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percentages for both portions. This significance was especially between the AAT<sup>-</sup> portion of the Nursing department (lowest score) and both the Emergency Health and Pharmacy departments (highest score) as well as between the AAT<sup>+</sup> portion of the Emergency Health (lowest score) and both the Nursing and Radiology and Medical Imaging departments (highest score). Echoing what had been mentioned earlier, the Emergency Health department had the significantly highest AAT<sup>-</sup> portion and the lowest AAT<sup>+</sup> portion. The highest total score of the Pharmacy department might be hypothesized by its (166) credit hours, which is the highest among the other departments, ranging from 127 credits to 138 credits. This hypothesis is accepted from one side, as the Nursing department that has the lowest AAT score also has the lowest credit hours (127). Conversely, this hypothesis is rejected by the fact that both the Radiology and Medical Imaging and the Emergency Health departments, which occupy the second and third highest total scores, have 137 and 133 credit hours, respectively. An additional hypothesis that might partially provide further explanation is that both the Pharmacy and the Emergency Health departments had the highest percentage of credit hours allocated for practical sessions (23.5% and 35.3%, respectively), while the range for other departments was 7.1% to 18.8%, again with the lowest percentage for the Nursing department. Practical and clinical parts for any health profession program require more effort and time for the students to study than the theoretical parts because they are based not only on cognitive skills but also on psychomotor and affective skills. It might be said that this hypothesis provides a partial explanation, as it can be applied for the Pharmacy and Emergency Health departments but not for the Radiology and Medical Imaging department, which has only 13.1% of practical credit hours. On the other hand, reviewing the teaching and assessment methodologies adopted by the different departments at the FCHS indicated that these methodologies are all the same except for Emergency Health department, in which the assessment instruments for theoretical courses include mid-semester and end-semester exams, reflective reports, poster presentations and oral defense. Other departments' assessment instruments mainly include quizzes, assignments, and mid- and final semester exams. The inclusion of quizzes throughout the semester, which usually assess fewer learning outcomes, include less content of the course topics, and have a lower percentage of the total course mark, might encourage students to study, induce less TA, and enhance better academic achievement. The opposite is true for the mid- and final-semester exams, in which the learning outcomes, content, and mark percentage are greater and consequently more effort and time are needed from students. Accordingly, there is a higher possibility of inducing more TA and negatively affecting the academic performance of the students. In other words, the inclusion of quizzes might enhance the AAT<sup>+</sup> while mid- and final-

semester exams induce AAT<sup>-</sup>. Although reflective reports, poster presentations and oral defense are valid assessment instruments that address the higher intellectual abilities of the students, exaggerated use of such instruments might result in an opposite effect on the students' performance and stimulate the AAT<sup>-</sup> portion and hinder the AAT<sup>+</sup> portion. This could explain why the Emergency Health department has the highest AAT<sup>-</sup> score and the lowest AAT<sup>+</sup> score. Another factor that may explain the results of the Emergency Health Department is the type of cases the students face while studying in this program. All the cases are serious life-threatening emergency cases that logically can place considerable stress and anxiety on the students, including the TA.

### Academic Factors Correlated to AAT Scores and Associated with Departments

The current study assessed the correlation of six academic factors with AAT scores. These factors are college grade entry, GPA of the previous semester, CGPA, average course load in a regular semester, study level, and HPSs' interest in their studies. The results revealed significant correlations between these six factors and AAT scores. In addition, the association of these factors with departments was studied and showed that all factors indicated significant associations except college entry grade and previous semester GPA. The results showed that students with high college entry grades, high GPA in the previous semester, high CGPA, and lower average course load per semester demonstrated significantly lower total AAT scores. As the total score is composed of AAT<sup>-</sup> and AAT<sup>+</sup> scores, it raises the question of whether the quality of TA is a debilitating or a facilitating factor. The significant correlation between those factors and AAT<sup>-</sup> answers the question and indicates that the debilitating TA is dominant. Therefore, low entry grades, low GPA and CGPA, and high course load have a negative effect on students and induce debilitating TA. These results raise a red flag and highlight the importance of proper assignment of course load to the students and hence the importance of academic advising, not only for students' academic achievement but also for their physical and mental wellbeing and to reduce their TA. Quality academic advice can act as a preventive measure against TA. When the academic advisors carefully study the students' academic files and transcripts, they can advise the students on the appropriate number of credit hours that they need to register per semester and balance between completion of the study plan in the standardized duration and minimize stress and anxiety on students, particularly the TA. The total AAT score also showed a positive significant correlation with the students' interest in their studies, which means that students with higher interest would have a higher level of TA. A claim might be raised that students with high interest would be at the same time invested in their academic achievement and this might lead to a high AAT<sup>+</sup> but this

