. quality of life and body composition), there is a need to increase PA time at school. The increase in PA may contribute to improve AA and, naturally, will be important for enhancing children's PA levels, which is important for overall health and function.

Summary: In general, results from the literature suggest that PE and school-based PA are positively related to AA. Increased time spent in PE does not detract from AA even when less time is devoted to academic subject matter in favor of PA. PA breaks during standard classroom instruction also have favorable associations with attention, concentration, academic behaviors and AA.

2.4. Inconsistency between self-report and objectively measured physical activity

Overall, the observed results demonstrate a positive association between self-reported PA and AA across most studies, which is consistent with previous literature reviews in which most studies assessed PA through self-reported questionnaires [11, 56]. However, several studies

that objectively measured PA showed no relationship with AA. Perhaps the inconsistency between subjective and objective measures of PA in association with AA may be due to the difficulty of estimating one's overall PA. Objective measures may fail to fully capture children's PA, and might not characterize the movement patterns of some children. Self-reported PA may include activities such as skateboarding or water sports (e.g. body boarding or surfing), which are skill-specific PA related with agility, balance, control and coordination and that do not accumulate activity counts. Therefore, objective and self-reported measures may reflect different constructs or context of PA.

Considering that self-reported PA could include some activities that may not be quantified when using objective instruments (e.g. water activities and skateboarding), and that evidence exists to suggest an association between self-reported PA and AA, it is expected that these types of activities may have a positive impact on students' cognition. This is a plausible argument because some activities that do not accumulate activity counts improve motor control. Motor control development enables children to engage in various postures and activities providing opportunities to interact with the environment and rehearse language and cognitive skills [57]. Children with better motor control performance have better AA [29, 57]. This is consistent with results that demonstrate interwoven associations between motor control and cognitive development, showing that many brain areas are involved in both motor control and cognitive processes [58].

Based on the inconsistent results observed for the objective and self-reported PA, it is clear that the relationship between PA and AA despite being generally accepted is not yet conclusive [11, 56]. It is worth to reinforce that self-reported PA methods possess several limitations in terms of reliability and validity [15]. Self-reported PA can be considered problematic in children and adolescents because they are less time-conscious than adults and tend to engage in PA characterized by sporadic periods with different intensities rather than consistent engagement patterns. Besides compromised reliability, the validity of self-reported PA measures may be affected in children and adolescents who feel compelled to respond in a socially desirable manner. As a result, to report that PA is associated with AA based mainly on self-reported PA should be done with caution; and the assumption that participation in PA positively affects AA or the way that children think and learn in school has yet to be validated [4].

Summary: The inconsistency between subjective and objective measures of PA in association with AA may be due to the difficulty of estimating one's overall PA. Considering that self-reported PA could include some activities that may not be quantified when using objective instruments (e.g. water activities and skateboarding), and that there is evidence suggesting an association between self-reported PA and AA, it is expected that these types of activities may have a positive relationship with students' cognition.

3. Cardiorespiratory fitness and academic achievement

CRF can be defined as the ability of the circulatory and respiratory systems to supply oxygen to skeletal muscles during sustained PA. Regular practice of PA is important to maintain or improve CRF. Although CRF is determined by non-modifiable factors such as growth, maturation, sex, age and heredity, it is also influenced by moderate-to-vigorous PA and sedentary

time [59]. Despite genetic contributions to CRF, high levels of PA are related with better CRF, which means that PA and CRF are intimately linked.

The relationship between fitness and cognition was first established in children in the 1950s [60]; nonetheless, evidence of fitness benefits on human cognition has been most developed in adults. In recent years, there has been an increase of studies on children and adolescents, mostly related with CRF and students' performance at school. Different from the inconclusive results observed between objectively measured PA and AA, most studies have found that CRF has a significant positive association with AA, suggesting that increasing CRF is important for adolescents' cognitive development and consequently AA [8].

In the United States, Castelli et al. [61] found that physical fitness was generally associated with AA, and in particular CRF was associated with AA in students from grades 3 and 5. Similar results were observed by other authors [62, 63]. Two studies performed with huge samples of Texas students corroborate previous observations, demonstrating a positive association between CRF and AA [64, 65]. Even when analyses were adjusted for potential confounders, the results remained significant [64, 65]. Linear modeling suggested a 5% increase in the prevalence of students meeting healthy body mass index and CRF standards would result in a 2.3 and 0.7% increase in the prevalence of students meeting the Texas Assessment of Knowledge and Skills standard [64]. Using a large sample of students in grades 2 and 3, Hansen et al. [16] found that CRF had a significant quadratic association with both spelling and math achievement. This finding suggests that increasing CRF may have a greater impact on spelling and math achievement for children below a particular fitness threshold than on those above. This further suggests that future research should evaluate the potential benefits of improving CRF for AA among students classified in lower fitness percentiles. More recently, the relationship between cardiovascular and muscular fitness with working memory and AA was investigated in preadolescent children [66]. Results from this study replicated previous findings, showing that mathematic achievement of algebraic functions was associated with CRF. Given that development of childhood CRF has become emphasized, these data suggest that activities targeting improvement of cardiovascular and muscular fitness should be integrated into school- and community-based programs for enhancing students' cognitive health.

