Amani Brandweiner, MSc

Which factors influence academic performance? The role of employment, parallel enrolment, psychosocial factors and study behaviour

MASTER'S THESIS

to achieve the university degree of
Master of Science

Master's degree programme:
Computational Social Systems

submitted to
Graz University of Technology

Supervisors
Univ.-Prof. Dr.phil. Guilherme Maia de Oliveira Wood
Department for Psychology

Univ.-Prof. Dr.rer.nat. Jana Lasser
Department for Data Analysis

Graz, January 2025

ACKNOWLEDGEMENTS

First and foremost, I would like to express my deepest gratitude to my supervisor, Professor Guilherme Maia de Oliveira Wood. His professional support and valuable feedback have been fundamental in helping this thesis to take shape. He has always provided constructive advice and motivated me with his expertise and commitment to keep this research project moving forward.

I would also like to thank Dr. Alexander Loder, who provided me with some necessary data and made the bureaucratic challenges and working with the Department for Performance and Quality Management much easier. His guidance and commitment were essential to the successful completion of this project.

Many thanks also go to my second supervisor, Professor Jana Lasser, who supported me with her expertise. Her willingness to take on this role and her perspectives were a valuable addition and support during the development of this thesis.

I would also like to thank the Department for Performance and Quality Management for the exciting task and the opportunity to apply my skills in such a practical and challenging context. The collaboration has enriched me both professionally and personally and has given me valuable insights into the work of the department.

Additional appreciation goes to my partner and my family. You have always had my back, motivated me and accompanied me through the ups and downs of this intense time with your patience and support.

Without the support of all these wonderful people, this work would not have been possible in this form.

TABLE OF CONTENTS

1. INTRODUCTION

Access to higher education, such as universities, has changed considerably in the last few decades since the Second World War. Institutions that were once primarily accessible to elite groups have become common educational options for a broader and more diverse population (Sobczak, 2018). The topic of study success, academic performance and studyability has received more attention since the late 2000s, in particular since the mid-2010s (Jang et al., 2023). There are several reasons for this, most of which are economic and educational. Increasing dropout rates have socio-economic consequences, as the number of graduates can affect overall economic growth (Bound & Turner, 2011). Degree program transfers and dropout rates also have negative economic consequences for the universities themselves, especially as university funding systems in many countries are performance-based (Bound & Turner, 2011; Larsen et al., 2013). From a pedagogical perspective, while dropping out is considered undesirable, universities typically want to maintain a high quality of education at the same time (Javed & Alenezi, 2023).

Study success can be defined in different ways and ultimately results in the successful completion of a university degree. However, academic performance can also be counted as study success, including the completion of individual learning tasks, the grade point average, the examination activity, the number of ECTS credits earned and many other performance-related factors (Ifenthaler & Yau, 2020; Loder et al., 2024). ECTS hereby stands for European Credit Transfer and Accumulation System and is an official international points system, used by both universities and governments, to make education comparable across borders (Atack, 2022). The following section examines and discusses several factors that may influence academic performance.

1.1. WORKING ALONGSIDE STUDYING

Not only has access to universities increased (Sobczak, 2018), but so has the ratio of working students (Riggert et al., 2006; Zucha et al., 2023). In OECD countries, the proportion of students in employment is between 44% and 80%; in Ireland for example around 61% of students work (Darmody & Smythe 2008), in Estonia over 60% (Beerkens et al., 2011), around 54% in Australia (Bennett et al., 2023), up to 72% in the USA, and around 64% in Canada (Bushnik, 2003).

With the increasing number of working students, the effects of working while studying have also been researched more thoroughly. Although working students can have advantages in the job market (Franzen & Hecken, 2002), employment is suspected to have negative effects on the actual study process. The hypothesis that weekly working hours negatively relate to academic performance is supported by Callender's study on British students (2008). Consequently, the probability of getting good grades decreases by a third if students work many hours per week (Callender, 2008). Wenz & Yu also found modest negative effects on grades for each hour worked per week in a sample of US students (2010). Other research results indicate that only time-intensive employment appears to negatively affect academic studies, especially favouring dropping out of university. Studies conducted in France and the Netherlands found that dropping out of university is only then more likely to occur with at least 8 hours of work per week or more and is even higher at risk with 12-16 hours per week or more (Body et al., 2014; Van den Berg & Hofman, 2005). Hovdhaugen replicated these results for Norwegian students who work more than 20 hours per week (2013), and Moulin et al. implicate the same effect when working more than 24 hours per week in Canada (2013). However, no clear consensus can be drawn from these results, as the many different samples, nationalities and statistical methods do not provide consistent research findings. Factors such as flexibility in the workplace, the current study phase and other elements were also often ignored. In principle, however, it can be assumed that high employment intensity can be disadvantageous for academic success (Body et al., 2014; Callender, 2008; Cinamon, 2015; Hovdhaugen, 2013; Moulin et al., 2013; Unger et al., 2019; Wenz & Yu, 2010).

Not only the work intensity itself but also the reasons for working seem to play a role in academic success. Not being forced to work, for example through higher parental income, is a significant demographic factor associated with better academic performance (Lisnyj et al., 2021). It has been shown that students who work for financial survival get lower grades than students who work to gain career-specific skills (Wenz & Yu, 2010). Despite this knowledge, a large proportion of students in OECD countries must work to cover living costs or tuition fees (Hordósy et al., 2018); in the UK, for example, this applies to around 60-80% of students (Dennis et al., 2018; Holmes, 2008; Richardson et al., 2009). In an Austrian study, 11-19% of university dropouts stated that financial constraints or the difficulty of combining work and study were the main reasons for leaving university (Unger et al., 2019), showing the importance of this topic even more.

Further work-related circumstances need to be considered. Positive interpersonal relationships at work, increased flexibility that increases study focus, and proximity to academic locations are not only popular among students, but can also improve academic performance (Butler, 2007; Taylor & Sandoval, 2023). A high level of workplace support is also related to better academic performance (Chu et al., 2019). Job-study congruence, in other words, the extent to which the educational content at university matches the workplace requirements, also increases student satisfaction and helps them to master both work and study at the same time substantially (Butler, 2007).

1.2. PSYCHOSOCIAL FACTORS INFLUENCING STUDY SUCCESS

Psychosocial factors are a combination of social factors, which cover social structures and processes, and psychological factors, covering the mental state and processes on the individual's level (Stansfeld & Rasul, 2007). However, the term also typically includes psychiatric and biological functions, as well as personal circumstances (Neukrug & Fawcett, 2019). Examples include stress perception, coping mechanisms, affective and cognitive reactions, resource evaluation, social support and substance abuse (Neukrug & Fawcett, 2019; Skinner & Zimmer-Gembeck, 2006; Thoits, 2011; Upton, 2013).

One of the most known psychosocial functions is stress, which university students experience a high level of (Böke et al., 2019; Saleh et al., 2017; Sharmila, 2023). Perceived stress has a negative impact on students' academic performance, as many independent studies have found (Akanpaadgi et al., 2023; Gustems-Carnicer et al., 2019; Mughal, 2021; Pluut et al., 2015; Talib & Zia-ur-Rehman, 2012). Stress is the result of an interaction between the individual and their environment and can be caused by external non-controllable or controllable circumstances. In addition, how the person individually evaluates these circumstances has a considerable impact on their stress appraisal (Ben-Zur, 2019; Lazarus & Folkman, 1984).

In general, stress in students is mainly caused by high workload (Agolla & Angori, 2009; Akanpaadgi et al., 2015; Lisnyj et al., 2021; Talib & Zia-ur-Rehman, 2012), which is only partially controllable through appropriate time management. High student workload not only has a direct negative impact on academic satisfaction and both physical and emotional health but also leads to poorer academic performance (Agolla & Angori, 2009; Lisnyj et al., 2021; Mughal, 2021). In addition, institutional factors of universities can have an impact on the perceived stress levels and are typically non-controllable sources of stress. Institutions that

do not provide clear academic guidance contribute to both higher stress levels and lower academic performance (Lisnyj et al., 2021). Depending on the region, there may be various further non-controllable stressors: for example, Austria has experienced very high inflation in recent years, which has put a heavy burden on the working class (Zuckerstätter et al., 2023). Other regional examples include the war in Ukraine, which affects the whole of Europe (Delanty, 2023), and the regional lockdowns and regulations during the COVID-19 pandemic (Łaszewska et al., 2021).

However, the perceived stress level is not a stand-alone factor that can influence academic performance. Coping strategies influence a person's ability to deal with stress (Ben-Zur, 2019; Gustems-Carnicer et al., 2019; Lazarus & Folkman, 1984; Lisnyj et al., 2021). Researchers have found that students with a stronger task-orientated coping style have less stress and less intention to drop out of university (Gustems-Carnicer et al., 2019; Lisnyj et al., 2021). Strong social support also has a positive impact on students' academic performance and reduces their stress levels (Lisnyj et al., 2021; Mughal, 2021). This means that students who study in their home country, or even in their home town, are more likely to have sufficient social support than students who move abroad to study. Böke et al. further have found that increased stress can result in unhealthy coping strategies (2019). In some cases, students turn to external, physically unhealthy resources such as alcohol or drugs to cope (Böke et al., 2019).

Other important psychosocial factors are, as already mentioned, affective and cognitive reactions and processes. For example, high perceived self-efficacy can positively influence academic performance (Lisnyj et al., 2021; Zajacova et al., 2005) and minimise the effects of perceived stress (Lisnyj et al., 2021). Academic motivation, or in other words, the desire to achieve one's educational goals, is also associated with lower stress, higher academic performance and higher academic satisfaction (Agolla & Angori, 2009; Heublein, 2014; Lisnyj et al., 2021).