claim is not confirmed by the current results as neither AAT<sup>+</sup> nor AAT<sup>-</sup> is significantly correlated to this factor. Saravanan et al. (2014) also reported that TA is positively correlated with students' motivation in their studies that were conducted on medical students in Malizia [24]. They explained their results that although the students experience TA, their internal motivation and external motivation to learn from their lecturers is unaffected, as they think motivation is imperative for achieving success. This motivation is developed based on demographics, university atmosphere, lecturing method, parental guidance, and students' perceptions about their future [24]. These demographics claimed by Saravanan et al. to support the students' internal and external motivation might also be applicable to HPSs at FCHS. Highly equipped and resourced with qualified faculties and staff and a safe, comfortable environment such as the FCHS is an empowering atmosphere for students' motivation. Additionally, the employment rate of FCHS graduates is high, which positively affects students' perceptions about their future. Moreover, senior HPSs demonstrated significantly higher AAT<sup>+</sup> which can be explained by their increased experience with their departments' assessment methodology and by their improved accommodation than junior HPSs which might make exams an opportunity to encourage them to study to achieve and to develop AAT<sup>+</sup> rather than AAT<sup>-</sup>. Similar results were reported in previous studies. Examples are the correlation between high TA and low GPA and CGPA for pharmacy, dental, and medical students in KSA [7] and reducing TA with senior nursing students in KSA [5]. Additionally, medicine, dental, pharmacy, nursing, and physiotherapy students at Gulf Medical College in UAE reported higher TA as they increased their academic level [20]. Three explanations are offered for these opposing results. The first is that the assessment tool used to assess the TA is different from that used in the two KSA studies as well as in the current study. The second is that the current study and the KSA studies included students from across all academic levels, while in the study conducted at Gulf Medical College, only students from levels 1-3 were included. The third reason is that the Gulf Medical College is a private university, while the FCHS and the 2 colleges of the KAS are governmental. Any overwhelming factor that is known to be specific to private universities might cause a cumulative negative effect on students as they progress through their academic levels, e.g., educational fees, and consequently increase the TA as the students grow in their studies. Of note, the current study did not confirm any significant correlation between the total AAT and the students' study level, but it is only the AAT<sup>+</sup>. Among the six academic factors that showed a significant correlation with TA, four factors (CGPA, average course load per semester, study level, and interest in the study) demonstrated a significant association with the student's department. The Nursing department showed a normal distribution, as a few percentages of the students were in the extreme categories of