Studies from other countries have also demonstrated a positive relationship between CRF and AA. A study carried out with an urban South African group of primary school children observed a positive relationship between CRF and AA, with more significant correlations found among girls than boys, and among older compared to younger boys and girls [67]. This is the only study from an African country, meaning that there is a need of more studies to understand the role of CRF in AA in this particular context. Nevertheless, based on this study, advocating the enhancement of physical fitness levels of children by promoting PA is necessary.

Evidence from European countries also supports the importance of physical fitness, particularly CRF, for students' AA. In the Netherlands, Greeff et al. [68] found a positive association between CRF, spelling and mathematics performance in non-socioeconomic disadvantage

students; and between CRF and mathematics for socioeconomic disadvantage students. This finding is important to understand the importance of CRF on students' learning, regardless of their socioeconomic status. In Spain, it was observed that CRF was associated with AA, and the significant association remains even after adjustment for fitness and body composition indicators [69]. In Portugal, the relationship between CRF and body weight status on AA was investigated among seventh-grade students from different cohorts [70]. CRF and weight status were independently and synergistically related to AA, independent of the different cohorts. This finding provides further support that CRF and healthy weight students are more likely to have better performance at school.

Although the evidence of the positive relationship between CRF and AA seems to be overwhelming, results from the presented studies need to be interpreted with caution, since the cross-sectional design can only suggest an association between the variables, rather than provide causal inference. Thus, longitudinal studies are needed to clarify the association. So far, there are not many longitudinal studies that analyzed the effect of CRF on AA.

However, recent research assessed potential differences in AA based on CRF over a 2-year period, and found that students who maintained a healthy CRF had the highest mean scores in AA tests [71]. Those who had the lowest scores were not in the healthy zone for CRF in grades 5 and 7. These suggest that attaining and maintaining a healthy CRF could be successful in terms of one's AA. A more recent investigation also examined the relationship between changes in CRF and changes in mathematics and reading achievement between grades 6 and 8 [72]. Improvements between grades 6 and 8 in CRF were positively correlated with AA. The results from this study support and corroborate previous studies, suggesting that students who are more cardiorespiratory fit are more likely to perform better on AA tests. This highlights the long-term role of improving fitness and increasing AA. Thus, it seems that developmental changes in CRF are important to consider when examining changes in AA.

Further, in Taiwan, the association between change in fitness and subsequent change in AA from grade 7 to grade 9 was examined [73]. The regression analyses in this study confirmed that improvement in CRF was significantly associated with better AA. Interestingly, CRF exhibits stronger longitudinal associations with AA than other forms of fitness or body mass index for students. More recently, in Portugal, Sardinha et al. [74] examined the prospective associations between CRF and AA in students from grade 5 to grade 7. Results corroborated those observed previously, indicating that being persistently fit, compared with those classified as persistently unfit, increased the odds of having high levels of AA at follow-up. Students, who were unfit at baseline but improved their CRF and became fit, also had higher odds of achieving better marks than those persistently unfit. These longitudinal studies demonstrate that improvements in CRF are prospectively associated with better AA.

Summary: Numerous cross-sectional studies demonstrate that CRF is consistently associated with AA. Results from these studies are confirmed by recent longitudinal studies, indicating that low levels of CRF can jeopardized students' academic future. An investment in PA promotion and PE is important because it might play a role in the positive effect of PA, CRF and consequently cognition and AA.

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4. Potential mechanisms for the association between PA, CRF and AA

The association between PA, CRF and AA is not yet clearly understood. However, there are several potential mechanisms that may explain the association [75]. Animal and human research have been helpful in understanding the neurobiological mechanisms by which PA and CRF affect brain structure and function [76], cognition, [3, 4] and consequently AA [4]. Although understanding molecular and cellular changes in brain is currently limited in humans, larger scale neuronal changes can be assessed using neuroimaging tools. Advances in neuroimaging techniques have enabled the field of neuroscience to bridge the gap between animal and human studies. Changes in brain structure and function as a result of PA and CRF can now be addressed through an understanding of changes in the volume and thickness of neuronal tissue, via alterations in functional changes such as blood flow across brain regions, and through the understanding of how neural networks influence one another [76]. Furthermore, with a cross-talk mechanistic approach between organs, exercise may induce systemic factors released from peripheral organs such as muscle (myokines), liver (hepatokines) and adipose tissue (adipokines) that may contribute to neurotrophin and neurogenesis, as well as cognition and memory function [77]. Even though some uncertainties about the exact mechanisms remain, this is an evolving and promising field of research that further emphasizes the systemic and integrated effects of exercise on mechanisms that link biology to selected behaviors.