1.3. OTHER FACTORS INFLUENCING STUDY SUCCESS

As the number, and therefore the diversity of university students increases, the influence of students' chronological age has also been increasingly studied over the years. Students over the age of 23 appear to have higher levels of motivation and concentration, which can have a positive impact on academic performance, regardless of the degree program they are pursuing (Santos et al., 2016). However, they are also more likely to have greater work and

family responsibilities, which may be detrimental to their studies, but further details on this were not covered in the study (Santos et al., 2016). In a study of healthy older students (between 50 and 79 years old), Imlach et al. found that age did not affect academic performance (2017). Fields of study and employment were not specified in the study, so it can be assumed that all fields of study were included in the test and that the majority of participants were already retired and therefore neither working nor actively caring for their children (Imlach et al., 2017). Other research even suggests that older students at a liberal arts college, i.e. 25 years of age or older, achieve higher GPAs (Spitzer, 2000), making age an important issue in the context of studying.

The chosen faculty or study program can also significantly influence academic performance, although the results do not appear to be consistent. Araque et al. show that there are significantly more dropouts among humanities students in a university in Granada, Spain, than among software engineering students or economic sciences students (2009). In Germany, there are significantly more dropouts, especially among bachelor's students. This mainly affects the faculties of mathematics, natural sciences and engineering, and less so the faculties of law, social sciences, human medicine, sport and linguistics (Heublein, 2014). This trend can also be observed very strongly in the USA, where, according to the President's Council of Advisors on Science and Technology, less than 40% of STEM students, i.e. from the faculties of science, technology, engineering and mathematics, receive a degree (2012). Bachelor's students are also more at risk here, as around 60% of all dropouts end their studies within the first two years (Chen et al., 2018). A Danish study supports findings that the natural sciences, medicine and technical sciences are associated with an increased risk of dropping out. However, the study also emphasises that no conclusive judgement can be made based on existing literature, as the composition of the student population in the various degree programs differs greatly, and the institutional framework conditions are also often very diverse (Larsen et al., 2013).

Vocational interests may also influence academic performance. It has been shown that certain interests and personality aspects of students influence their future path. For example, pupils with strong conventional or social interests are more likely to choose a working path, while pupils with strong exploratory or enterprising interests are more likely to choose a higher education path (Usslepp et al., 2020). Other studies suggest that interests are related to academic performance (Nye et al., 2012), although possibly through interaction effects with other psychological parameters (Patrick et al., 2010).

Another factor that can influence academic performance is one that students can largely influence themselves, namely their daily time allocation. The time that is spent daily, or at least regularly, on their studies includes attendance at lectures, social integration in study groups, internships, self-learning activities and working on theses (Ifenthaler & Yau, 2020; Van den Berg & Hofman, 2005). These different study elements can positively affect the grade point average, satisfaction with the academic experience and academic success (Ifenthaler & Yau, 2020; Van den Berg & Hofman, 2005; Webber et al., 2013).

1.4. STUDYING IN AUSTRIA AND PARALLEL ENROLMENT

To understand the characteristics of the sample in the present study, it is necessary to understand the Austrian public university system. The following information applies to the University of Graz, where each participant in the sample was enrolled without exception while the study was conducted, but it also applies to most other universities in Austria.

Over 30,000 people are currently enrolled at the University of Graz, making it the largest university in Styria's provincial capital of Graz. In principle, every Austrian or European Union citizen can study at the University of Graz without facing restrictions, such as refusal of admission to studies or paying high tuition fees. Study programs can be cancelled at any time without consequences and are generally free of charge until a certain period, including a buffer, the so-called tolerance semester, has been exceeded. In Graz, this duration typically covers six semesters for a bachelor's degree (with exceptions, such as secondary school teaching or medicine), to which two tuition-free tolerance semesters can be added. A master's degree course typically consists of four semesters (with exceptions), during which one tuition-free tolerance semester can be added. Additional tolerance semesters can be earned through certain extracurricular activities, such as mentoring first-year students (Federal Ministry of Education, Science and Research, 2002; University of Graz, n.d.).

One can always enrol for the winter semester before October or the summer semester before March. However, some specific degree programs are restricted by entrance examinations, which often have early application deadlines, and most degree programs require a school-leaving exam, a high school diploma or similar qualifications (Federal Ministry of Education, Science and Research, 2002; University of Graz, n.d.).

Further, there is no limit to the number of degree programs in which one can be enrolled simultaneously or consecutively. It is also possible to be enrolled in different universities in

Graz, or anywhere in Austria, at the same time. There are no additional costs unless the mentioned study duration is exceeded. The same admission regulations apply as when enrolled in only one degree program. However, students pursuing more than one degree program are not favoured in any way, as credit or course transfers between degree programs are possible, but usually only to a very limited extent, and therefore two degree programs generally mean double the effort (Federal Ministry of Education, Science and Research, 2002; University of Graz, n.d.). Suppose a student is enrolled in more than one university program simultaneously. In that case, it is called "parallel enrolment" (Loder et al., 2024). It differs considerably from terms like "dual enrolment" offered in some high schools (An, 2013), "double major" with a low credit effort (Rossi & Hersch, 2008) or "joint degree" with higher time and credit effort, but them still being lower than two separate degrees (Pineda, 2024).

Pursuing several degree programs at the same time is quite special in Austria, as not only are there no additional costs involved, but in most other countries it is linked to more complex regulations or even restrictions. In Germany, for example, it depends on the respective federal state, can be associated with increased administrative hurdles, and is sometimes restrictive in the case of cross-university curricula or numerus clausus-restricted admissions (Universität Leipzig, n.d.). In the USA, it is not only generally very expensive to study, but it is also more common to choose a joint degree or double major, where an overlap of courses or a shorter study duration is possible (Accelerated Degrees Vs Dual Degrees in The US, 2023; Rossi & Hersch, 2008; Pineda, 2024). In Italy, enrolling in several different degree programs was forbidden until recently, but this has been permitted since the 2022/2023 academic year (Di Torino, 2024).

Another reason why enrolment in several degree programs in Austria is popular could be the overall low cost of studying. In some European countries, including Austria, studying is free for EU (European Union) and EEA (European Economic Area) citizens. In comparison, universities in the UK charge up to around 13,000 US dollars per academic year for nationals; the University of Cambridge, for example, charges UK residents more than 10,000 US dollars. Peking University for Undergraduate Students in China charges almost 4000 US dollars per academic year. The Netherlands charges over 2000 US dollars per academic year for EU/EEA citizens. South Korea also charges around 2000 US dollars per academic year for national universities (Hanson, 2024; My blog, 2023; *The Education Price Index 2022 — A Study By N26*, n.d.). In addition, low-income households in Austria are supported during

the standard duration of their studies with state-run financial aid for the cost of living, adjusted to respective parental income (*RIS - Studienförderungsgesetz 1992 - Bundesrecht Konsolidiert, Fassung Vom 06.10.2024*, n.d.).

1.5. EXPECTATIONS

Every country, city, and university has individual regulations, laws, funding systems and procedures, which results in little consistency in the current research (Himanen et al., 2009; Lee, 2014; Pietrucha, 2017). Most of the existing literature allows no or only very limited conclusions about studying in Austria, particularly at the University of Graz.

The present study aims to filter out the exact factors and their characteristics that support or hinder academic performance. In the Austrian system, the influence of employment is to be demonstrated by recording the amount of work and the funding of students. As it is available in the Austrian society, psychosocial factors will be surveyed in detail to determine their potential influence on academic performance. The investigation of being enrolled into more than one degree program, as well as other potential influences known from research, such as age, time allocation and enrolled faculty, has the advantage that it provides additional information and can contribute to a better understanding of studyability on a global level. Additional factors will be exploratively investigated for internal processing. To achieve this, a survey will be conducted with students from the University of Graz and academic performance data will be extracted from an administrative university database.

More knowledge about studyability in Austria and at the University of Graz could greatly help local political decisions. Due to its location, politics, and economic situation, Austria has an important bridging function in Central Europe. As Austria's second-largest city, Graz can make influential decisions that resonate with the whole region. Examples of potential political decisions would be a change in access regulations for degree programs, adjustments to funding, access to useful technologies including both hardware and software options, or the reorganization of courses or faculties. On a smaller scale, more knowledge can also help to ensure that the university itself makes structural decisions and changes. For instance, the university could choose to include specific support programs, training courses, orientation programs, or the restructuring of individual degree programs. The findings can also serve as a basis for further research.

2. METHODS

2.1. DATA ACQUISITION AND POTENTIAL PARTICIPANTS

All students at the University of Graz were eligible for the data collection, with a total population of around 30,000 enrolled students. Students in Austria can enrol for as many different degree programs as they wish free of charge, even across different universities. This is supported by the Austrian legal situation and the geographical closeness of departments and universities (Federal Ministry of Education, Science and Research, 2002; University of Graz, n.d.).

Participants were recruited via word of mouth and social media (Facebook and Instagram), as well as via a university-wide mailing service. The mailing list included all students at the University of Graz who have not previously actively unsubscribed from the mailing list. As compensation, three randomised raffles of €100 each were held at the end of the study, which was also openly communicated at the beginning for advertising purposes. The study had been fully approved by the ethics committee of the University of Graz before it was sent out (GZ 39/96/63 ex 2022/23).

The data collection was conducted at the end of June 2023, being aware of the potential limitation that most final course examinations are not held until the beginning of July. However, this timing made it possible to reach more students, as there is a three-month course-free period starting in July, which is often used as a summer holiday before the start of a new semester in October.

