

The Influence of Sleep Deprivation on Academic Performance Among College Students

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Abstract: Educators worldwide have been concerned with searching for the determinants of academic performance with the purpose of improving the same. This article discusses a study which intended to examine the influence of sleep deprivation on academic performance among college students. This included examining the extent to which students report sleep deprivation and whether or not they experienced sleep deprivation differently by sex and other selected demographic variables. A total of 116 first year Community Development college students responded to the James Maas's sleep deprivation scale and to questions seeking information on demographic variables such as sex, age, marital status, past education experience, employment status, religion, fee payment status and birth order. Their semester General Average Performance (GPA) was then traced at the end of semester. Descriptive analysis identified three categories of sleep deprivation among students: normal range (43.9%), borderline (31.6%) and abnormal sleep deprivation (23.9%). It was further found that female than male students reported abnormal sleep deprivation [$\chi^2(2, n = 114) = 7.27, p = 0.03, \text{Cramer's } V = 0.32$]. Although Chi-square analysis found significant sex difference with large effect in sleep deprivation, there was no difference in GPA with sleep deprivation among both male and female students. It was concluded that sleep deprivation must not necessarily account for students' difference in academic performance in terms of GPA where almost everyone in the sample is already sleep deprived.

Keywords: Sleep Deprivation, College Students, Academic Performance, Abnormal Sleep Deprivation

1. Introduction

This article presents a study whose purpose was to examine the influence of sleep deprivation on academic performance among college students. Like other studies on the determinants of academic performance: [18, 19, 23, 21]; this is an attempt to address academic underperformance as a problem and how it can be improved. The term academic performance has been interchangeably used with other terms to mean any of the three outcomes as described in [18]. These outcomes are: (i) performance goal indicated by grade, marks, divisions, class ranks, General Performance Average (GPA) in the examination results; (ii) Mastery goal indicated by the skills, interests and efforts one acquires in a specific training after a given learning time; and (iii) Self-authorship, which is reflected by individual's internal ability to define their values and beliefs prior to constructing knowledge. Specific to this article the

term academic performance means college students' marks obtained in specific modules at the end of semester and general performance average (GPA) in semester examinations.

Before detailing the association existing between academic performance and sleep deprivation, it sounds crucial to characterize the term sleep deprivation as loss of sleep occurring as a result of natural conditions such as staying awake all night or long hours of the night than one's normal sleeping hours to perform an activity considered vital [15]. Okano et al defines 'normal' sleeping hours as eight hours for adults. Examples of such activities may be studying for an examination, taking care of a patient, waiting for a friend, charting with a friend, attending a night club etc. [19]. Sleep deprivation has been associated with indicators such as constant yawning, dozing off when not active, sleep inertia (sleepy grogginess experienced all day long), slowed thinking, reduced attentions pan, lack of energy, worsened memory and poor or risky decision-making [15].

1.1. Sleep Deprivation Among College Students

Sleep deprivation has been reported elsewhere though with variations in prevalence. It has been reported that 70% of colleges students are sleep-deprived [28] in such a way that their next day activities cannot be properly performed. Batra, Sharma and Batra, et. al., in a Meta analysis review of 27 studies constituting 90,879 college students from 15 countries found that 50.5% of college students are sleep deprived [2]. Jahrami, Dewald-Kaufmann, Faris, et al. [17] undertook a meta analysis review and reports a mean of 6.3h sleep per night among college students and indicates 55% of college students being sleep-deprived out of 43 studies from 13 countries. Schlarb, Fredrich and Claßen [39] report 60% of university students being sleep deprived and diagnose insomnia to 7.7% of the same students. In Kenya, Huawanga [16] reports 80% out of 378 undergraduate students being sleep deprived.

Sex Difference in Sleep Deprivation among College Students

Sex difference in sleep deprivation has been found as twice greater among women and girls relative to their counterpart men and boys [29, 30]. Sex difference in sleep deprivation has also been characterized with difference in sleep disorders whereby female than male participants have reported short sleep duration and insomnia [6, 14, 51, 37]. Since the causes of sex differences in sleep deprivation was beyond the scope of this study, its discussion is similarly excluded here yet such a discussion can be found in other works [51, 37]. Yet, understanding sex difference in sleep deprivation and its associated impacts might help in addressing sleep-related disorders that affect more females than males [30].