CGPA, which were less than 2 and 4. However, the Pharmacy and Radiology and Imaging departments were similar; both had a concentration of the students' percentages in the middle CGPA categories, which were more than 2 and less than 3 and more than 3 and less than 4. Meanwhile, the Physiotherapy department has a different pattern in that three-quarters of the students (76%) are in the category of more than 3 and less than 4. The Emergency Health department has a unique pattern as well; it is the department with the highest percentage in the category of less than 2 CGPA and the lowest percentage in the category of 2 and less than 3. These results can indicate a comparatively lower CGPA among Emergency Health students and can add to the previously hypothesized reasons for the high TA among students in this department. It could be claimed that too many assessments result in TA that led to unsatisfying CGPA; then, this unsatisfied CGPA would repeat the cycle of high TA and low CGPA, which can turn into a never-ending negative cycle. A second red flag is raised, and the number and type of assessments should be carefully designed for any course to motivate and drive student learning rather than to increase their TA and reduce their CGPA. The association between the departments and the average course load per regular semester was also studied. The range of the average semester course load was 8 to 18, and the average was 14.1 credit hours. Therefore, to study the association between course load and department, the course load was categorized into less than or 14 and more than 14 credit hours, and the results indicated a significant association between those two factors, department, and course load. Three departments had the highest percentage of their students in the category of more than 14 credit hours course load; these departments are Emergency Health, Pharmacy, and Radiology and Imaging departments. Echo that these three departments were the departments with the highest AAT scores raises the same red flag that was previously raised about the importance of registering students in a manageable number of credit hours to mitigate TA. Although the Radiology and Imaging Department was the highest in the facilitating AAT<sup>+</sup> score, this association between course load and department places the facilitating TA under suspicion, and in the end, it is anxiety. Another association was found between the department and the study level of the students. The two departments with the highest percentage of junior students were the Pharmacy and Emergency Health departments. The significant association between the study level and departments strengthens the previously mentioned results that senior students had less TA. It can be said that as the study level is correlated with the TA with the advantage to the senior students and most of both Pharmacy and Emergency Health students were junior students, explains why these two departments had the highest level of TA. The academic factor of students' interest in their study was uncertain because, as mentioned earlier, it showed a

significant correlation with total AAT but with no evidence if this TA is of debilitating or facilitating type. A significant association between student interest in study and department added to this query because the Nursing department had the lowest AAT scores and had the lowest percentage of students in the category of moderately or highly interested in study. Meanwhile, the Radiology and Medical Imaging and Pharmacy departments had 100% of students in this category, as did the Emergency Health department, and almost all (92.3%) of its students were in this category as well. As if the students are interested in their programs, other factors hinder their academic achievement and cause their high TA. Factors such as poor studying skills, inability to manage time, or poor English language level might be causative factors. Admission requirements to the FCHS include the level of English language of students, and one of the courses offered by the general requirement department is English writing to assure a high English language level of students. However, it should not be forgotten that the senior students had lower TA than the junior students, and one factor could be their improved English skills that facilitated their study.

### Demographic Factors Correlated to the AAT Scores and Associated with Departments

The current study was concerned not only with students' academic factors but also with their demographic factors. Thus, six demographic factors were assessed in terms of correlation with the ATT scores. These factors are the students' age, marital status, father's educational level, mother's educational level, accommodation, and family social support. Out of these six factors, only accommodation and family social support showed a correlation with AAT scores, but none revealed any association with the students' departments. Although the senior students, who are generally older students, had a significant correlation to the AAT<sup>+</sup>, the student's age does not have any correlation to any of the ATT scores. This might be interpreted as follows: senior students had more AAT<sup>+</sup>, not because they were older but because they had more experience in the college, and they were more familiar with the teaching and assessment methods in their departments. In addition, they might be more concerned about their academic achievement, GPA and CGPA as they are closer to graduation. In other words, the factor of student's study level seemingly relates to the factor of student's age, but practically, they should be treated differently. A recent study by Alkawatli (2022) on HPSs reported that the TA is higher among students who are older than 20 years of age [20], but it should be noted that the assessment tool and the academic levels of students included in his study are different from those of the current study, as explained earlier, and these differences can provide clarification for the different findings between the two studies. The present study included three questions about the students' accommodation in a trial



to estimate their economic level and the environment they study in at home. The three questions were about whether their accommodation is rented or owned, whether they live in a flat or villa, and whether they have a separate or shared room. The results indicated that students who were living in villas, which might indicate a high economic level, had a significantly higher total AAT, but there was no correlation with either AAT<sup>-</sup> or AAT<sup>+</sup>, which led to uncertainty; however, economic level has a debilitating or a facilitating TA effect. The second demographic factor that had a correlation with TA was family social support. The results indicated that family social support empowered the students and significantly reduced their debilitating TA. This result highlights how social support is effective in reducing students' TA, as if family social support is a shield against TA. Being supported by the family provides the students with security, confidence, and assurance against TA. A green flag is raised regarding the role of family in students' academia, not only young students in primary or secondary schools but also adult students in health profession schools.