2.2. STUDY SAMPLE

Three hundred and seventy-four students started the online survey, of which 213 students fully completed the questionnaire. Therefore, the final sample consisted of 213 people, 161 female (75.59%) and 52 male (24.41%). The age of the participants at the time of the survey ranged between 17 and 67 years, with an average age of 25 years (M = 25.43, SD = 6.65). Most of the study sample, a total of 177, had Austrian citizenship (83.10%). The participants came from 19 different types of schools through which they obtained their higher education qualifications.

Students from all faculties of the University of Graz were represented in the sample. The percentages in brackets refer to the proportions of the study sample and are not necessarily representative of the entire University of Graz. There were 85 students enrolled in the faculty of Natural Sciences (nawi, 39.91%), 25 in the faculty of Humanities (gewi, 11.74%), 13 in the faculty of Environmental, Regional and Educational Sciences (urbi, 6.10%), eight in the faculty of Law (rewi, 3.76%), seven in the faculty of Social and Economic Sciences (sowi, 3.29%) and one person in the faculty of Catholic Theology (cath, 0.47%). 74 students were enrolled in more than one faculty (mixed, 34.74% of the sample), either due to parallel enrolments across different faculties or because their degree program is transdisciplinary. As the faculty of Catholic Theology was strongly underrepresented, it was included in the 'mixed' faculty to prevent data distortion.

According to the internal administrative database of the University of Graz, 168 participants of the study sample were enrolled in one degree program at the University of Graz (78.87%), 36 in two degree programs (16.90%), eight in three degree programs (3.76%) and one person in four degree programs (0.47%). Due to the limitations of the internal database, no official information on enrolments at other universities could be collected, but survey answers indicated that this was the case for four participants.

2.3. MATERIALS

To be considered as a participant, an online questionnaire had to be fully completed. Also, the participant's matriculation number had to be provided so that the questionnaire data could be linked to the data of the internal administrative database of the University of Graz.

2.3.1. Administrative Database of the University of Graz

Data taken from the internal administrative database of the University of Graz included academic performance indicators for the winter semester 2022/23 and the summer semester 2023 up to participation in the study. Of relevance was the number of ECTS, i.e. the number of course credits, earned in the entire academic year up to the time of the survey completion. This number was later used as the dependent variable for the study. Further, available information from the administrative database also included information about parallel enrolments and several socio-demographic variables including age, origin and prior education.

2.3.2. Online Survey

The online survey was reachable via a web link, which led to a survey web interface. At first, general information about the survey and study was presented, as well as information concerning personal data protection. Participants were also informed about the merging of survey data and database data that occurs when they provide their student ID. All participants had to give informed consent and acknowledge the data privacy regulation. This was submitted and handled separately from the survey data to ensure data privacy and was mandatory to continue further data collection.

Lengthy questionnaires pose a problem for high survey completion rates (Galesic & Bosnjak, 2009), so the online survey was kept as short as possible but as long as necessary. It included items of the AIST-R, the PSS, and the SCI, which will be explained in more detail in the following chapters (Bergmann & Eder, 2005; Satow, 2012; Schneider et al., 2020). If a participant stated that they were employed during their studies, responsive questions were asked about the type of employment, the extent to which it was carried out, when it started or ended, and a resulting estimate of income. The survey also covered questions about the distribution of time in everyday life, namely how many hours per day on average are spent on the following activities: Exercise and sports, attending classes and studying, sleeping at night, caring for other people, engaging in social media, socialising, daily chores such as personal hygiene or housekeeping, and other activities or hobbies. Participants also had to break down the proportions of their income coming from employment and the proportions coming from relatives or partners, savings, grants and scholarships, or other sources. Participants were also briefly asked about the distribution of their expenses.

Further questions dealt with psychosocial factors related to the study program(s), including satisfaction with the study program(s), satisfaction with one's academic performance, satisfaction with the courses of the study program(s), and the desire to continue or discontinue the program(s). In addition, participants were asked to what extent their resources were being utilised by their studies, by studying, and by academic stress. In this context, resources were defined and explained as interest, motivation, perseverance, competencies and other similar factors.

If a participant stated that they were enrolled in more than one degree program at the time of the survey, further questions were asked about this responsively. Firstly, they were

asked whether the studies were treated as equivalent or whether there was a 'main study program' in their eyes that received more attention or energy. Secondly, reasons for enrolment in more than one degree program were asked, with the following options, of which multiple could be selected: Consideration of changing degree programs, the main degree program not being demanding enough, the main degree program being too demanding, waiting for the entrance exam of the desired degree program, circumventing prerequisite chains in the main degree program through a second degree program (STEOP or curriculum restrictions), and receiving financial benefits (such as a scholarship, student discounts, or similar).

2.3.2.1. AIST-R

AIST-R stands for 'Allgemeiner-Interessen-Struktur-Test - Revision', which translates to the revision of the general interest structure test (Bergmann & Eder, 2005) and is a reworked version of the AIST (Bergmann & Eder, 1992). The use of the test is recommended especially for counselling in school or professional careers and shows good reliability and validity: The internal consistency varies between .82 and .87, and the retest reliability after one month falls between .85 and .92 (Muck, 2007).

The test instrument is based on the theoretical RIASEC vocational model by John Holland (Bergmann & Eder, 2005; Holland, 1997). Holland classified six different interest orientations (1997) that are mostly used for vocational career interests (Zeigler-Hill & Shackelford, 2020). The model is based on many years of theoretical research and has evolved over time (Holland, 1959; Holland, 1997). The six different orientations form the name of the RIASEC model with their first letters, and consist of the following:

- Realistic: Synonyms such as practical and technical are also used for this interest. People with this orientation show an interest in technology, handicraft, agriculture or electrical engineering. The reason for this is the urge to achieve visible and concrete results through strength, coordination and craftsmanship (Bergmann & Eder, 2005; Muck, 2007).
- Investigative: The synonyms intellectual and explorative are used for this orientation. This orientation is based on an interest in scientific or mathematical concepts. The reason for this is the urge to understand complex relationships and solve problems in a task-orientated manner, which can be achieved through systematic observation and research (Bergmann & Eder, 2005; Muck, 2007). There are indicators that this

interest dimension could be related to educational performance, however, only together with subject-specific or gender-specific correlations (De Fruyt & Mervielde, 1996).

- Artistic: This orientation involves an interest in unstructured artistic or linguistic activities, for example in the fields of art, linguistics, music, literature and acting (Bergmann & Eder, 2005; Muck, 2007). With this interest dimension, it is also suspected to be related to educational success, but again only with subject-specific or gender-specific correlations (Fruyt & Mervielde, 1996).
- Social: People with this orientation are generally interested in interpersonal relationships. This is particularly evident in the areas of nursing and caretaking, as well as teaching and mentoring (Bergmann & Eder, 2005; Muck, 2007).
- Enterprising: This orientation is also known under the synonym entrepreneurial; the interest focuses mainly on leadership or on the power of persuasion. This is based on the urge to influence or manipulate situations or activities using linguistic or other means (Bergmann & Eder, 2005; Muck, 2007).
- Conventional: The synonyms organising and administrating are also used for this orientation. The interest here lies, for example, in the regulated and structured handling of data (Bergmann & Eder, 2005; Muck, 2007).

To keep the survey as short as possible, as already mentioned, the entire AIST-R questionnaire with 60 items could not be included in the survey, but instead only 30 of these items. As a result, 5 personally chosen items were dedicated to each interest orientation instead of the originally intended 10 items each (Bergmann & Eder, 2005) which can be found in the annex. This decision was made based on research findings indicating that even shortened or modified versions of the AIST-R have acceptable levels of reliability and validity (Armstrong et al., 2008).

2.3.2.2. PSS

For the online survey, items of the German PSS-10, short for ‘10-item Perceived Stress Scale’, were used. The German adaption is based on the original items by Cohen et al. (1983) and shows good psychometric properties for clinical and nonclinical participants: The internal consistency for nonclinical participants is .88, and strongly correlates with reported mental health (r = -.72, p < .001; Schneider et al., 2020). The test items inquire about the

participants' thoughts and feelings during the last month and cover perceived helplessness and perceived self-efficacy (Schneider et al., 2020). Again, for a shorter survey, only six out of ten items of the PSS-10 were used, removing seemingly redundant items covering the same question but inverted.

2.3.2.3. SCI

SCI stands for 'Stress- und Coping-Inventar' and is suitable for reliably assessing current stress levels, stress symptoms and coping with stress. This is done by measuring several different psychometric scales (Satow, 2012). In the case of this study, only the classification of different stress-coping mechanisms was used, namely differentiating between positive thinking, active stress overcoming, social support, faith-based support, alcohol consumption and cigarette consumption (Satow, 2012).

Based on these stress-coping classifications, one question per classification was included in the survey, leading to six items regarding stress-coping mechanisms. However, as these items do not have any reliability or validity on their own (Satow, 2012), they were only assessed for internal use and are not included in the analysis.

2.4. TOOLS AND INSTRUMENTS

The data retrieved from the administrative database of the University of Graz originates from an Oracle® SQL database and was processed with R (*v4.3.1.*; R Core Team, 2022) with the RODBC package (*v1.3-20*; Ripley & Lapsley, 2022) and then linked to the questionnaire data. The online survey was created and conducted using LimeSurvey® (LimeSurvey Project Team, 2023).