1.2. Theoretical Role of Sleep

There are several hypotheses on the function of sleep in human life. While some of the hypotheses have concentrated on evolutionary role of sleep, others have focused on the psycho-patho-physiological effects of sleep deprivation [1]. For the purpose of the discussion in this article, three theories have been reviewed. For instance, evolutionary theory of sleep [27] suggests that sleep functions as an animal's survival stratagem as sleep is a means to effectively schedule their survival behavior.

Another theory is a repair and restoration theory of sleep [35], which proposes that while NREM sleep is useful for restoration of physiological functioning, REM sleep recuperates mental functioning. In support of this hypothesis, Xie, Kang, Xu, et al [48] found that sleep repairs the brain to enable it perform daily recurring tasks successfully. Research by Xie, et. al [48] also suggests that sleep enables the brain to remove toxic substances. Despite the fact that this theory has been empirically supported, research supporting this hypothesis has been conducted with mice and not human subjects, leaving a room for further quest as to whether or not this function applies to human beings [1].

Third, is the information and consolidation theory of sleep [3] proposing that sleep helps to process information

perceived during the day, helps brain to actively work in the next day, and helps to store information in the long term memory. In support of this hypothesis, sleep has been found to enhance motor learning so that sleep deprivation retards the ability to recall and remember information [46, 31, 3]. In addition, it has been reported that both phasic and tonic REM sleep are responsible for environmental alertness and information processing; and that sleep deprivation is associated with numerous neurological and psychopathologies [12]. Sleep deprivation has also been associated with risk taking behavior [47].

1.3. Sleep Deprivation and Academic Performance

Academic performance among college students has been associated with attendance, sleep quality, and sleep disorder co morbidity [12]. In addition, according to Kocak, Göksuand Goktas, [22], academic performance have been correlated too ther psychological factors with negative effect sizes such as anxiety, depression, academic stress, external regulation and amotivation. Others are performance avoidance goals, boredom, subsequent depression, self hand capping, academic emotions–Negative High arousal (NHA), and academic emotions–Negative Low Arousal (NLA).

Previous studies in Tanzania have associated academic performance with factors such as creative thinking, metacognition and teachers' ability to foster cognitive variables alongside quality of instruction [19, 20], timely feedback [23, 21]). Other reported determinants are policy environment, culture, student's ability and the teaching-learning environment [26]. Having conducted a meta-analysis Kocak et al. [22] has synthesized about 254 variables associated with academic performance and 427 effect sizes into nine categories; and found that variables categorized under psychological characteristics, school and special education had significant negative effects on academic performance and call for special attention if the improvement of academic performance is to be realized. Since sleep deprivation is among the variables categorized in psychological characteristics, school and special education, It is thus, prudent to pay attention to it as one of the potential determinants of academic performance among college students.

This is because consistent normal sleeping hours have been found to strengthen brain synaptic connections, which are associated with activeness of cognition, memory, and attention span; all of which are central determinants of academic performance [32]. On the other hand, extreme sleep deprivation has been associated with negative health conditions such as obesity, diabetes, cardiovascular diseases, stroke, infections and depressions. In America, it has been reported that each year sleep deprivation claims loss of 16 and 50 billion US\$ in health care costs and in lost productivity respectively. People with sleep deprivation have also been found being unable to focus, pay attention and responds lowly. They also exhibit moodiness, inability to handle stress, impaired decision making and decreased

alertness [43].

With regard to sleep and academic performance, researchers report mixed results from different parts of the world. For example, Maheshari and Shaukat [25] report negative impacts of poor quality of sleep on academic performance among medical student in Pakistan. Similarly, Okano [32] reports positive correlation between academic performance and quality, duration and consistency of sleep; and that sleep measures accounted for 25% of variance in academic performance. A longitudinal study by Chen and Chen [4] among 3549 college students found an association between chronic sleep deprivation and lower GPA. Chen and Chen also report lower chance of graduation among sleep-deprived students experiencing sleep deprivation in the senior year. In Kenya, Gikunda, Abura, Kiriungi, et al., [11] reports positive correlation between sleep deprivation and academic performance among public universities.

On the other hand, while Zhang, Dimitriou and Halstead [50] found that greater severity of sleep disturbances enhanced academic achievement in China, Thomas [41] reports 88% of sleep deprivation out of 143 college students' sample in Alabama. According to Thomas, there was positive relationship between sleep deprivation and both mental and physical health complaints but no correlation between sleep deprivation and academic performance. Similar results have been reported by Patirck, Lee, and Raha et al [34] whose findings indicate that sleep deprivation affects physical but not cognitive ability among healthy university students.