In conclusion, HPSs at the FCHA, Al Ain, UAE have a moderate level of TA, as demonstrated by the total AAT score, with no significant differences between departments. Academic factors that reduced the students' TA were high college entry grades, high previous semester GPA, high CGPA, and lower average course load per semester. The students' interest in their study increased their TA, and being a senior student increased their facilitating TA. This study emphasized the importance of family social support to reduce students' debilitating TA. Some of the studied academic factors showed an association with the students' department, and none of the studied demographic factors showed any association with the students' department.

## Conclusion

In conclusion, HPSs at FCHA- Al Ain campus- UAE have a moderate level of TA as demonstrated by the total AAT score with no significant differences between departments. Academic factors that reduced the students' TA were high college entry grade, high previous semester GPA, high CGPA, and lower average course load per semester. The students' interest in their study increased the TA and being a senior students increased their facilitating TA. On the other hand, this study emphasized the importance of family social support to reduce the students' debilitating TA. Some of the studied academic factors showed association with the students' department and none of the studied demographic factors showed any association with the students' department.

## Educational Implications

The findings of the current study highlight the following educational implications:

- 1- The eagerness of the academic advisor to help students complete their study plan in the standardized duration might induce TA to students. The semester course load should be carefully decided to enable students to complete their study in the most appropriate duration and at the same time with the minimal intensity of TA.
- 2- The number and type of assessment instruments should be considered not only as a tool to measure students' achievement in learning outcomes but also as a source of TA. That is why the instructors should handle these instruments with a delicate approach to design an assessment protocol that balances the assessment educational purpose and, at the same time, the student's physical and mental well-being.
- 3- Students at FCHS go through a sort of orientation before encountering patients to prepare them for their first clinical practice. This approach should be emphasized for Emergency Health students, as most of the cases they deal with during clinical practice are critical cases, and they need to be prepared and learn coping mechanisms to reduce their psychological stress and anxiety in general and TA in particular.
- 4- Family social support is one of the protective mechanisms against TA, and the provision of orientation to family in this regard would be so precious as to reduce TA.

## Delimitation

Although this study assessed 12 demographic and academic factors, there are many other factors that might affect students' TA. Among these factors are the student's personality type, physical activity level, self-esteem, previous failure, study skills, time management and history of medical or mental illness. It is difficult for one study to address all these factors, as this would prove time-consuming and inconvenient for the participants. In addition, it might not be visible from a statistical analysis perspective to include too much data.

## Areas of Future Work

Future research work might study other factors that might affect the HPSs TA that are not included in the current study, such as the students' type of personality, physical activity level, and nutrition style. Studying the physiological negative impact of TA is also necessary.

## Declaration

### Ethical Approval and consent to participate

The study obtained ethical approval from the FCHS ethical approval committee (Reference No: FECE-20-03-23-PT-Salwa.) on March 21<sup>st</sup>, 2023.

The first section of the questionnaire used in the study included a consent form which was signed by the students in case of using the hard copy and for students who responded to the electronic version of the questionnaire, it was mentioned that responding to the questionnaire would be considered an agreement to participate in the study.

### Consent to Publication

Not applicable.

### Data Availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

### Conflict of interest

All authors declare that there were no potential conflicts of interest.

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### Author contribution

Salwa B. El-Sobkey initiated the research idea.

Salwa B. El-Sobkey, Shaik Balkhis Banu, Emne Hammoud, Suliman Salih, Monika Sachdeva, Noon Kamil, Aisha Namshan Aldawsari, and Scott Cottam designed the methodological procedure and collected the research data.

Salwa B. El-Sobkey analyzed the collected data and wrote the manuscript.

All the authors have read and approved the manuscript.

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