Further data preprocessing and all analyses were carried out with R (*v4.4.1*; R Core Team, 2024), using the packages *haven* (*v2.5.4*; Wickham et al., 2023), *writexl* (*v1.5.0*; Ooms, 2024), *readxl* (*v1.4.3*; Wickham & Bryan, 2023), *tidyverse* (*v2.0.0*; Wickham et al., 2019), *ggplot2* (*v3.5.1*; Wickham, 2016), *dplyr* (v1.1.4; Wickham et al., 2023), *broom* (*v1.0.6*; Robinson et al., 2024), *ggpubr* (*v0.6.0*; Kassambara, 2023), *MASS* (*v7.3-60.2*; Venables & Ripley, 2002), *rstudioapi* (*v0.16.0*; Ushey et al., 2024), *foreign* (*v0.8-87*; R Core Team, 2024), and *ggpubr* (*v0.6.0*; Kassambara, 2023).

2.5. DATA PREPROCESSING AND ANALYSIS

Using the student ID of the participants, the survey data of the participants could be confidentially matched with the data of the administrative database by the University of Graz staff and thus linked. Before further processing, the data was completely anonymised and only provided with an untraceable participant primary key, which is a unique identifier for every participant that does not change over time (Oracle FAQ, 2020). These steps were performed after the survey availability ended, i.e. in mid-July 2023.

Missing data did not need to be re-coded as all survey responses were mandatory and the administrative database was complete. Participants who dropped out of the survey before finishing the questionnaire were excluded and therefore completely removed from the data set, resulting in 161 removed participants.

The proper evaluation of the AIST-R involves several steps before it can be used for the psychological diagnosis of vocational interests. First, the raw scores must be calculated by summing up the individual responses for each interest orientation. The three highest total scores are recorded in descending order as a three-letter Holland code. The internal consistency, i.e. the similarity of the orientation with the highest sum is also recorded. All these scores are then converted into standardised scores using norm tables (Bergmann & Eder, 2005; Muck, 2007). For the present study, however, the conventional evaluation was not used, as there are a total of 120 different possibilities for Holland codes and this would have considerably limited the comparability of the study participants. Therefore, only the highest raw score was used, which represents the vocational orientation with the highest level of interest.

The required items from the PSS were inverted and a total PSS score was calculated as described in the manual (Schneider et al., 2020). Information on current financing was divided into ‘financed by work’ and ‘financed by other means’ with the respective percentage values. If participants were enrolled in more than one degree program, these were also classified as ‘almost identical’, ‘similar’ and ‘very different’ to each other, which was also used for internal data collection. The number of different studies was added as the variable ‘parallel studies’. Other reasons than those provided in the questionnaire for pursuing more than one study program were evaluated and a common answer was subsequently given and categorised. Questions relating to university study-related resources were calculated into an overall score, as were questions relating to university study-related

positive emotions. The current age during the data collection was added as the variable ‘age’. The total average daily time spent on studying, courses and other university projects was taken as the variable ‘daily uni time’.

As the number of Psychology students in the bachelor's and master’s programs and the number of Computational Social System students were strongly over-represented in the sample, the proportion in the sample was compared with the total population of the University of Graz and weighted accordingly for the analysis ($Psychology_{Bachelor}$ = 0.30, $Psychology_{Master}$ = 0.22, Computational Social Systems = 0.14).

The glm.nb model of the *MASS* package was used for the analysis (*v7.3-60.2*; Venables & Ripley, 2002), which works as an extension of the Poisson regression, with the predicted variable following a negative binomial distribution. The Poisson regression is ideal for modelling count data with a Poisson distribution, but cannot handle overdispersion well (McCullagh & Nelder, 1989). The variance in the weighted data set (s^2 = 82.43) was much bigger than the mean (M = 9.99) and had therefore the problem of overdispersion, which is why the negative binomial model was used (Hilbe, 2011).

3. RESULTS

To obtain an overview of the sample and the variables, several descriptive statistics were calculated. An overview of the exact values can be found in Table 1 and Table 2.

On average, participants stated that they were rather less satisfied with their studies and study-related matters (M = 131.17, SD = 87.82). Their study-related resources were, on average, about half utilised (M = 149.51, SD = 65.04), and they also stated that they spent an average of about four and a half hours a day studying or spending time at the university (M = 4.56, SD = 2.44). On average, students had to work more than ten hours a week (M = 10.68, SD = 11.71), with many stating that they did not work at all (n = 82; 38.5%) while few worked full-time (n = 12; 5.6%). The students in the sample had to finance about one third of their studies and life through their work (M = 37.02, SD = 35.28). The average of the PSS values indicated a high perceived stress in the sample (M = 17.75, SD = 4.49). The exact distribution of the number of enrolled programs, average age during study participation and distribution of participants across the different faculties have already been described in the methods section. Reasons for studying more than one program at the same time (n = 47) were subject-related interest (n = 12; 25.53%), considering a change of study program (n = 10; 21.28%), a non-demanding main study program (n = 9; 19.15%), a main study program that is too demanding (n = 4; 8.51%), waiting for the entrance examination of the actual desired study program (n = 7; 14.89%), circumventing prerequisite requirements in the main study program (n = 4; 8.51%), and financial advantages (n = 5; 10.64%). An open answer field resulted in adding the option “better job opportunities” post-dated, as it was a very common answer (n = 12; 25.53%). The variable attributes of the AIST-R are quite unevenly distributed, as can be seen in Table 2. Some attributes only occur once, like IAE, IAS, and IEC, while others occur 30 times or even more often, like RAS and RIC, hinting towards common orientations.

Table 1

All metric and ordinal variables with their number of participants (n), minimum (min), maximum (max), mean (M) and standard deviation (SD).

Variables	***n***	***min***	***max***	***M***	***SD***
		Predictors			
parallel studies	213	1	4	1.29	0.54
positive emotions	213	0	496	131.17	87.82
resources	213	13	300	149.51	65.04
weekly work hours [h]	213	0	40	10.68	11.71
financed by work [%]	213	0	100	37.02	35.28
Age [y]	213	17.53	67.60	25.43	6.65
daily uni time [h]	213	0	14	4.56	2.44
PSS	213	7	29	17.75	4.49
		Criterium			
ECTS	213	0	46	10.05	8.89

Table 2

The nominal variable AIST-R with the respective number of main variable factors. It can be understood as the highest interest shown.

AIST-R main factor	R	I	A	S	E	C
n	124	7	18	23	12	29

The exact distribution of the dependent variable in the model, namely the ECTS points collected by the students in the respective academic year, can be seen in Figure 1. A left-skewed distribution with a clear accumulation of lower values can be seen, which indicates comparatively few ECTS points collected (M = 10.05, SD = 8.89). Some participants had not yet collected any ECTS in the relevant academic year at the time of the survey (n = 36, 16.90% of the sample), while the highest successes were over 40 ECTS (n = 3, 1.41% of the sample). The dispersion of ECTS points is relatively high, which indicates a high variance (s^2 = 78.96). The values of the weighted sample data set (M = 9.99, SD = 9.08) differ slightly

from the unweighted values and have a higher variance (s^2 = 82.43). The distribution of the mean ECTS collected by all degrees or degree combinations of the University of Graz in the respective academic year can be seen in Figure 2 and represents the entire population of the University of Graz. It differs from the sample data set and has higher mean and standard deviation values (M = 22.98, SD = 14.30) and a substantially higher variance (s^2 = 204.44), leading to a debatable representation of the whole population in the study sample. Thus, all results should be handled with care. However, only data aggregated per degree or degree combination was available, not for every individual student at the University of Graz, potentially leading to an incorrect distribution in this case.

Figure 1

Distribution of the total number of ECTS credits earned by participants in the respective academic year, (almost two full semesters), which is the metric criterium variable. The graph does not take the weighting of over-represented degree programs into account.

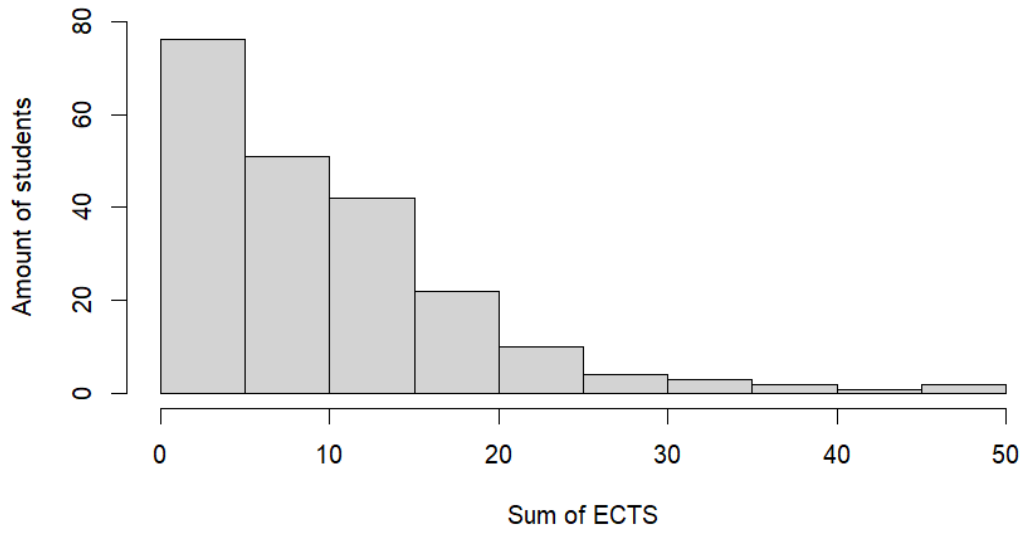
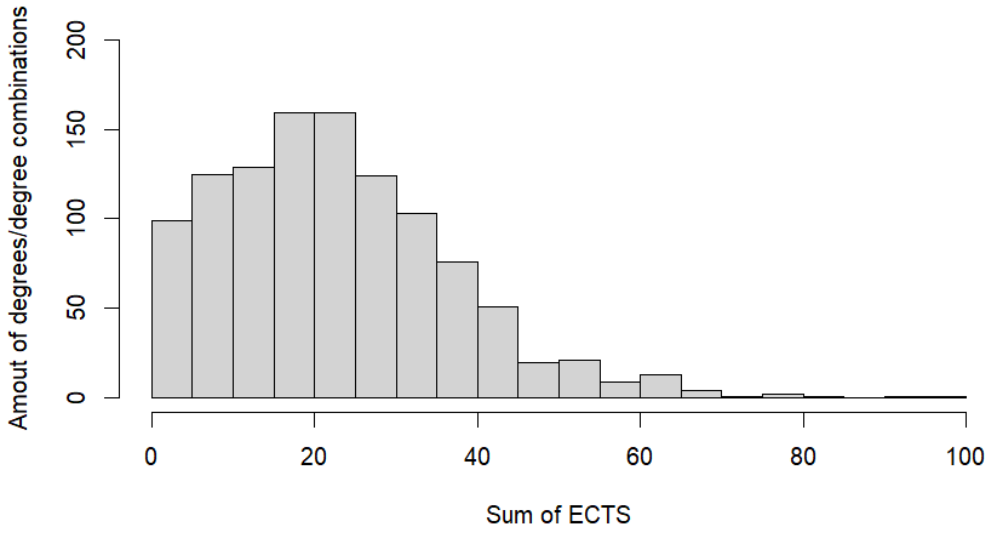