Although Thomas reports no correlation between sleep deprivation and academic performance, the author also reports association between sleep deprivation and both mental and physical health. Added to that, is the fact that in most cases learning outcomes and achievements in colleges are measured through tests and examinations, which usually demand answers, some of which have to be cognitively remembered. Since sleep deprivation has been found to compromise cognition and memory [4], it is thus, logical to further direct curiosity to the extent and context into which sleep deprivation can affect academic performance among college students.

In addition to these mixed results on the topic, the prevalence of sleep deprivation and its possible association with academic performance among college students in Tanzania has received little attention among researchers studying academic performance in the country. In light provided by Jahrami et al. [17] different results with regard to difference s in sleep deprivation studies in relation to sleep practices and attitudes, gender and other variables might be emanating from cultural values, local conditions, and environment. Therefore, this paper reports the study which aimed at examining the influence of sleep deprivation on academic performance among college students.

1.4. Objectives of the Study

This study aimed to examine the influence of sleep deprivation on academic performance among college

students. This was done through the following specific Objectives:

1. To identify sleep deprivation among college students.
2. To explore the influence of sleep deprivation on academic performance among students.

Achievement of these objectives was enhanced by the following research questions:

1. To what extent does college students report sleep deprivation?
2. Do students experience sleep deprivation differently by sex, and other selected demographic variables?
3. What is the influence of sleep deprivation on academic performance among students?

2. Methodology

2.1. Research Design

One questionnaire was administered to Community Development first year diploma students (NTA Level 5) registered in the Community Psychology Course. The questionnaire was comprised of the James Maas's Sleep Deprivation Scale and questions seeking information on demographic variables such as sex, age, marital status, past education experience, employment status, religion, fee payment status and birth order. The questionnaire was administered one week before students started doing their scheduled college test one. Then, attend of the semester examinations; semester's General Performance Average (GPA) and performance in the Community Psychology course were used to represent the respondents' academic performance. Sleep deprivation, demographic variables were both analyzed along academic performance to identify sleep deprivation and check for the influence of the same on academic performance among students.

2.2. Target Population Sampling Procedure and Sample Size

This study targeted Community Development first year diploma students (NTA Level 5) registered in the Community Psychology Course whose total number was 347. Students' performance in previous level of study (NTA Level 4) was used to strategically select a sample size where by students' GPAs in level 4 were arranged in descending order. The list was then divided into three so that one third of students starting with GPA were labeled as high performing group and one third starting from low GPA upward was labeled as high performing group. One third of the class made a total of 116 students, which was then divided into two to include both low and high performing groups in the sample. Thus, 58 students from the top and 58 students from the bottom were included in the sample, making a total of 116 sample size.

2.3. Measuring Sleep Deprivation

Measuring sleep deprivation has been done through several methods and techniques. One method,

electroencephalographic monitoring of sleep tendency, has been used to record periodic abnormalities in the electroencephalogram; and studying circadian cycles. This method has been relevant in the identification of sleep deprivation [53]. Sleep deprivation has also been measured using self reporting tests and scales, some of the scales including both frequency, duration and quality of sleep a person experiences relative to the sleep one ought to experience. These are such as the Stanford Sleepiness Scale (SSS), the Epworth Sleepiness Scale (ESS) and Sleep Quality Scale [49]. Another measure, the James Maas's Sleep Deprivation Test [24] requires dichotomous responses for each of its items. It further instructs that the yes responses for

any 3 items could imply sleep deprivation. This measure was applied in the present study given its specificity to measure sleep deprivation.

2.4. Measuring Academic Performance

Academic performance was represented by direct students' scores in the students' GPA in semester examinations. Academic performance among first year diploma students studying community development in Tanzania is usually described, classified and interpreted as illustrated in Table 1 to get a semester GPA.

Table 1. Description and classification of academic performance.

Grading of Examination Performance				Degree of Classification	
Letter grade	Range of marks	Grade point	Classification	Overall GPA	Classification
A	100–80	4	Excellent	4.0–3.5	FIRST CLASS
B	79–65	3	Very Good	3.4–3.0	SECOND CLASS
C	64–50	2	Average	2.9–2.0	PASS
D	49–40	1	Poor	NIL	NIL
F	0–39	0	Failure	NIL	NIL

This classification was used to categorize students' academic performance in this study.