In school-aged children, a growing body of literature suggests differential brain structure related to CRF [75]. Specifically, an association has been shown among CRF, greater hippocampal volume, cognition and memory [78]. Such findings are interesting because the hippocampus is intricately involved in learning and memory, aspects of cognition important to AA, and these data suggest that CRF is beneficial to this subcortical region of the brain as well as the cognitive processes supported by it. Chaddock et al. [79] further observed differences in the basal ganglia, a subcortical structure involved in the interplay of cognition and willed action, between children with lower and higher CRF. Children with higher CRF exhibited greater volume in the dorsal striatum when compared to lower fit children. Such findings indicate that higher CRF is associated with better control of attention, memory and cognition. Children with better CRF exhibited increased inhibitory control and response resolution, and further higher basal ganglia volume was related to better task performance. These findings point to the dorsal striatum's involvement in higher order cognition and that CRF might influence cognitive control during children development.

Functional neuroimaging data have indicated that higher CRF is associated with increased cerebral blood flow in the microvasculature of the hippocampus in children, independent of sex, age and hippocampal volume [80]. Increased hippocampal blood flow is also linked to higher task performance on a spatial memory task. Thus, CRF might influence how the brain

regulates its metabolic demands via blood flow to a particular region important for learning and memory.

To characterize PA-related differences in brain function, Davis et al. [81] used functional magnetic resonance imaging (fMRI) to investigate changes in the blood oxygen level dependent (BOLD) signal following PA intervention. Twenty sedentary, overweight children were randomized into an after-school PA intervention or a non-PA control group that lasted 14 weeks. Following the PA intervention, increased bilateral activation of the prefrontal cortex and decreased bilateral activation of the posterior parietal cortex was observed in the PA group relative to the non-PA control group. These differences in brain were elicited during tasks that tap inhibition, one aspect of executive control, indicating that the PA intervention affect brains function. A study, using fMRI, observed increased activation in prefrontal and parietal brain regions during early task blocks, and decreased activation during later task blocks in children with higher CRF relative to children with lower CRF [82]. As higher CRF children outperformed lower CRF children on aspects of the task requiring the greatest amount of executive control, higher CRF children appear more capable of adapting neural activity to meet the demands imposed by tasks that tapped higher order cognitive processes such as inhibition and goal maintenance. These two presented studies [81, 82] suggest that higher CRF children are more efficient in the allocation of resources in support of cognitive control operations.

Additional evidence may be derived from other investigations that have examined the neuroelectric system to investigate which cognitive processes occurring between stimulus engagement and response execution are influenced by CRF. Studies that examined the P3 component, a stimulus-elicited neuroelectric component involved in the allocation of attentional resources, have shown that higher CRF children have larger amplitude and shorter latency P3 response relative to their lower cardiorespiratory fit peers [21, 83]. Such findings indicate that higher CRF children allocate greater attentional resources and have faster cognitive processing speed relative lower cardiorespiratory fit children [21, 83]. Additional research also suggests that higher CRF children are related to greater flexibility in the allocation of attentional resources [81, 82].

At the biochemical level, investigations have shown that PA augments the synthesis of brain-derived neurotrophic factor (BDNF), which enhances brain plasticity by changing the structure of the neuron and strengthening its signaling capability [84]. An increase in BDNF is associated with increases in the volume of the hippocampus as well as improved memory performance [85]. Induced by PA (among other factors), BDNF activation is also related with increased long-term potentiation and neurogenesis [84]. Long-term potentiation is shown to improve learning and memory by strengthening the communication between specific neurons [86]. Based on animal studies, the increase in neurogenesis is hypothesized to increase learning [76, 84].

Figure 1 shows a simplify model of potential mechanisms for the relationship between PA, CRF and AA. PA may influence CRF. CRF, in turn, along with PA, are related with changes in brain structure, brain function and cognition. These changes may affect AA.

