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ORIGINAL ARTICLE

Nonacademic qualities as predictors of performance in an undergraduate healthcare program

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Objective: Nonacademic qualities such as time management, study skills, stress, and motivation have been linked to academic performance. The purpose of this study was to gain an understanding of this relationship to enable early remediation in a chiropractic training program.
Methods: Questionnaire data were collected at the beginning of the academic year, end of semester 1, and end of semester 2. Questions were related to participants' time management, study skills, stress, and motivation. These were compared to summative assessment results. Semistructured interviews were conducted at the end of semester 1 and end of semester 2.
Results: Amount of time spent studying did not correlate significantly with assessment results. At the beginning of the year, 85.7% of students participated in extracurricular activities. This reduced throughout the year; students who stopped activities were significantly more successful in assessments. When stress at the beginning of the year was compared to end of semester 1, there was a significant increase ($p = .012$), with further significant increases from semester 1 to the end of semester 2 ($p = .001$). Students were very motivated at the beginning of the year, and this was maintained to the end of semester 1 ($p = .257$). However, at the end of semester 2, students became significantly less motivated ($p = .007$). End-of-year motivation correlated with poor student outcomes ($p = .056$).
Conclusion: Time management, study skills, stress, and motivation influenced academic performance in this sample of students. This study supports the notion that student assistance is needed. Additional research into student assistance would be beneficial.

Key Indexing Terms: Time Management; Study Skills; Anxiety; Education; Chiropractic

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INTRODUCTION

It is somewhat self-evident that success at university is largely attributed to academic results, and for many students, progression through university and degree classification obtained is dependent on these results. However, there are nonacademic factors that inhibit academic performance.[1] By identifying these factors and their impact on academic achievement, universities can attempt to flag students at risk and intervene to reduce the danger of underperforming or failing.[2] This study examines students' time management, study skills, stress, motivation, and the relationship these nonacademic factors have with academic performance.

The terms "study strategy" or "learning strategy" are overarching concepts that encompass study skills and time management. Study skills are often confused with learning styles. In this paper we refer to study skills as techniques used by students to aid their recall and understanding of information.

Time management can be thought of as a combination of time assessment, planning, and monitoring of activities, goal setting, and balancing studies with personal activities.[3] The amount of time spent studying is a key component of time management, but it does not equate to quality of studying; thus, correlating the number of hours studying to academic outcome has shown mixed results.[4–6]

Despite a wealth of research investigating the ways in which humans retain information, it appears that few students use study skills that are beneficial to their learning or that facilitate long-term recall of knowledge.[7,8] This may be due to students intending to use effective skills but not being able to implement them,[8] students not knowing which skills are best,[9,10] and tutors, as well as students, not being fully aware of the evidence-informed skills available for learning.[8] Some studies suggest that when study skills are effectively employed by students, clear links can be made with academic achievement.[11] Consequently, stu-

dents who are weak at the implementation of study skills may be at risk of poor academic progress.[12] For higher education students in health profession courses, the volume of information they must assimilate, understand, and apply can lead to time management difficulties as well as the adoption of ineffective study skills, increasing the possibility of assessment-related stress,[13,14] and poor academic performance.[12]

It is suggested that healthcare education is associated with high stress due to the intense nature of the academic and clinical demands.[15] The main source of stress among healthcare students has been found to be related to academics, such as academic performance, assessment anxiety, time management, and organization of large amounts of information.[13,16] It is thought that stress has a negative impact on academic achievement.[15,17] However, the relationship between stress and academic performance may not be that simple. Moderate stress can facilitate academic performance; conversely, chronic or high stress is linked to poor academic performance and a higher number of failed assessments.[18] Correspondingly, stress causes illness, both physical and immunologic.[19] The signs and symptoms of stress can cause missed classes, which can create more stress from falling behind in academic studies.[20]

A student's motivation to learn is a critical factor that can impact the ability to learn.[21] A widely acknowledged theory of motivation is the self-determination theory. The theory suggests that motivation can be divided into intrinsic motivation, external motivation, and amotivation.[22] Intrinsic motivation in academia refers to the drive gained from personal needs and satisfaction, such as the enjoyment of learning new things. External motivation in academia refers to the drive that comes from the environment or a sense of obligation.[23] Students entering a vocational healthcare degree program are likely to be highly motivated, given the rigorous requirements for entry, and demonstrate a high intrinsic motivation.[24] There is a paucity of literature linking motivation to academic achievement; however, some studies suggest that there is a link and that high motivation to study is positively linked to academic achievement.[21]

A reciprocal relationship occurs between stress and motivation; motivation is somewhat moderated by both stress and poor academic performance.[23] Student assistance should target motivation and stress simultaneously and those activities that promote motivation benefit from interventions reducing stress.[23] As such, strategies designed to reduce academic stress should consider the relationship between motivation and stress.

Previous studies have focused on a single nonacademic quality and its relationship with academic performance. There is a paucity of research within chiropractic education investigating the impact of nonacademic factors within chiropractic programs. An understanding of this relationship may enable universities to look for early warning signs in students who are struggling and may be at risk of poor academic performance. These students may require increased or additional assistance to improve their chance of success. This study hopes to provide a unique view of nonacademic factors, which is an important addition to the literature. The uniqueness of this study lies in the methodology, being both explanatory and exploratory.