2.5. Data Collection

Data were collected during free class time in the third week of November, 2021. The sampled students stayed together in one room, researcher then distributed questionnaires, pencils and erasers. The researcher was present in person to clarify the instructions and respondents' questions if any. The questionnaire was comprised of sleep deprivation test scale and the questions directly inquiring for students' demographic variables, which were self reported.

2.6. Data Analysis

In analyzing the sleep deprivation test scale, the 'yes' responses were totalized in to obtain the total respondent's score in sleep deprivation. This was consistent with Maas's professional guides on how to score the scale instructing that any three yes responses in scale implies sleep deprivation [24, 42]. To categorize sleep deprivation, total scores in sleep deprivation were binned so that the scores less or equal to 9 were labeled 'normal range'; between 10 and 11 were labeled 'borderline'; and scores above 12 were labeled 'abnormal'.

2.7. Reliability of the Sleep Deprivation Scale

The scale reached acceptable reliability index, greater or equal to $\alpha = 0.7$ [40, 8, 33]. The internal consistency index for the Sleep Deprivation Test Scale was good (Cronbach $\alpha = 0.71$).

2.8. Ethical Consideration

Research clearance to conduct this research was granted by Buhare Community Development Training Institute in Mara Region. Prior to the commencement of this study, respondents were requested for their informed consent to participate in the study by signing the informed consent statement attached to the questionnaire. Further, although this study used human sample, there was no laboratory experiment conducted; and all information collected through survey were self-reported, handled with confidentiality and used only for the purpose of this study.

3. Results

3.1. Demographic Characteristics of the Respondents

Participants were heterogeneous in nature. There were 41.2 % (47) males and 58.8 % (67) females. Their age varied between a low of 19 years and a high of 35 years with a mean age being 21.66 and a standard deviation of 2.26. Other variables are summarized in Table 2.

Table 2. Characteristics of the respondents.

Variables	Levels	Proportion	
		n	%
Sex	Males	47	41.2
	Females	67	58.8
Marital Status	Married	15	13.2
	Single	95	83.3
	Divorced	1	.9

Variables	Levels	Proportion	
		<i>n</i>	%
Tuition fee payment status	Separated	1	.9
	Cohabiting	2	1.8
	Paid in full	59	51.8
	Not paid and not sure of getting	32	28.1
	Not paid, not sure of paying in time	23	20.2
Previous Education level reached	Form Four	7	6.1
	Form Six	106	93.0
	First born	21	18.4
Birth Order	Last born	25	21.9
	Middle (Neither first nor last born)	68	59.6
Religious belief	Muslim	15	13.2
	Christian	99	86.8

3.2. Sleep Deprivation Among Students

Sleep deprivation among students ranged between a low of 2 and a high of 14 with a mean score of 9.46 and standard deviation of 2.74. Sleep deprivation among college students

was identified in three main categories, namely; normal range (43.9%), borderline (31.6%), and abnormal sleep deprivation (23.9%). Table 3 illustrates the responses to each item in the sleep deprivation scale.

Table 3. Sleep deprivation among college students.

Items	Responses			
	No		Yes	
	Freq.	%	Freq.	%
I need an alarm clock to wake up at the appropriate time	27	23.7	86	75.4
It's a struggle for me to get out of bed in the morning	24	21.1	90	78.9
I feel tired, irritable, and stressed out during the week	17	14.9	97	85.1
I have trouble concentrating	37	32.5	77	67.5
I have trouble remembering	43	37.7	71	62.3
I feel slow with critical thinking, problem solving, and being creative.	51	44.7	63	55.3
I fall asleep watching TV.	23	20.2	91	79.8
I fall asleep in boring meetings or lectures in warm rooms	40	35.1	74	64.9
I fall asleep after heavy meals or after low doses of alcohol	52	45.6	62	54.4
I fall asleep within five minutes of getting into bed	33	28.9	81	71.1
I feel drowsy while driving	64	56.1	50	43.9
I sleep extra hours on weekend mornings	15	13.2	99	86.8
I need a nap to get through the day	15	13.2	99	86.8
I have dark circles around my eyes	76	66.7	38	33.3

Table 3 indicates 86.8% (99) of respondents reported sleeping extra hours on weekend mornings and need a nap to get through the day. These were followed by the feelings of tiredness, irritability, and being stressed during the week reported by 85.1% (97). The items in the sleep deprivation scale which received least affirmation are having dark circles around the eyes reported by 33.3% (38) and feeling drowsy while driving reported by 43.9% (50) of respondents. Perhaps because developing dark circles around the eyes could imply very long time sleeplessness, while feeling drowsy while driving might not be experienced by most students given the nature of their daily responsibilities.