Figure 2

Distribution of the average ECTS credits earned by all degrees or combinations of degrees at the University of Graz in the respective academic year (nearly two full semesters).



In the negative binomial regression model, the coefficient (*b*) of the predictor variables, also known as the estimate, represents the effect on the criterium variable. A positive coefficient stands for a positive relationship and a negative coefficient for a negative relationship between the predictor and the criterium. The standard error (*SE*) represents the variability of the coefficients. A larger standard error suggests a higher uncertainty of the coefficient estimation. The z-value (*z*), or z-statistic, is calculated as $z = b / SE$. A large z-value implies a strong effect of the predictor on the criterium. Usually, the effect of a predictor is statistically significant, when it is larger than $z = 1.96$ or smaller than $z = -1.96$ (considering a 5% alpha significance level). The p-value indicates that the predictor has a statistical effect on the criterium if it is below the alpha significance level of 5%, meaning that the $p < .05$. The smaller the p-value is, the stronger the evidence against the null hypothesis. The generalised variance inflation factor (*GVIF*) represents the degree of multicollinearity among the predictors, meaning that predictors are highly correlated with each other. In this case, the *adjusted GVIF* was calculated, where the degrees of freedom of categorial variables with multiple levels are accounted for. This is the case for the predictors AIST-R and faculty. It is calculated as $adjusted\ GVIF = GVIF^{(1 / [2 * df])}$. GVIF values around

one indicate little to no multicollinearity. Higher values, like *GVIF* >5 or *GVIF* >10 show problematic multicollinearity, where the predictors are not independent in the model (Cameron & Trivedi, 2013; Fox & Weisberg, 2019; Hilbe, 2011). All described values can be seen in Table 3.

The null deviance, which was D_{null} = 272.15 (*df* = 212), explains the deviation of a model without any predictors. The residual deviance $D_{residual}$ = 213.67 (*df* = 183) represents how well the model fits all the included predictors. The explained deviance is $D_{explained}$ = 58.48. It is calculated by subtracting the two deviance values from each other and shows the amount of deviance removed by adding the predictors to the model. The explained deviance can also be used in the form of *Pseudo R-squared* = 0.215, which is calculated as $(1 - [D_{null} / D_{residual}])$, indicating that 21.5% of the outcome variability is explained by the model (Cameron & Trivedi, 2013; Hilbe, 2011). For the negative binomial regression model, the variance in the data was appropriately accounted for, as the *Overdispersion* = 1.17. Values much greater than one suggest significant overdispersion, which was not the case here (Agresti, 2015; Hilbe, 2011). All described values can be seen in Table 3.

Table 3

Multivariate negative binomial regression model predicting the student performance indicator Sum of ECTS.

Predictor	***b***	***SE***	***z***	***p***	***adj. GVIF***
parallel studies	0.301	0.15	2.05	.041*	1.22
positive emotions	0.003	<0.01	3.15	.002**	1.14
resources	0.002	<0.01	1.21	.225	1.42
weekly work hours	-0.008	0.01	-0.70	.483	1.97
financed by work	-0.002	<0.01	-0.65	.515	1.93
age	-0.035	0.01	-2.87	.004**	1.15
daily uni time	0.018	0.04	0.46	.647	1.42
PSS	-0.009	0.02	-0.45	.643	1.30
faculty nawi	-0.204	0.25	-0.81	.419	1.13
faculty sowi	-0.470	0.44	-1.08	.282	–
faculty urbi	0.025	0.35	0.07	.942	–

Continuation of Table 3. Multivariate negative binomial regression model predicting the student performance indicator Sum of ECTS.

Predictor	***b***	***SE***	***z***	***p***	***adj. GVIF***
faculty rewi	-0.567	0.39	-1.45	.148	–
faculty mixed	0.047	0.23	0.20	.841	–
AIST-R mainly R	-0.115	0.28	-0.42	.676	1.05
AIST-R mainly I	-0.451	0.47	-0.95	.342	–
AIST-R mainly S	0.180	0.33	0.54	.589	–
AIST-R mainly E	-0.121	0.42	-0.29	.773	–
AIST-R mainly C	-.051	0.33	-0.15	.877	–
Null deviance		272.15	AIC		1169.99
Residual deviance		213.67	Log-likelihood		-553.99
Explained deviance		0.215	Overdispersion check		1.17

* and ** indicate significance respectively at the 95% and 99% levels.

Further, a Chi-square test was calculated, as it is used to evaluate whether a predictor significantly contributes to the fitness of the model based on deviance. As can be seen in Table 4, the Chi-square tests also support the relevance of the variables parallel studies, positive emotions, and age. They are relevant predictors for the sum of students' ECTS, which improves the fit of the model significantly.

Table 4

Chi-square tests for the significance of predictors.

Predictor	χ^2	***df***	***p***
parallel studies	4.61	1	.032*
positive emotions	8.03	1	.005**
age	8.07	1	.005**

* and ** indicate significance respectively at the 95% and 99% levels.

An additional correlation analysis that compares the results with and without extreme outliers was conducted to understand the effects more precisely and reduce the possibility of

random effects. The effect of age remains when the extreme values (three people aged >55 years) are removed (r = -.16, p = .022). The effect of the number of studies disappears when the outlier with 4 parallel studies is removed (r = .09, p = .178). The effect of positive emotions remains robust even without outliers (2 people with a score <100) (r = .22, p < .001).

The precise implications of these results and what influence they have on studyability are explained in detail in the discussion section.

4. DISCUSSION

The primary objective of this study was to investigate the factors that influence academic performance among Austrian students and to gain more clarity about studyability at the University of Graz. Current literature suggests that individuals who work long hours, have high levels of stress, spend little time on study activities, or have negative feelings towards their studies are less likely to experience academic success. The present study was designed to replicate the current research basis and the precise clarification of factors influencing studying and was only partially successful. Furthermore, the enrolled faculty and vocational interests were explored, as they are suspected to influence academic performance, which does not appear to be the case in this study. The effects of being able to enrol easily and inexpensively in several degree programs were also to be uncovered, and these appeared to be positive.

In most OECD countries, between 44% and 80% of students are employed while studying (Beerkens et al., 2011; Bennett et al., 2023; Bushnik, 2003; Darmody & Smythe 2008). The proportion of working students at the University of Graz is 61.5%, which is considered average by OECD standards. The assumption that working has a negative influence on studying could not be confirmed in this study. However, it must be added that negative effects were mainly found concerning grades (Callender, 2008; Wenz & Yu, 2010) or the drop-out probability (Body et al., 2014; Hovdhaugen, 2013; Moulin et al., 2013; Van den Berg & Hofman, 2005), and not to the number of credits earned. The inconsistency in the research findings up to now could also indicate that different samples from different countries can have very varied results.

Moreover, the obligation to work in order to finance one's personal life largely through it does not seem to influence academic performance, contrary to what previous research has assumed. It is hypothesised that a higher parental income or working for career-specific skills rather than for survival, produces better academic performance (Lisnyj et al., 2021; Wenz & Yu, 2010), but this does not appear to be the case for students in Graz. However, the sample size was not evenly distributed in terms of the students' income, as most participants reported an income of up to €1500 per month, and only very few earn more than that. Consequently, the potential advantage of wealthy students cannot be replicated with the present sample.

Students experience high levels of stress (Böke et al., 2019; Saleh et al., 2017; Sharmila, 2023), which is also the case with students at the University of Graz, particularly during the exam phase. Studies agree that perceived stress has a negative effect on study performance (Akanpaadgi et al., 2023; Gustems-Carnicer et al., 2019; Mughal, 2021; Pluut et al., 2015; Talib & Zia-ur-Rehman, 2012), yet this effect could not be found in the present study. One potential explanation for this discrepancy could be that the sample was tested at a time before the examination phase when there was already a substantial amount of academic stress, but the examinations had not yet been conducted. Consequently, the current perceived stress may be reflected in the future examination results, but not in the previous results up to the time of the stress assessment. This assumption is not in contradiction with current literature, in which either no measurement time was reported at all, the GPA was used as the performance variable, or the stress level for a specific exam was compared with the respective exam results (Akanpaadgi et al., 2023; Gustems-Carnicer et al., 2019; Pluut et al., 2015; Talib & Zia-ur-Rehman, 2012).