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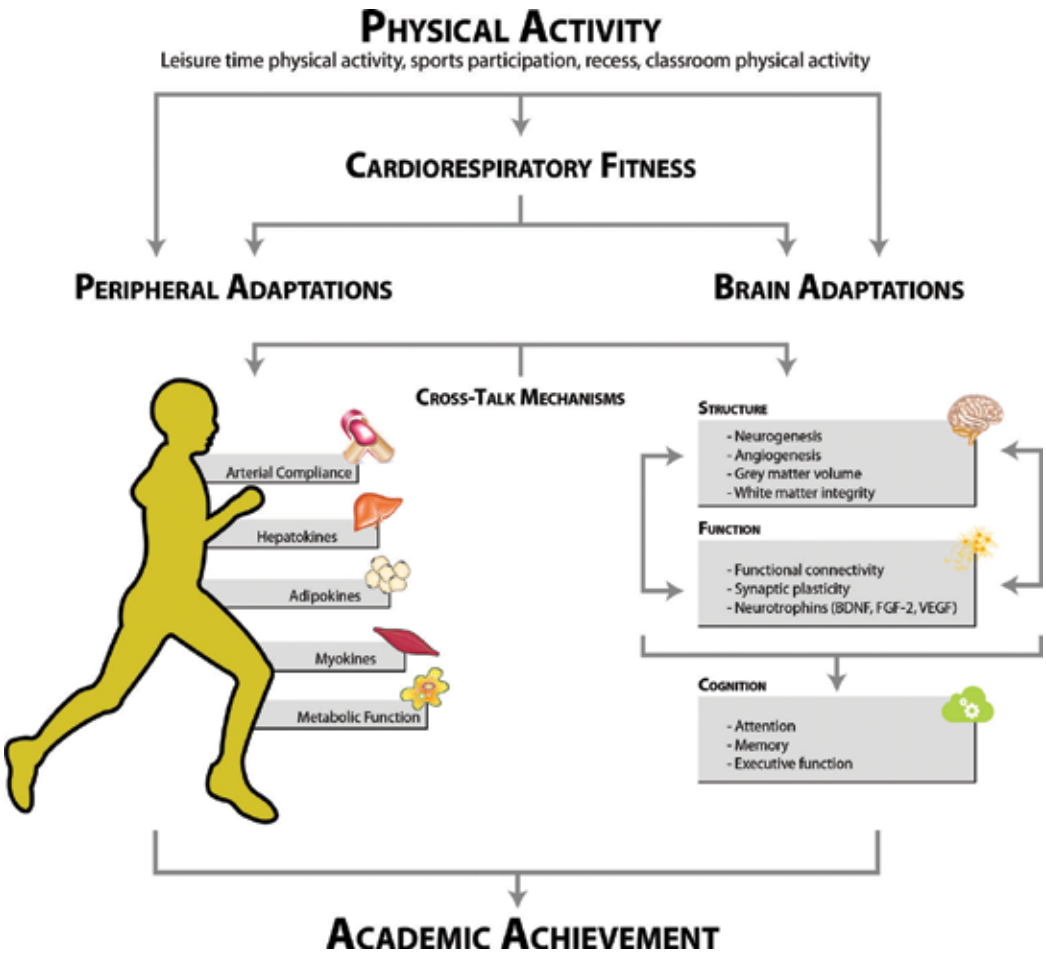

Figure 1. Simplified model of the relationship between physical activity, cardiorespiratory fitness and academic achievement. BDNF, brain-derived neurotrophic factor; FGF-2, fibroblast growth factor 2; VEGF, vascular endothelial growth factor.

Besides these physiological and psychological effects described above, PA practice and CRF improve students' behavior in the learning context, consequently increasing the odds of better concentration and achievement [56], which is directly related to AA.

Summary: The mechanisms underlying the relationship between PA, CRF and AA are not yet clearly understood. There is evidence that PA and CRF can affect brain structure and function using a variety of neuroimaging tools. At a biochemical level, CRF enhances the synthesis of brain-derived neurotrophic factor (among other molecular and cellular processes). Increasing BDNF is associated with increases in the volume of the hippocampus and improved memory.

5. Conclusion

This chapter presents evidence suggesting an association between PA, CRF and AA. Promoting PA and improvements in CRF are important for improving children and adolescents' health, and consequently, AA. Because students spend much of their daily lives in school, school-based PA may result in benefits to AA.

Attention to these findings is important because they have implications for students' education, predominantly in societies where economic development is important. With an increasing emphasis on formal academic disciplines, decision-makers are under pressure to achieve academic standards. Considering the relationship between PA, but mainly CRF, with AA, lower levels of CRF might jeopardize students' academic future. Therefore, changes in public policy are needed to systematically provide incentive and direction for increasing PA and enhanced CRF levels in school-aged children. Accordingly, it is justifiable for schools to increase time and resources to promote healthy and active lifestyles.

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Emotional, physical and social well-being describe human health from birth. Good health goes hand in hand with the ability to handle stress for the future. However, biological factors such as diet, life experiences such as drug abuse, bullying, burnout and social factors such as family and community support at the school stage tend to mold health problems, affecting academic achievements. This book is a compilation of current scientific information about the challenges that students, families and teachers face regarding health and academic achievements. Contributions also relate to how physical activity, psychosocial support and other interventions can be made to understand resilience and vulnerability to school desertion. This book will be of interest to readers from broad professional fields, non-specialist readers, and those involved in education policy.

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