3.3. Difference in Sleep Deprivation by Sex

Results as analyzed using Chi-square test for independence (Table 5) indicates a significant difference between male and female students, $\chi^2 (2, n = 114) = 7.27, p = 0.03$, *Cramer's V* = 0.32 in reporting sleep deprivation. The *Cramer's V* = 0.32

interprets that the magnitude of difference was large (Cohen, 1998).

3.4. Difference in Sleep Deprivation by Tuition Fee Payment Status

Table 4 indicates that out of 23.9% who reported abnormal sleep-deprivation, 31.5% were owing the college tuition fee and were not sure of paying compared to 16.9% in that category who reported to have fully paid the college tuition fee. Although slight differences in demographic levels can be descriptively observed in table 4, chi-square test for independence indicated no significant association between other demographic variables and sleep deprivation.

3.5. Sleep Deprivation and Academic Performance in Semester GPA Among Students

Students' academic performance ranged between a low of 2.0 GPA and a high of 3.5 GPA with a mean score of 2.7 and

standard deviation of 0.099 in semester examinations. Results indicated a positive skew of academic performance from average to excellent, with 46.5% (53) respondents scoring excellent (first class), 12.3% (14) Very good (second class), and 41.2% (47) scoring 'Average' (PASS) categories. However, none of the students categorized in first class

scored beyond the minimum score in that category of 3.5 GPA. No student performed in the categories of 'Failure' and 'Poor.' Chi-square analysis for independence as shown by data in Table 6 indicate no statistically significant difference at the $p < .05$ level, in GPA for the three sleep deprivation categories: $F(2, 112) = 0.50, p = 0.61$.

Table 4. Sleep deprivation by sex, marital status and tuition fee payment status.

Category of deprivation	Selected Demographic Variables																			
	Sex				Marital status								Tuition fee payment status							
	Males		Females		Married		Single		Divorced		Cohabiting		Separated		Fully Paid		Not Paid Not sure of Paying			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%		
Normal range	28	59.6	22	32.8	7	46.7	42	42.2					-		1	100	26	44.1	24	44.4
Borderline	7	14.9	29	43.3	7	46.7	28	29.5	1	100	1	50					23	39.0	23	24.1
Abnormal	11	23.4	16	23.9	1	6.7	24	25.3	-		1	50			10	16.9	17	31.5		

Table 5. Sex difference in Sleep deprivation.

Variable		Sleep Deprivation						Chi-square est			
		Normal		Borderline		Abnormal					
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	²	<i>df</i>	<i>p</i>	<i>Cramer's V</i>
Sex	Males	28	20.4	7	14.7	11	11.0	11.588 ^a	2	0.003	0.32
	Females	22	29.6	29	21.3	16	16.0				

Table 6. Association between Sleep deprivation and academic performances.

Variable		Academic Performance in GPA						Chi-square test			
		Average (Pass)		Very good (Second class)		Excellent (First class)					
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	²	<i>df</i>	<i>p</i>	Cramer's <i>V</i>
Sleep deprivation	Normal range	19	20.8	5	6.2	26	23.0	1.877 ^a	4	0.758	0.091
	Borderline	16	15.0	6	4.5	14	16.6				
	Abnormal	12	11.2	3	3.3	12	12.4				

4. Discussion

4.1. Sleep Deprivation Among College Students

The results in this study indicate that most respondents (97%) responded 'yes' to at least 3 items of sleep deprivation, which according to James Maas as reported in Santorck [42] exemplifies sleep deprivation. This is a proportion higher than the prevalence of sleep deprivation usually reported [52, 28, 16, 39, 17, 1]. It is further consistent with the past studies with regard to sex differences where women than men are reporting being more affected [29, 30, 6, 14, 51, 37]. Such a similarity in sex difference in reporting sleep deprivation seems to transcend cultural barriers and thus, its generalizability is beyond doubt. Indeed, although the mechanism is not clear, past research has indicated clinical evidence that the use of one dosage of olanzapine increased slow wave sleep (SWS) in women while the same dosage decreased SWS to men [10, 30].