The extent to which academic resources are being utilised, such as personal skills, interests and stamina, also appears to have no significant influence on academic performance. It is hypothesised that a high student workload not only enforces high perceived stress levels but also poorer academic performance (Agolla & Angori, 2009; Lisnyj et al., 2021; Mughal, 2021), which does not appear to be the case for the students in Graz. One potential explanation for this discrepancy could be that students may not be putting their full effort into exam preparation and studying in general. Alternatively, the degree programs may be so varyingly difficult and time-consuming that they are incomparable in terms of resource allocation.

Academic motivation is thought to have a positive effect on academic performance (Agolla & Angori, 2009; Heublein, 2014; Lisnyj et al., 2021). This hypothesis could be replicated, as students who were satisfied with their studies and their performance also earned more ECTS credits. However, the average time spent studying or learning per day does not appear to have an impact on academic performance among the students in Graz. These findings are atypical, as it is commonly assumed that more daily time spent on courses, studying, writing a thesis and other study-related activities has a positive effect on academic performance (Ifenthaler & Yau, 2020; Van den Berg & Hofman, 2005; Webber et al., 2013). Nevertheless, it must be noted that the survey was only a self-assessment, and it is not possible to verify such information. Consequently, the subjective reports may be biased and

influenced by psychosocial factors. Furthermore, only the absolute time spent learning was recorded and not what learning strategy was used. The latter could be an important predictor of study success, especially if it is meaning-oriented, self-regulated and deep (Tynjälä et al., 2005). Unfortunately, measuring this would have gone beyond the scope of this study and is an idea for a separate research project.

The age of students can have various influences on their academic performance. Santos et al. report a higher level of concentration with increasing age on the one hand, but also more private responsibilities on the other, which in turn can have a negative impact on studies (2016). Other results indicate no discernible age effects (Imlach et al., 2017), or even improved grades at older ages (Spitzer, 2000). The latter cannot be confirmed in the present study, as age appears to have a negative influence on academic performance. The older the students were at the time of the survey, the fewer ECTS they achieved in the assessed academic year. A distorted effect due to a few elderly students over the age of 55 with particularly low academic performance can be ruled out, as an outlier analysis showed that this effect is also caused by comparatively young students. As Santos et al. also report (2016), this phenomenon could be related to increased responsibility in private life, for example, due to having children of their own or other factors that were not recorded in the present study.

That the choice of faculty can have an impact on academic performance and dropout rates is a controversial claim. Depending on the study, country, and university, results show that either humanity, medicine, or STEM programs can have less academic success, but there is no consensus in these results (Araque et al., 2009; Heublein, 2014; Larsen et al., 2013). At the University of Graz, no discernible influence of the faculty on academic performance has been observed, although it should be noted that subjects such as medicine and highly technical subjects like computer science and engineering are not offered at the university. Moreover, certain degree programs in the respective faculties are restricted by an entrance examination, resulting in a pre-selection process and thus making it difficult to compare subjects and faculties with one another.

It is known that vocational interests can influence the performance of pupils (Usslepp et al., 2020). This may is not particularly applicable to university students, as interests may be related to academic performance, but probably rather through interaction effects with other psychological parameters (Nye et al., 2012; Patrick et al., 2010). In the present study, neither a direct influence nor an interaction was found. It is important to emphasise that while

vocational interests may have an effect, the congruence of vocational interest and the chosen degree program is much more important. This is known as interest congruence and has an impact on both academic performance and persistence as well as satisfaction (Ertl et al., 2022; Nye et al., 2012). However, to determine interest congruence, not only the participants' AIST-R results are needed but also the respective interest profile of each study program. This goes far beyond the scope of this study, as the interest profile would first have to be empirically determined for each degree program, and the academic performance and graduation rates would also have to be recorded. This would require either a comprehensive longitudinal study of its own, in which continuous academic performance would also have to be measured, or dropouts and graduates would have to be tested equally, with a sufficient number of participants in each individual degree program.

There has not been much research on parallel studies because of the rather unusual offer in Austria of being able to study as many degree programs as one wishes at the same time without being charged (Federal Ministry of Education, Science and Research, 2002; University of Graz, n.d.). In many countries there are strict regulations (Di Torino, 2024; Universität Leipzig, n.d.) or other options, such as a 'double major' or a 'joint degree', which are less effort or more affordable than a 'parallel enrolment' (Loder et al., 2024; Rossi & Hersch, 2008; Pineda, 2024). The present study shows that parallel enrolment is very popular, with almost a quarter of the sample doing so. The main reasons for this are subject-related interest, considering a change of study program, a less demanding main study program, and better job opportunities. Furthermore, enrolment in more than one degree program has a positive effect on academic performance, as students enrolled in more than one degree program at the same time had more ECTS credits in the assessed academic year. Although these results are not indicative regarding the completion rates of the individual students, which would need to be measured on a longitudinal basis, they do indicate increased engagement and motivation. It could also be argued that individual courses from other degree programs could provide a more varied preparation for the workplace, or that motivation is maintained through greater variety in the learning material. Regardless of whether all started degree programs are completed, they may have a positive effect on students, which is supported by the results of improved academic performance.

4.1. IMPLICATIONS AND LIMITATIONS

The main limitation of the present study is probably the lack of representativeness of the sample, as it differs from the overall population of the University of Graz in terms of the dependent variable. In addition, as mentioned above, the data collection was completed before the end of the academic year, which excludes an entire, potentially crucial examination period. However, using the entire previous year as a reference would not be a solution either, as psychosocial factors and employment are momentary assessments and can fluctuate greatly. Therefore, the chosen study design may not be ideal, but it is still a good solution to combine psychosocial factors with performance factors.

Since employment does not seem to affect the academic performance of students in Graz, there is no reason not to study while working. On the contrary, student employment is beneficial and, in some countries, essential for the labour market (Franzen & Hecken, 2002). Nevertheless, very time-intensive employment should be avoided, if possible, as several other studies report a trade-off with academic performance (Body et al., 2014; Callender, 2008; Hovdhaugen, 2013; Moulin et al., 2013; Van den Berg & Hofman, 2005; Wenz & Yu, 2010).

As no effect of daily study time on academic performance was found, contrary to the existing literature (Ifenthaler & Yau, 2020; Van den Berg & Hofman, 2005; Webber et al., 2013), it may not be sufficient to simply obtain a self-assessment of time spent studying. For further research, it is important to include the learning strategy used in order to gain more insights. Learning analytics has the potential to be an effective technique to support students and help them with their performance (Ifenthaler & Yau, 2020) and can therefore also be applied to the University of Graz.

The age of students at the University of Graz seems to have a negative impact on academic performance, although this is a rather rare research finding (Imlach et al., 2017; Santos et al., 2016; Spitzer, 2000). The reasons for this are unclear; possible reasons include caring for one's own children, changes in brain or learning processes, less social integration in study networks, or other unknown factors. All of this should be considered when conducting further research. At this point, however, it is important to add that age alone is not necessarily associated with an increased dropout rate. Since in the present study only fewer ECTS credits earned were found, it could simply mean that a longer study duration is required. Nevertheless, this problem could be prevented if the University of Graz were to

offer special support programs for students who do not start their studies directly after graduating from high school. This could come in a variety of different formats, such as the provision of student studying communities, orientation programs, childcare support, or teaching effective learning strategies.

As already mentioned, the congruence between vocational interests and the chosen degree program could also influence academic performance, at least according to existing research (Ertl et al., 2022; Nye et al., 2012). Further research could empirically measure this interest congruence in a longitudinal study in order to identify its potential effects. Findings on this topic could serve as a valuable predictor of future academic performance even before students enter university, and the application of the AIST-R to students could significantly enhance and support their future decisions.

Enrolment in more than one degree program can be costly for the state, or the university involved, but seems to have a positive effect on academic performance. This option is very popular with students in Graz and is widely used, with many different personal reasons for this. The most commonly cited reasons, namely subject-related interest and better job opportunities are more praiseworthy than troublesome and suggest higher motivation, commitment and involvement. As long as it does not become too expensive for the state or the universities, there is much to be gained from continuing to offer this opportunity. Alternatively, if graduation rates are too low, the introduction of hybrid studies could be considered, as is already the case in some other countries (Loder et al., 2024; Rossi & Hersch, 2008; Pineda, 2024).

4.2. CONCLUSION

The present study investigated potential influences on the academic performance of students at the University of Graz and provides important new insights into their study conditions. The results partly confirm existing research findings but also contradict some existing studies on important aspects. For example, neither the expected negative influence of employment on academic performance nor the influence of perceived stress can be demonstrated. The influence of student workload and daily study time does not seem to have an impact on the ECTS credits earned at the University of Graz. It has also been shown that neither the faculty nor vocational interests have a significant impact on academic performance.

On the other hand, the positive influence of the motivation to study was confirmed: Students who are more satisfied with their studies achieve more ECTS credits. Surprisingly, it was also found that chronologically older students achieve fewer ECTS in an academic year than younger students, which could be due to a variety of reasons. The results also suggest that various university-specific support programs could be helpful for non-traditional older students. Furthermore, the study shows that enrolling in more than one degree program at the same time can have a positive effect on overall academic performance, which supports the idea of offering multiple enrolments at the same time.