Thus, the aim of this study was to explore the nonacademic qualities of time management, study skills, stress, and motivation, and their relationship both with academic performance and with each other.

METHODS

Study Design

A mixed method design was chosen.[24] Quantitative questionnaires were used to answer specific questions, and the answers to these questions were used to inform the qualitative semistructured interview questions. Thus, the questionnaires were exploratory and the interviews were explanatory.[25] The qualitative and quantitative elements of this study were synergistic, where triangulation of these data provide a greater understanding of the subject area than would a single approach.[25] Thus, the study drew on both numeric and narrative approaches in order to answer the research questions.[26]

Participants

The AECC University College (AECC UC) ethics committee approved this study. All year 1 students at AECC UC enrolled in the undergraduate Master of Chiropractic (MChiro) program in 2015 were eligible to participate. All students were given an information sheet with details of the study and an opportunity to ask questions. Those who chose to volunteer signed an informed consent form before beginning the study.

Each participant was provided with 3 questionnaires, one at the beginning of the academic year (Q1), one at the end of semester 1 (Q2), and 1 at the end of semester 2 (Q3).

The questionnaires explored time management by asking how many hours a week a student spent on university work outside of formal teaching and how many hours a week were spent participating in extracurricular activities. The questionnaire explored study skills by asking students to rate them and indicate what study methods they employed. The questionnaire exploring stress included a Likert scale, which asked participants to rate how often they felt stress and frequency of signs and symptoms of stress, such as anxiety, depression, insomnia, irritability, unhappiness, panic, and mood changes. Possible triggers of stress were listed for participants to choose from; participants could choose multiple options from the list. Questions related to stress were the same questions used in the National Union of Students (NUS) Mental Distress Survey.[14] Questions exploring levels of motivation asked participants to rate their motivation using a Likert scale.

Semistructured interviews were conducted with study participants who volunteered. This sample was obtained by asking all participants, by email, if they would like to attend an interview. Respondents were selected on a first-response basis. The authors attempted to interview 10% of the study participants, and interviews took place at the end

Table 1 - Self-reported Median Number of Hours Students Spent on University Work Outside of University Timetabled Hours

Estimated Hours (Q1) vs Reported Hours in Semester 1 (Q2)	*p*	Reported Hours in Semester 1 (Q2) vs Reported Hours Semester 2 (Q3)	*p*
10–15 hr vs 5–10 hr	.0175	5–10 hr vs 15+ hr	.000

Q, questionnaire.

of each semester with questions aimed at exploring the questionnaire data obtained from the cohort.

Summative marks for all units and demographic data, were collected from the AECC UC Undergraduate Programmes Office. These included numerical grades for written examinations and coursework as well as pass or fail for practical assessments. In the United Kingdom, students are given 2 opportunities to pass an assessment in a unit. The first attempt of an assessment is called the "first sit." If a student is unsuccessful in this "first sit," they are given a second opportunity to be assessed, called the "resit." If a student is unsuccessful at resit, they enter a repeat unit mode and are required to repeat the entire unit in the next academic year.

Data Analysis

Quantitative data were analyzed using statistical software (SPSS version 24; IBM Corporation, Armonk, NY). Demographic continuous data generated mean age and gender proportions, while ordinal data were compared using Wilcoxon sign-rank test for related samples and categorical data using Pearson χ^2 test for trend. Qualitative data were analyzed using NVivo 12 Pro (QSR International, Doncaster, Australia) using a thematic analysis approach with coding generating themes supported by illustrative quotes.

RESULTS

Demographic Data

Forty-nine students, out of a cohort of 67 students, volunteered to take part in the study, constituting 73% of the cohort. Of these, 57% were female, with a mean age of 20.9 (±4.5) years. All participants completed Q1 at the beginning of the academic year, with 43 completing Q2 at the end of semester 1 and 42 completing Q3 at the end of semester 2. Paper questionnaires were distributed to participants during a lecture, with absence from lectures underlying reduced numbers in semester 1 and 2.

Six participants took part in the interviews at the end of semester 1. Four participants took part in the interviews at the end of semester 2. One participant who was booked for an interview in semester 2 was absent on the day of the interview.

University Work Hours

Participants were asked to estimate how many hours per week they thought they would need for university work. Table 1 refers to the estimated hours at the beginning of the year vs reported semester 1 hours, as well as reported semester 1 hours vs reported semester 2 hours.

During the semistructured interviews, participants were asked what their greatest barrier to study time was. Five codes emerged: family pressure on time; employment outside of the university hours; time spent on social media; time organization difficulties; and procrastination. These were all discussed as reasons for ineffective use of time or external pressures on time. Two codes emerged that were mentioned by all but 1 participant. These were family pressures on time and procrastination. With regard to family pressure on time, 1 participant encapsulated this external pressure on time by saying, "*My family are my brother, boyfriend, nieces, nephews, and although they are all supportive, they say they don't see me very often and that is like a dagger to my heart and I feel very guilty*." Regarding procrastination, one participant discussed that they were not very good at time management and said, *"Instead of more time, I need to make better use of that time."* This was mirrored by another participant who said, *"I get distracted sometimes. I have to check myself and say this is what I need for my future."*

University Work Hours and Resit Students

Figure 1 refers to the number of hours a participant reportedly spent studying outside of formal lecture and practical tutorials in semester 1 vs participants who were required to resit 1 or more units during the academic year. There was no significant association (χ^2) between hours of studying and resit participants ($p = .170$).