The results on existence of sleep deprivation among college students to such a large proportion have a potential application to development and policy. The fact that most college students are sleep-deprived calls for the need for public health intervention policies addressing factors associated with sleep deprivation. For instance, there are among college students people who are likely to drive long

distances with unsettled minds; and thus, potentially accidents causative agents. Economically, sex difference in sleep deprivation is a signal to the reduced speed in economic performance. It is well known that women are increasingly participating in production activities in addition to their traditional roles at family level in Tanzania. In some cases, women are both heads of families and thus, bread winners. Further, with emphasis to Equality, Diversity and Inclusion (EDI) framework, it has been increasingly realized that national social, economic and political development is likely to be accelerated by ensuring participation of women in developmental activities in all spheres of life. The fact that women than men are more affected by sleep deprivation, calls for immediacy in the need of policy intervention considering that sleep deprivation is not without its associated ramifications such as cardiovascular disease (heart attacks and strokes), type 2 diabetes, influenza, obesity, dental problems, depression, cancer, early onset of Alzheimer's disease, time to recover from sickness, reduction of longevity and weakening of immune system [24].

4.2. The Influence of Sleep Deprivation on Academic Performance

Results in this study indicate no relationship between sleep deprivation and academic performance among college students. These results are similar to the results by Thomas

[41] while on the other hand, they differ from other findings [25, 32]. The difference might be accounted for in the nature of sleep measures employed. Although these results indicate no statistical significant relationship between sleep deprivation and academic performance, they have indicated that almost each respondent had experienced sleep deprivation with different magnitude. In fact, 41.2% of respondents scored an average GPA while none of the students categorized in first class scored beyond the minimum score (3.5 GPA). This raises an argument that since none of students was free from sleep deprivation; much could have been scored had the students obtained expected sleep of 8+ [42].

Although this particular study could not establish the relationship between sleep deprivation and academic performance, studies elsewhere has indicated the role of sleep deprivation on academic performance in colleges. Thus, policy intervention might be very important with regard to the daily timing in starting and finishing studies in the colleges lest this desynchronize students' circadian rhythms. This calls for collaboration between public health and education sectors in coming up with policies appropriately designed to intervene and thus, improve quality of sleep among both men and women in the colleges. For example in a tight schedule of the studies in the college where students commence studies at 0700 hours, with daily group as well as individual assignments from almost 9 modules, preparation for timed tests and semester examinations; one might imagine how hard it is for a student to maintain consistency in achieving 8+ hours sleep.

4.3. Limitations and Generalizability

This study employed self-report instruments in studying sleep deprivation, which might be associated with reporting biases such as social desirability, halo effect, extreme response style and acquiescence [6]. The survey was also conducted in one college with relatively small sample, calling for cautiousness in any attempt to generalize the results in the entire country. Yet, with other samples similar in characteristics to the sample in the present study, generalizability is quite possible. This is because similar results have also been reported elsewhere [6, 14, 51, 37].

5. Conclusions and Recommendations

The purpose of this article was to examine the influence of sleep deprivation on academic performance among college students. Specifically, three main questions addressed were the extent to which college students report sleep deprivation; whether or not students experienced sleep deprivation differently by age, sex, marital and employment status; and what could be the influence of sleep deprivation on academic performance among students. Basing on the findings, three conclusions are hereby drawn: first, although most college students reported sleep deprivation, the extent to which they are sleep deprived differ from normal range, borderline and

abnormal sleep deprivation with abnormal sleep deprivation existing among 29.9% of college students. Second, sleep deprivation is reported differently with sex than with other demographic variables such as age, marital and employment status. Third, the reported sleep deprivation must not necessarily directly account for students' difference in academic performance in terms of GPA, as long as the sampled students all report sleep deprivation.

Future research in Tanzania in this aspect may explore the level of awareness of sleep and its impacts in human health among students, women, and community in general. Further, research need to address the extent to which cultural values, practices, local conditions, there is a need to study further the influence of cultural values, practices and attitudes, local conditions and environment related variables might compromise academic performance as these might account for the reported differences in findings with regard to this topic [17]. This could help in coming up with intervention strategies to lessen the problems associated with sleep deprivation such as insomnia, poor sleep quality, difficulties falling asleep, frequent night awakenings, and staying awake for long period of time throughout the night [13, 30]. Further, despite the fact that sleep deprivation predicts severe depression in adulthood [7] sleep is a modifiable behavior [6] and thus, research aiming at developing policies guiding sleep behavior among students might be of paramount.

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