Overall, the study contributes to existing research by examining the effects of a wide range of potential influencing study factors and demonstrating that these factors can have different effects depending on the institutional context. It also highlights the importance of motivation to study and the potential of parallel studies for academic performance. However, some further research is needed to develop more precise recommendations and guidelines for the management of the University of Graz, government policymakers, and other relevant stakeholders.

REFERENCES

Accelerated Degrees vs Dual Degrees in the US. (2023, 3 August). Shorelight. Retrieved on 3 October 2024, from https://shorelight.com/student-stories/dual-degree-programs-vs-double-majors-how-to-choose/

Agolla, J., & Ongori, H. (2009). An assessment of academic stress among undergraduate students: The case of University of Botswana. *Educational Research and Reviews*. *4*. 63–70.

Agresti, A. (2015). *Foundations of Linear and Generalized Linear Models*. John Wiley & Sons.

Akanpaadgi, E., Binpimbu, F. & Kuuyelleh, E. N. (2023). The Impact of Stress on Students' Academic Performance. *SunText Review Of Economics & Business, 4*(2). https://doi.org/10.51737/2766-4775.2023.082

American Psychological Association. (2020). *Publication manual of the American Psychological Association* (7th ed.). https://doi.org/10.1037/0000165-000

An, B. P. (2012). The Impact of Dual Enrollment on College Degree Attainment. *Educational Evaluation And Policy Analysis*, *35*(1), 57–75. https://doi.org/10.3102/0162373712461933

Armstrong, P., Allison, W., & Rounds, J. (2008). Development and initial validation of brief public domain RIASEC marker scales. *Journal of Vocational Behavior, 73*(2), 287–299. https://doi.org/10.1016/J.JVB.2008.06.003

Atack, P. (2022). *What is the European Credit Transfer System (ECTS)?* Study.eu. Retrieved on 5 November 2024, from https://www.study.eu/article/what-is-the-ects-european-credit-transfer-and-accumulation-system

BBC News. (2015). Increase in university students „working to fund studies". Retrieved on 29 December 2024, from https://www.bbc.com/news/education-33843987

Beerkens, M., Mägi, E. & Lill, L. (2010). University studies as a side job: causes and consequences of massive student employment in Estonia. *Higher Education*, *61*(6), 679–692. https://doi.org/10.1007/s10734-010-9356-0

Ben-Zur, H. (2019). Transactional Model of Stress and Coping. In *Springer eBooks* (p. 1–4). https://doi.org/10.1007/978-3-319-28099-8_2128-1

Bennett, D., Knight, E., & Li, I. (2023). The impact of pre-entry work experience on university students' perceived employability. *Journal of Further and Higher Education*, 47, 1140–1154. https://doi.org/10.1080/0309877X.2023.2220286

Bergmann, C. & Eder, F. (1992): *Allgemeiner Interessen-Struktur-Test/Umwelt-Struktur-Test (AIST/UST)*. Weinheim: Beltz.

Bergmann, C., & Eder, F. (2005). *AIST-R. Allgemeiner-Interessen-Struktur-Test mit Umwelt-Struktur-Test (UST-R). Revision*. Beltz Test Gesellschaft.

Body, K.M., Bonnal, M., Giret, J.F. (2014). Does Student Employment Really Impact Academic Achievement? The Case of France, *Applied Economics*, *46*(25), 3061–3073. https://doi.org/10.1080/00036846.2014.920483

Böke, B. N., Mills, D. J., Mettler, J. & Heath, N. L. (2019). Stress and Coping Patterns of University Students. *Journal Of College Student Development*, *60*(1), 85–103. https://doi.org/10.1353/csd.2019.0005

Bound, J. & Turner, S. (2011). Dropouts and Diplomas. In *Handbook of the economics of education* (S. 573–613). https://doi.org/10.1016/b978-0-444-53444-6.00008-0

Bushnik, T. (2003). Learning, earning and leaving: The relationship between working while in high school and dropping out. *Ottawa: Statistics Canada, Education, Culture and Tourism Division*.

Butler, A. B. (2007). Job characteristics and college performance and attitudes: A model of work-school conflict and facilitation. *Journal Of Applied Psychology*, *92*(2), 500–510. https://doi.org/10.1037/0021-9010.92.2.500

Callender, C. (2008). The Impact of Term-Time Employment on Higher Education Students' Academic Attainment and Achievement, *Journal of Education Policy*, *23*(4), 359–377. https://doi.org/10.1080/02680930801924490

Cameron, A. C. & Trivedi, P. K. (2013). *Regression Analysis of Count Data*. https://doi.org/10.1017/cbo9781139013567

Chen, Y., Johri, A., & Rangwala, H. (2018). Running out of STEM: a comparative study across STEM majors of college students at-risk of dropping out early. *Proceedings of the 8th International Conference on Learning Analytics and Knowledge*. https://doi.org/10.1145/3170358.3170410

Chu, M. L., Creed, P. A. & Conlon, E. G. (2019). Work–Study Boundary Congruence, Contextual Supports, and Proactivity in University Students Who Work: A Moderated-Mediation Model. *Journal Of Career Development*, *48*(2), 166–181. https://doi.org/10.1177/0894845319830253

Cinamon, R. G. (2015). Integrating Work and Study Among Young Adults. *Journal Of Career Assessment*, *24*(3), 527–542. https://doi.org/10.1177/1069072715599404

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A Global Measure of Perceived Stress. *Journal of Health and Social Behavior*, *24*, 385–396. http://dx.doi.org/10.2307/2136404

Darmody, M. & Smyth, E. (2008). Full-time students? Term-time employment among higher education students in Ireland. *Journal Of Education And Work*, *21*(4), 349–362. https://doi.org/10.1080/13639080802361091

De Fruyt, F., & Mervielde, I. (1996). Personality and interests as predictors of educational streaming and achievement. *European Journal of Personality*, *10*, 405–425. https://doi.org/10.1002/(SICI)1099-0984(199612)10:5<405::AID-PER255>3.0.CO;2-M

Del Rossi, A. F. & Hersch, J. (2007). Double your major, double your return? *Economics Of Education Review*, *27*(4), 375–386. https://doi.org/10.1016/j.econedurev.2007.03.001

Delanty, G. (2023). Introduction to the special issue on the Russo-Ukrainian War: A new European war? Considerations on the Russo-Ukrainian War. *European Journal Of Social Theory*, *26*(4), 431–449. https://doi.org/10.1177/13684310231174098

Dennis, C., Louca, V. & Lemon, J. (2018). Term-time Employment and Student Attainment in Higher Education. *Journal Of Perspectives in Applied Academic Practice*, *6*(1), 28–38. https://doi.org/10.14297/jpaap.v6i1.294

Di Torino, P. (2024, 17 April). *Double enrolment in two degree programmes*. Politecnico Di Torino. Retrieved on 3 October 2024, from https://www.polito.it/en/education/applying-studying-graduating/admissions-and-enrolment/double-enrolment-in-two-degree-programmes

Ertl, B., Hartmann, F., & Wunderlich, A. (2022). Impact of Interest Congruence on Study Outcomes. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.816620

Fox, J. & Weisberg, S. (2019). *An R Companion to Applied Regression* (3rd ed.). SAGE Publications.

Franzen, A. und Hecken, A. (2002). Studienmotivation, Erwerbspartizipation und der Einstieg in den Arbeitsmarkt, *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, *54*(4), 733–752. https://doi.org/10.1007/s11577-002-0107-9

Galesic, M. & Bosnjak, M. (2009). Effects of Questionnaire Length on Participation and Indicators of Response Quality in a Web Survey. *Public Opinion Quarterly*, *73*(2), 349–360. https://doi.org/10.1093/poq/nfp031

Gustems-Carnicer, J., Calderón, C. & Calderón-Garrido, D. (2019). Stress, coping strategies and academic achievement in teacher education students. *European Journal Of Teacher Education*, *42*(3), 375–390. https://doi.org/10.1080/02619768.2019.1576629

Hanson, M. (2024, 11 May). *Cost of College by Country [2024]: Average Tuition Fees*. Education Data Initiative. Retrieved on 6 October 2024, from https://educationdata.org/average-cost-of-college-by-country

Heublein, U., Ebert, J., Hutzsch, C., Isleib, S., König, R., Richter, J. & Woisch, A. (2017). *Zwischen Studienerwartungen und Studienwirklichkeit: Ursachen des Studienabbruchs, beruflicher Verbleib der Studienabbrecherinnen und Studienabbrecher und Entwicklung der Studienabbruchquote an deutschen Hochschulen*. Deutsches Zentrum für Hochschul- und Wissenschaftsforschung.

Hilbe, J. M. (2011). *Negative binomial regression*. https://doi.org/10.1017/cbo9780511973420

Himanen, L., Auranen, O., Puuska, H. & Nieminen, M. (2009). Influence of research funding and science policy on university research performance: a comparison of five countries. *Science And Public Policy*, *36*(6), 419–430. https://doi.org/10.3152/030234209x461006

Holland, J. L. (1959). A theory of vocational choice. *Journal of Counseling Psychology*, *6*, 35–45. https://doi.org/10.1037/h0040767

Holland, J. L. (1997). Making Vocational Choices: A Theory of Vocational Personalities and Work Environments (3rd ed.). *Odessa: Psychological Assessment Resources*.