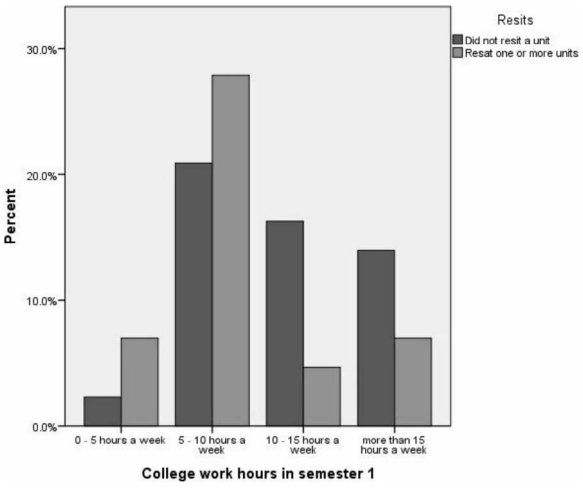

Figure 1 - Number of hours a participant spent studying outside of formal lecture and practical tutorials in semester 1 regarding participants requiring 1 or more resits.

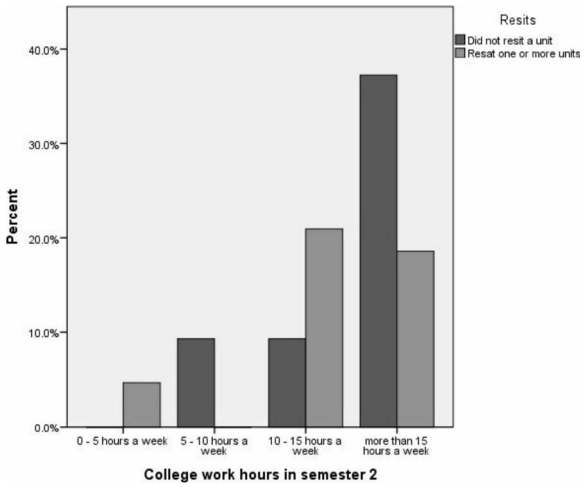

Figure 2 - Number of hours a participant spent studying outside of formal lecture and practical hours in semester 2 with regard to participants requiring 1 or more resits.

Figure 2 refers to the number of hours a participant reportedly spent studying outside of formal lecture and practical tutorials in semester 2 vs participants who were required to resit 1 or more units during the academic year. Again, there was no significant association (χ^2) between hours of studying and resit participants ($p = .017$).

University Work Hours and Practical Assessment Results

Chi squared showed no association between the number of hours a participant spent studying outside of formal lecture and practical tutorials in semester 1 and participants requiring a resit in the semester 1 practical assessment ($p = .474$). This was also the case for the number of hours a participant spent studying outside of formal lecture and practical hours in semester 2 and participants requiring a resit in the semester 2 practical assessment ($p = .805$).

Hobby and Sport Hours

Table 2 represents the percentage of participants who partook in sport or a hobby. Participants were asked at the beginning of the academic year if they participated in a hobby or sport (Q1). At the end of semester 1, participants were asked if they still participated in a hobby or sport or no longer participated in a hobby or sport (Q2). At the end of semester 2, participants were asked if they still participated in a hobby or sport or no longer participated in a hobby or sport (Q3). Despite a small number precluding statistical analysis, it is evident that there was a rise throughout the year in the number of participants who stopped their sport or hobby.

Table 3 represents the participants who continued to participate in hobbies and sport. Participants were asked how many hours they spent on hobbies and sport before starting the academic year (Q1), how many hours they spent on hobbies and sport in semester 1 (Q2), and how many hours they spent on hobbies and sport in semester 2 (Q3). Here again, small numbers precluded statistical analysis. However, it is evident that there was a rise throughout the year in the number of participants who reduced the number of hours of participation in their sport or hobby.

Participants who no longer participated in a hobby or sport were asked a follow-up open questionnaire question of why they no longer participated, with 100% of participants indicating a lack of time. One quote from a semester 2 interview encompasses the general feeling of the participants: *"I am not doing as much sport as I want to, there is just not enough time."*

Time Spent With Family and Friends

Table 4 represents the amount of time a participant spent with family and friends per week. There was little change across the year.

In the qualitative interviews, one main code emerged, which was one of university comradery. Many participants are living away from home and felt they did not see their families and nonuniversity friends very often during term time. This was evident in the interviews with most students, who stated variables of "*I basically ignored everyone I know this year"* and *"I cancelled events I was going to with my friends."* However, they no longer saw their university colleagues as only fellow students, but rather as their new friends and family. This was evident in all but 1 end of the semester 2 interviews, with 1 quote encapsulating the general feeling: *"I see my friends every day now, they are just my university friends and not my friends before university."*

Time Spent on Social Media

Table 5 represents the amount of time per week a participant spent on social media. There was little change across the year.

In the qualitative interviews, 2 main codes emerged. One was the use of social media as a procrastination tool, and the second was the use of social media (particularly Facebook) in education. The class had formed a Facebook group, and important notices and information were being disseminated through this platform. As a procrastination

Table 2 - Percentage of Participants Who Participate in a Sport or Hobby

Amount of Participation	Beginning of the Year ($n = 49$)	Semester 1 ($n = 43$)	Semester 2 ($n = 43$)
Do not participate in a hobby/sport	14.3%	16.3%	16.3%
Participate in a hobby/sport	85.7%	74.4%	62.8%
No longer participate in a hobby/sport	–	9.3%	20.9%

Table 3 - Of the Participants Who Participated or Continued to Participate in a Sport or Hobby, How Many Hours Are They Spending Each Week

Number of Hours	Before the Academic Year ($n = 42$)	Semester 1 ($n = 32$)	Semester 2 ($n = 27$)
0–5 hr a week	38.1% ($n = 16$)	34.4% ($n = 11$)	37.0% ($n = 10$)
5–10 hr a week	40.5% ($n = 17$)	43.8% ($n = 14$)	44.4% ($n = 12$)
10–15 hr a week	16.7% ($n = 7$)	18.8% ($n = 6$)	14.8% ($n = 4$)
>15 hr a week	4.8% ($n = 2$)	3.1% ($n = 1$)	3.7% ($n = 1$)

tool, Facebook appeared effective, with 1 student summing up the general use: *"I spend a lot of time on social media. I don't sit there for hours at a time, but if I'm studying and I don't understand something, I click the tab and cat videos and 10,000 cat videos and before you know it you are looking at your mechanic's sister's wedding videos even though you don't know who they are*." However, participants felt that deleting or not using social media was not an option as it was being used as an information dissemination tool: *"I planned to delete my Facebook account when I came here, but then on the first day it became apparent that is quite a crucial part of communicating because we get academic notices on there, the academic reps, or this room has changed, or information about what we are studying."*

Study Skills

Table 6 represents how the participants rated their own study skills, with little change in the perception of study skills across the year.

In the qualitative interviews, one main code emerged when participants were asked to rate their study skills. Participants felt that study skills used or taught in school did not prepare them for university. Two quotes from 2 interviewees in semester 1 outline the general feeling from all interviews throughout the year. One was, *"If I remember rightly, you are spoon fed at school. I didn't do what I do now."* The other said, *"I didn't have study skills at high school . . . , I didn't have independent study skills, or study skills really, until I went to university, and I had to figure it out really quickly."*

Participants were given the following options and allowed to choose more than 1: rote learning, mind maps, past assessments (assessments from previous years), flash cards, reading and highlighting, annotations, and understanding. Table 7 represents the methods that participants felt most comfortable with.

There was a decrease in the number of students who used rote learning as a study method, while the use of flash cards and past assessments increased slightly. For participants who chose the option of "other," they were asked to describe what "other" was, with the majority indicating this meant group work and group studying.

Motivation

Participants were asked to rate their motivation to succeed at the AECC UC at the beginning of the academic year (Q1), end of semester 1 (Q2), and end of semester 2 (Q3). Participants were very motivated at the beginning of the year; this remained so for the end of semester 1 (very motivated vs very motivated, $p = .257$). The closer to the end-of-year assessments (end of semester 2), participants were significantly less motivated (very motivated vs motivated, $p = .007$).

Motivation was explored during the semistructured interviews. Firstly, the reasons participants wanted to study chiropractic were explored. Five codes emerged (listed in decreasing order): successful previous treatment by a chiropractor; wanting to help people; family influence (a chiropractor in the immediate family); wanting a more vocational career; financial gain. One participant summed up the primary motivators, stating the *"main reason I want to do chiropractic is because it helps people, having experienced it for myself and know how wonderful it is."* Secondly, changes in motivation throughout the academic year were explored. Participants noted an increase in motivation due to particular units being *"exciting"* such as *"practical"* and *"neurology,"* with 1 participant stating that *"motivation has gotten stronger over the 1st year, I didn't realize what we would be learning, but once I saw the outline of the practical I fell in love with chiropractic even more."* However, equally discussed was a decrease in motivation due to *"dry"* units where the relation to chiropractic practice was not obvious to the participants. One participant demonstrated this by stating *"some stuff you learn, motivation decreases a little bit . . . it's really dry and pointless."*

Table 4 - Amount of Time a Participant Spent With Family and Friends Before the Start of the Academic Year, During Semester 1, and During Semester 2

Number of Hours	Before the Academic Year ($n = 49$)	Semester 1 ($n = 43$)	Semester 2 ($n = 42$)
0–5 hr a week	30.6% ($n = 15$)	30.3% ($n = 13$)	38.0% ($n = 16$)
5–10 hr a week	44.9 % ($n = 22$)	16.3% ($n = 7$)	26.2% ($n = 11$)
10–15 hr a week	12.3% ($n = 6$)	25.6% ($n = 11$)	14.3% ($n = 6$)
More than 15 hr a week	12.2% ($n = 6$)	27.9% ($n = 12$)	21.4% ($n = 9$)

Table 5 - Amount of Time a Participant Spent on Social Media Before the Start of the Academic Year, During Semester 1, and During Semester 2

Number of Hours	Before the Academic Year ($n = 49$)	In Semester 1 ($n = 43$)	In Semester 2 ($n = 43$)
0–5 hr a week	67.4% ($n = 33$)	58.1% ($n = 25$)	67.5% ($n = 29$)
5–10 hr a week	20.4% ($n = 10$)	25.6% ($n = 11$)	23.3% ($n = 10$)
10–15 hr a week	10.2% ($n = 5$)	7.0% ($n = 3$)	7.0% ($n = 3$)
More than 15 hr a week	2.0% ($n = 1$)	9.3% ($n = 4$)	2.3% ($n = 1$)

Motivation and Summative Assessment Results

Participants at the beginning of the year who scored higher on motivation were less likely to require a resit in 1 or more units in the academic year (χ^2, $p = .03$). This result was repeated at the end of semester 1 where participants who were more motivated at this stage were also less likely to require a resit in 1 or more units in the academic year (χ^2, $p = .03$). However, at the end of semester 2, there was no association between motivation and assessment outcome (χ^2, $p = .27$).

Stress

Participants were asked how often they felt stress or the signs of stress at the beginning of the year (Q1), end of semester 1 (Q2), and end of semester 2 (Q3). Table 8 refers to reported stress and signs of stress at the beginning of the year vs end of semester 1, as well as end of semester 1 vs end of semester 2. The general trend suggests stress, and signs of stress increased between the beginning of the year and the end of semester 1. However, stress and the signs of stress become significantly more apparent in semester 2.

While the quantitative data demonstrated an increase in stress, the semistructured interviews did not. All participants interviewed at the end of semester 2 stated that they did not feel an increase in stress, with 1 participant suggesting, *"I don't think I am very stressed. I don't feel stressed."*

Participants were provided with 13 triggers of stress and asked to indicate which triggers they found stressful at the beginning of the year (Q1), end of semester 1 (Q2), and end of semester 2 (Q3). These were related to their academic studies as well as triggers outside of their academic studies. Figure 3 shows reported causes of stress in semester 1 vs causes of stress in semester 2.

During the semistructured interviews, the triggers of stress were explored. Two codes emerged (listed in decreasing order): assessment stress and personal problems (external stress). All participants stated that assessments were the highest cause of stress. One participant summed up the feeling of the interviewees: *". . . got stressed at exam time–my stress level is a vicious circle. I will be so stressed and anxious that I don't sleep, but then I stress out because I will be tried the next day."* Four out of the 10 participants interviewed stated that external stress, such as personal problems, was an issue in the year. When asked if they had sought student services help, or other assistance, one participant mentioned, *"You don't want to go to your tutor saying I'm having troubles; you don't want them to think 'ok this kids an idiot' you know what I mean?"*

Stress and Summative Assessment Results

Stress was compared to participants who required 1 or more resit assessments at the end of the academic year. Assessment outcomes were not associated with stress at the beginning of the year (χ^2, $p = .81$), end of semester 1 (χ^2, $p = .43$), or at the end of semester 2 (X^2, $p = .99$).

DISCUSSION

Participants in this study overestimated the number of hours they would need to study at the beginning of their academic year compared to the reported hours studying in semester 1. Number of hours spent studying outside of formal timetabled hours increased significantly in semester 2. It is possible that this may be linked to the increase in the number of assessments in semester 2 compared with semester 1 (2 units at the end of semester 1 compared to 5 units at the end of semester 2), as the drive to study is influenced by assessments.[27] Equally, due to the number of failures in the practical unit in semester 1, this prior knowledge and expectation of potential failure in semester 2 practical assessment may have had an impact on participants' perception of the amount of work required to pass the subsequent assessments. Qualitative data revealed that a barrier to the number of hours spent on university work was external pressure to spend time with

Table 6 - How Participants Rate Their Study Skills Before the Start of the Academic Year, During Semester 1, and During Semester 2

Study Skills Rating	Before the Academic Year ($n = 49$)	Semester 1 ($n = 43$)	Semester 2 ($n = 43$)
My study skills are not very good	4.1% ($n = 2$)	9.3% ($n = 4$)	7.0% ($n = 3$)
I have some skills that need development	38.8% ($n = 19$)	25.6% ($n = 11$)	32.6% ($n = 14$)
I have adequate skills	53.1% ($n = 26$)	62.8% ($n = 27$)	53.5% ($n = 23$)
I have great study skills	4.1% ($n = 2$)	2.3% ($n = 1$)	7.0% ($n = 3$)

Table 7 - Percentage of Participants Who Use Particular Study Methods

Study Methods	Before the Academic Year	Semester 1	Semester 2
Rote learning	17.0%	13.7%	11.9%
Mind maps	6.3%	4.6%	6.5%
Past assessments	16.4%	21.6%	18.5%
Flash cards	8.2%	15.0%	16.7%
Read and highlight	15.1%	10.5%	13.1%
Annotate	15.1%	11.1%	11.3%
Understand	17.0%	19.0%	16.7%
Other	5.0%	4.6%	5.4%

family. Interestingly, the reported number of hours spent with friends and family fluctuated only slightly. However, there was no pattern to the fluctuations. Interview data did indeed confirm participants spending less time with their family and friends outside of university; however, participants saw their new university colleagues as friends. In the questionnaire, no differentiation was made between university colleagues and friends outside of university, and as such the questionnaire data does not adequately represent the quantitative data.

Procrastination seemed to be an ongoing internal barrier to study time. Studying procrastination has been negatively associated with poor grades; however, student services rarely address this issue.[2] There is a paucity of literature regarding effective tools to prevent unnecessary procrastination while studying. As such, it is a subject area to be explored in the future.

One assumes that the amount of study hours a student puts in should have equated to a better outcome. However, this did not occur in this cohort of participants. There was no correlation between number of hours spent on university work outside of formal teaching hours and participants requiring 1 or more resits. It is possible that the quantity of hours spent studying outside of formal teaching hours does not equate with quality of studying. Indeed, there have been mixed results with regard to outcome or summative marks.[4–6] It would appear that there are several factors that are more beneficial to outcomes than study hours alone; however, an exploration

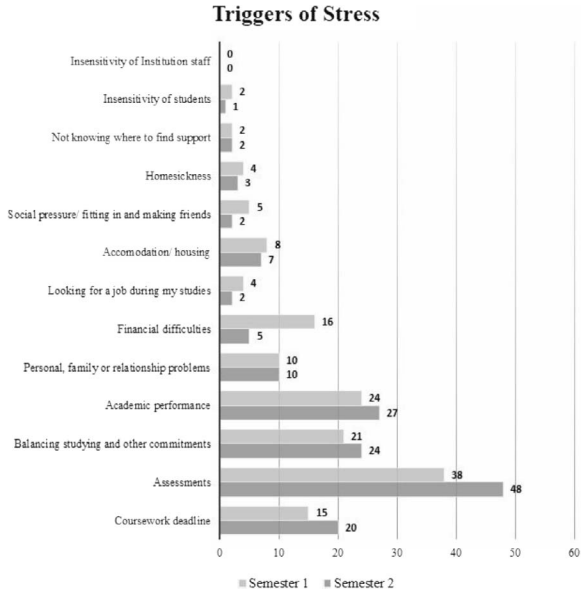

Figure 3 - Reported causes of stress in semester 1 and semester 2. The numbers on the x-axis indicate percentage of students.

of these factors was not within the scope of this study. What is evident is a substantive shift from semester 1 to semester 2 in work hours of both successful and unsuccessful participants from a mean of 5–10 hours in semester 1 to a mean of 15 or more hours in semester 2.

The number of participants who did not participate in a hobby or sport stayed constant throughout the year. In other words, no one began a new hobby or sport within the academic year. Of interest is the number of participants who gave up their sport or hobby (9% in semester 1 and 20% in semester 2); however, the number of hours spent on the hobby or sport remained the same. This indicates that participants preferred to give up their sport or hobby completely and did not see cutting down the number of hours as an option. All participants listed a lack of time as the reason for giving up their sport or hobby and that the time spared was being spent on university work. As a healthcare institution, and with the nature of a sport and

Table 8 - Comparison of Medians at the Beginning of the Year, End of Semester 1, and End of Semester 2 for Stress and Signs of Stress

Signs and Symptoms of Stress	Median Category at Beginning of Year vs Median Category Semester 1	*p*	Median Category Semester 1 vs Median Category Semester 2	*p*
Stress	Once a month vs once a week	.01	Once a week vs more than once a week	.00
Lack of energy or motivation	Once a month vs once a month	.63	Once a month vs once a week	.00
Feeling unhappy or down	Once a month vs once a month	.70	Once a month vs once a week	.01
Anxiety	Once a semester vs once a semester	.23	Once a semester vs once a week	.04
Insomnia/trouble sleeping	Once a semester vs once a semester	.08	Once a semester vs once a month	1.00
Feeling depressed	Never vs never	.07	Never vs once a semester	.03
Irritability or anger	Once a semester vs once a semester	.10	Once a semester vs once a month	.01
Panic	Once a semester vs once a month	.00	Once a month vs once a month	.51
Sudden mood changes	Once a semester vs once a month	.26	Once a month vs once a month	.03

hobby being a source of stress relief, it is thought-provoking that 20% of participants gave up.

The reported number of hours spent on social media fluctuated slightly within the academic year; however, there was no pattern to the fluctuations. The interviews revealed 2 codes, a procrastination tool and a class information dissemination tool. Procrastination as a code appeared in study hours, as it did social media hours. It would appear that in this cohort of participants, social media was a well-used procrastination tool. Junco[28] suggests that this is not unusual in university students. Equally, Facebook and social media is being increasingly used for dissemination of information and notices in a university setting.[29] While many universities still prefer to maintain email as the official channel of communication, participants are using Facebook for university notices and fast, effective communication within the year or class.[29]

Participants were asked to rate their study skills throughout the year. There were minor fluctuations within their rating; however, they were mostly consistent. Thus, within this cohort of participants, their confidence in their study skills remained the same throughout the year. It is assumed that participants' study skills improve throughout their academic life[9]; however, they appear to have not changed within this cohort in 1 academic year. During interviews, one overwhelming theme arose: the perception that study skills taught or used in schools did not prepare participants for university. As this cohort of participants was 1st-year students, predominantly new to higher education, the majority of the participants had not experienced university previously and were reliant on study skills used and taught in schools. The lack of improvement in confidence and competencies around study skills perhaps demonstrates the need for universities to focus on or implement remediation in this area.

At the beginning of the year, students were "very motivated" to succeed in their studies. As chiropractic education is often a strong vocational choice, this is to be expected and in keeping with the literature.[22] Students maintained being "very motivated" to succeed in semester 1. However, this was significantly reduced to "motivated" to succeed in semester 2. It should be noted that both preferences of "very motivated" and "motivated" have positive connotations; while a decrease is noteworthy, it is not alarming.

It is suggested that intrinsic motivators are stronger than extrinsic motivations.[23] The codes for choosing to study chiropractic are a mix of intrinsic and extrinsic motivators. Wanting to help people is an intrinsic motivator, whereas family influence and financial gain would generally be considered extrinsic.

Participants felt that staying motivated throughout the academic year was linked to excitement about new learning. This is a strong intrinsic motivator and should be encouraged throughout the academic year. Potentially, the reason why some participants felt demotivated by "dry" or "pointless" units is that they failed to see the connection between what they perceived to be "pointless" and the real relevance to their future career.

A decrease in energy or motivation is 1 symptom of stress. When looking at the frequency of low energy or motivation, no change from the beginning of the academic year to the end of semester 1 was recorded, remaining at "once a month." However, participants noted a lack of energy and motivation once a week toward the end of semester 2, which constitutes a significant change in motivation over the time period. The increase in frequency of lack of energy and motivation also correlated with the decrease in motivation.

Participants' stress significantly increased throughout the year, from stress "once a month" at the beginning of the year to stress "more than once a week" at the end of the academic year. Most signs of stress, such as lack of energy, feeling unhappy, anxiety, feeling depressed, irritability, and sudden mood changes remained the same or increased slightly between the beginning of the year and the end of semester 1. However, these increased significantly toward the end of semester 2. Panic and insomnia increased nonsignificantly throughout the year. This demonstrates a general trend of increasing stress and symptoms of stress throughout the year, but more acutely toward the end of semester 2. This may be due to the assessment schedule for the year. Students have assessments for 2 units at the end of semester 1, whereas students have assessments for 5 units at the end of semester 2.

The UK NUS Mental Distress Survey 2013[14] was carried out in Mental Health Awareness Week in 2013. In this survey, 1302 participants from across England took part in the survey. As the survey was carried out in May 2013, its results correspond with the end of semester 2 (Q3) from the study presented here. When comparing the results of this study to the results of the NUS Survey, the study participants felt stress "more than once a week," whereas the NUS Survey participants felt stress "once a term." The study participants felt a lack of energy or motivation once a week compared with the NUS Survey of once a term. This indicates that overall, the participants in this study exhibited symptoms and signs of stress more frequently than those participating in the England-wide NUS Survey. The NUS Survey was open to all higher education students across all years and programs, and it is already known that healthcare education is associated with high stress due to the intense nature of the academic and clinical demands.[15] However, the difference highlights the need for additional student assistance to be made available focusing on stress and symptoms of mental distress in healthcare students.

The highest triggers of stress were academic in nature and related to assessments: exams, academic performance, coursework deadlines, and the balancing act between studying and other commitments. This is in keeping with the current literature.[13,16] Equally, this was mirrored by the NUS Survey, which had identical results. As these are recognized triggers of stress, these could be targeted by student services to provide increased assistance. External personal and relationship problems were equally high in semester 1 and 2. The interviews indicated this is a very real issue for students and has an impact on stress. How much of an impact relationship problems had on academic results was not within the scope of this study. Financial

stress was high in semester 1 and decreased in semester 2. This change may be due to students finding their feet within the first few months of university.

Students with higher motivation were less likely to fail 1 or more units. However, frequency of stress did not correlate with summative results. Moderate stress can facilitate academic performance, but high stress is linked to poor academic performance.[18] This study did not ask about level of stress but focused on frequency of stress. As such, it is feasible that although participants perceived stress frequently, the level of stress was moderate and facilitative to academic performance. It would be beneficial for future studies to investigate stress level and frequency simultaneously.

While it is easy to reach a conclusion that more student assistance is needed in the areas of stress, stress triggers, and motivation, it should be noted that student assistance is freely available to all students at the AECC UC. Students need to make an appointment or ask for help; however, it would appear that students are reluctant to do so. They have concerns about appearing to not be coping or "being an idiot," which is concerning, but not unusual across the sector. According to the NUS Survey, only 17% of students who experienced feelings of mental distress approached student services for assistance. In an effort to reduce the stigma associated with mental distress, the Time to Change Campaign was launched in England and Wales.[30]

As students are often not seeking help themselves, potentially underperforming students should be flagged to student services and offered intrusive advising. Intrusive advising or high involvement advising assists the students in identifying and potentially resolving causes of poor academic performance.[31] The literature suggests that intrusive advising has a positive impact on student results.

Limitations

Seventy-three percent of students in the year group took part in the study. As such, it is reasonable to assume that the data are reflective of this cohort. However, to what extent the data are generalizable to other cohorts is unknown. It is possible that participants may have altered their responses to the questionnaire or interview questions to appear to have a more positive outcome. It is unknown to what extent reporting bias may have influenced the results of this study.

CONCLUSION

This study aimed at investigating the relationship between nonacademic factors and academic performance, as well as the relationship between nonacademic factors themselves. Time management, study skills, stress, and motivation influenced academic performance. Equally, there were relationships that existed between the nonacademic factors, such as the relationship between stress and motivation. This study supports the notion that student assistance is needed; however, this is a simplistic view. Future research may focus on uptake of assistance by students and type of assistance that would best help the student, particularly considering the relationships between nonacademic factors.

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REFERENCES

1. Abdulghani HM, Al-Drees AA, Khalil MS, Ahmad F, Ponnamperuma GG, Amin Z. What factors determine academic achievement in high achieving undergraduate medical students? A qualitative study. *Med Teach*. 2014(suppl 36):S43–48.
2. Goroshit M. Academic procrastination and academic performance: an initial basis for intervention. *J Prev Interv Community*. 2018;46(2):131–142.
3. Häfner A, Stock A, Oberst V. Decreasing students' stress through time management training: an intervention study. *Eur J Psychol Educ*. 2015;30(1):81–94.
4. Eikeland OJ, Manger T. Why students fail during their first university semesters. *Int Rev Educ*. 1992;38:489–503.
5. Barbarick KA, Ippolito JA. Does the number of hours studied affect exam performance? *J Natl Resources Life Sci Educ*. 2003;32:32–35.

6. Bonsaken T, Brown T, Lim HB, Fong K. Approaches to studying predict academic performance in undergraduate occupational therapy students: a cross-cultural study. *BMC Med Educ*. 2017;17:76.
7. McAndrew M, Kamboj RS, Pierre GC. Do dental students use optimal study strategies? *J Dent Educ*. 2015;79(1):33–37.
8. Morehead K, Rhodes MG, DeLozier S. Instructor and student knowledge of study strategies. *Memory*. 2016; 24(2):257–271.
9. Blasiman RN, Dunlosky J, Rawson KA. The what, how much, and when of study strategies: comparing intended versus actual study behaviour. *Memory*. 2017; 25(6):784–792.
10. McCabe J. Metacognitive awareness of learning strategies in undergraduates. *Mem Cognit*. 2011; 39(3):462–476.
11. West C, Sadoski M. Do study strategies predict academic performance in medical school? *Med Educ*. 2011;45(7):696–703.
12. Oude Egbrink MG, Schuwirth LW. Narrative information obtained during student selection predicts problematic study behavior. *Med Teach*. 2016;38(8): 844–849.
13. Paul G, Hinman G, Dottl S, Passon J. Academic development: a survey of academic difficulties experienced by medical students and support services provided. *Teach Learn Med*. 2009;21(3):254–260.
14. Kerr H. *Mental Distress Survey Overview*. London: National Union of Students; 2013. https://www.nus.org.uk/global/campaigns/20130517%20mental%20distress%20survey%20%20overview.pdf. Accessed Oct 4, 2018.
15. Dahlin M, Joneborg N, Runeson B. Stress and depression among medical students: a cross-sectional study. *Med Educ*. 2005;9:594–604.
16. Abdulghani HM. Stress and depression among medical students: a cross sectional study at a medical college in Saudi Arabia. Pak J Med Sci. 2008;24:12–17.
17. Sohail N. Stress and academic performance among medical students. *J Coll Physicians Surg Pak*. 2013;23: 67–71.
18. Iorga M, Dondas C, Zugun-Eloae C. Depressed as freshmen, stressed as seniors: the relationship between depression, perceived stress and academic results among medical students. *Behav Sci*. 2018;8(8):70.
19. Kiecolt-Glaser J, Glaser R. Depression and immune function: central pathways to morbidity and mortality. *J Psychosom Res*. 2002;53:873–876.
20. Cheng V, Catling J. The role of resilience, delayed gratification and stress in predicting academic performance. *Psychol Teach Rev*. 2015;21(1):13–24.
21. Henning MA, Krägeloh CU, Hawken SJ, Doherty I, Zhao1 Y, Shulruf B. Motivation to learn, quality of life and estimated academic achievement: medical students studying in New Zealand. *Med Sci Educ*. 2011;21(2): 142–150.
22. Fairchild AJ, Horst SJ, Finney SJ, Barron KE. Evaluating existing and new validity evidence for the Academic Motivation Scale. *Contemp Educ Psychol*. 2005;30:331–358.
23. Park J, Chung S, An H, Park S, Lee C, Kim SY, Kim KS. A structural model of stress, motivation, and academic performance in medical students. *Psychiatry Investig*. 2012;9(2):143–149.
24. Henning MA, Krägeloh CU, Booth R, Hill EM, Chen J, Webster C. An exploratory study of the relationships among physical health, competitiveness, stress, motivation, and grade attainment: pre-medical and health science students. *Asia Pacific Scholar*. 2018;3(3):5–16.
25. Creswell JW. *Research Design: Qualitative, Quantitative and Mixed Method Approaches*. 3rd ed. London: Sage; 2009.
26. Johnson RB, Onwuegbuzie AJ, Turner LA. Towards a definition of mixed methods research. *J Mix Methods Res*. 2007;1(2):112–133.
27. Wormald BW, Schoeman S, Somasunderam A, Penn M. Assessment drives learning: an unavoidable truth? *Anat Sci Educ*. 2009;2(5):199–204.
28. Junco R. The relationship between frequency of Facebook use, participation in Facebook activities, and student engagement. *Comput Educ*. 2012;58(1): 162–171.
29. Dickie VA, Meyer H. The Facebook tutor: networking education. *Ubiquitous Learning*. 2015;8(2):1–12.
30. Time to change: let's end mental health discrimination. Web site. Time to Change. https://www.time-to-change.org.uk/. Accessed April 4, 2088.
31. Vander Schee BA. adding insight to intrusive advising and its effectiveness with students on probation. *NACADA J*. 2007;27(2):50–59.