Holmes, V. (2008). Working to live. *Education + Training*, *50*(4), 305–314. https://doi.org/10.1108/00400910810880542

Hovdhaugen, E. (2013). Working while studying: the impact of term-time employment on dropout rates, *Journal of Education and Work*. https://doi.org/10.1080/13639080.2013.869311

Ifenthaler, D. & Yau, J. Y. (2020). Utilising learning analytics to support study success in higher education: a systematic review. *Educational Technology Research And Development*, *68*(4), 1961–1990. https://doi.org/10.1007/s11423-020-09788-z

Imlach, A., Ward, D. D., Stuart, K. E., Summers, M. J., Valenzuela, M. J., King, A. E., Saunders, N. L., Summers, J., Srikanth, V. K., Robinson, A. & Vickers, J. C. (2017). Age is no barrier: predictors of academic success in older learners. *Npj Science Of Learning*, *2*(1). https://doi.org/10.1038/s41539-017-0014-5

Jang, C. S., Kwak, E. & Cho, S. (2023). A Bibliometric Study of Student Success in Higher Education. *Korean Educational Research Association*, *61*(6), 27–51. https://doi.org/10.30916/kera.61.6.27

Javed, Y. & Alenezi, M. (2023). A Case Study on Sustainable Quality Assurance in Higher Education. *Sustainability*, *15*(10), 8136. https://doi.org/10.3390/su15108136

Kassambara, A. (2023). ggpubr: *'ggplot2' Based Publication Ready Plots [R package version 0.6.0]*. https://CRAN.R-project.org/package=ggpubr

Larsen, M. R., Bjørnøy, H. & Larsen, S. (2013). Evidence on Dropout Phenomena at Universities. *Danish Clearinghouse For Educational Research*. http://edu.au.dk/fileadmin/edu/Udgivelser/Clearinghouse/Review/Evidence_on_dropout_from_universities_brief_version.pdf

Lazarus, R., & Folkman, S. (1984). *Stress, Appraisal, and Coping*. New York: Springer.

Pietrucha, J. (2017). Country-specific determinants of world university rankings. *Scientometrics*, *114*(3), 1129–1139. https://doi.org/10.1007/s11192-017-2634-1

LimeSurvey Project Team. (2023). *LimeSurvey: An Open Source survey tool* [Computer Software]. LimeSurvey GmbH, Hamburg, Germany. http://www.limesurvey.org

Lisnyj, K. T., Gillani, N., Pearl, D. L., McWhirter, J. E. & Papadopoulos, A. (2021). Factors associated with stress impacting academic success among post-secondary

students: A systematic review. *Journal Of American College Health*, *71*(3), 851–861. https://doi.org/10.1080/07448481.2021.1909037

Loder, A. K. F., Brandweiner, A. C. & Wood, G. (2024). Parallel Enrollments: Associations Between College Student Satisfaction and Performance. *Journal Of College Student Retention: Research, Theory And Practice*. https://doi.org/10.1177/15210251241232683

Łaszewska, A., Helter, T. & Simon, J. (2021). Perceptions of Covid-19 lockdowns and related public health measures in Austria: a longitudinal online survey. *BMC Public Health*, *21*(1). https://doi.org/10.1186/s12889-021-11476-3

McCullagh, P. & Nelder, J. A. (1989). *Generalized Linear Models* (2nd ed.), Chapman and Hall, London. http://dx.doi.org/10.1007/978-1-4899-3242-6

Moulin, S., Doray, P., Laplante, B. & Street, M. C. (2013). Work intensity and non-completion of university: longitudinal approach and causal inference. *Journal Of Education And Work*, *26*(3), 333–356. https://doi.org/10.1080/13639080.2011.653554

Muck, P. M. (2007). AIST-R - Allgemeiner Interessen-Struktur-Test mit Umwelt-Struktur-Test (UST-R) - Revision. *Zeitschrift Für Arbeits- und Organisationspsychologie*, *51*(1), 26–31. https://doi.org/10.1026/0932-4089.51.1.26

Mughal, Y. H. (2021). AN INVESTIGATION ON ROLE OF STRESS ON ACADEMIC PERFORMANCE OF STUDENTS. *Gomal University Journal Of Research*, *37*(3), 287–296. https://doi.org/10.51380/gujr-37-03-04

My blog. (2023, 11 July). *Comparing tuition costs in fifteen different countries - IvyEdge Global*. IvyEdge Global - COLLEGE ADMISSIONS CONSULTING. Retrieved on 6 October 2024, from https://ivyedgeglobal.com/comparing-tuition-costs-in-fifteen-different-countries/

Neukrug, E. S., & Fawcett, R. C. (2019). *Essentials of Testing and Assessment: A practical guide for counselors, social workers, and psychologists, enhanced*. Cengage Learning.

Nye, C. D., Su, R., Rounds, J. & Drasgow, F. (2012). Vocational Interests and Performance. *Perspectives On Psychological Science*, *7*(4), 384–403. https://doi.org/10.1177/1745691612449021

Ooms, J. (2024). writexl: *Export Data Frames to Excel 'xlsx' Format [R package version 1.5.0]*. https://CRAN.R-project.org/package=writexl

Patrick, L., Care, E. & Ainley, M. (2010). The Relationship Between Vocational Interests, Self-Efficacy, and Achievement in the Prediction of Educational Pathways. *Journal Of Career Assessment*, *19*(1), 61–74. https://doi.org/10.1177/1069072710382615

Pietrucha, J. (2017). Country-specific determinants of world university rankings. *Scientometrics*, *114*(3), 1129–1139. https://doi.org/10.1007/s11192-017-2634-1

Pineda, P. (2024). Double the degree, double the identity? Identification and experiences of students studying two simultaneous degrees. *International Journal Of Educational Research*, *125*, 102346. https://doi.org/10.1016/j.ijer.2024.102346

Pluut, H., Curşeu, P. L. & Ilies, R. (2014). Social and study related stressors and resources among university entrants: Effects on well-being and academic performance. *Learning And Individual Differences*, *37*, 262–268. https://doi.org/10.1016/j.lindif.2014.11.018

President's Council of Advisors on Science and Technology (2012). *REPORT TO THE PRESIDENT ENGAGE TO EXCEL: PRODUCING ONE MILLION ADDITIONAL COLLEGE GRADUATES WITH DEGREES IN SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS*. https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/pcast-engage-to-excel-final_2-25-12.pdf

Primary key. (2020). Oracle FAQ. Retrieved on 5 November 2024, from https://www.orafaq.com/wiki/Primary_key

R Core Team. (2022). R: A language and environment for statistical computing. *R Foundation for Statistical Computing*. Vienna, Austria.

R Core Team (2024). foreign: *Read Data Stored by 'Minitab', 'S', 'SAS', 'SPSS', 'Stata', 'Systat', 'Weka', 'dBase', ... [R package version 0.8-87]*. https://CRAN.R-project.org/package=foreign

R Core Team. (2024). R: A language an environment for statistical computing. *R Foundation for Statistical Computing*. Vienna, Austria.

Riggert, S. C., Boyle, M., Petrosko, J. M., Ash, D. & Rude-Parkins, C. (2006). Student Employment and Higher Education: Empiricism and Contradiction. *Review Of Educational Research*, *76*(1), 63–92. https://doi.org/10.3102/00346543076001063

Ripley, B., Lapsley, M. (2022). RODBC: *ODBC Database Access [R package version 1.3-20]*. https://CRAN.R-project.org/package=RODBC

RIS - Studienförderungsgesetz 1992 - Bundesrecht konsolidiert, Fassung vom 06.10.2024. (n.d.). Retrieved on 6 October 2024, from https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=10009824

Robinson, D., Hayes, A., Couch, S. (2024). broom: *Convert Statistical Objects into Tidy Tibbles [R package version 1.0.6]*. https://CRAN.R-project.org/package=broom

Saleh, D., Camart, N. & Romo, L. (2017). Predictors of Stress in College Students. *Frontiers in Psychology*, *8*. https://doi.org/10.3389/fpsyg.2017.00019

Santos, L., Bago, J., Baptista, A., Ambrósio, S., Fonseca, H., & Quintas, H. (2016). Academic success of mature students in higher education: a Portuguese case study. *European journal for Research on the Education and Learning of Adults*, *7*(1), 57–73. https://doi.org/10.3384/RELA.2000-7426.RELA9079

Satow, L. (2024). Stress- und Coping-Inventar (SCI): Test- und Skalendokumentation (2., überarbeitete und neunormierte Version). Available at https://www.drsatow.de/tests/stress-und-coping-inventar/

Schneider, E. E., Schönfelder, S., Domke-Wolf, M. & Wessa, M. (2020). Measuring stress in clinical and nonclinical subjects using a German adaptation of the Perceived Stress Scale. *International Journal Of Clinical And Health Psychology*, *20*(2), 173–181. https://doi.org/10.1016/j.ijchp.2020.03.004

Sharmila, S. (2023). A Study on Impact of Stress Factors on College Student's Academic Performance. *International Journal For Multidisciplinary Research*, *5*(2). https://doi.org/10.36948/ijfmr.2023.v05i02.2475

Skinner, E. A. & Zimmer-Gembeck, M. J. (2007). The Development of Coping. *Annual Review Of Psychology*, *58*(1), 119–144. https://doi.org/10.1146/annurev.psych.58.110405.085705

Sobczak, A. (2018). Access to Higher Education – From the Orientation to Elite Through Democratization to Parentocracy. *Studia Edukacyjne*, *50*, 121–133. https://doi.org/10.14746/se.2018.50.8

Spitzer, T. M. (2000). Predictors of College Success: A Comparison of Traditional and Nontraditional Age Students. *NASPA Journal*, *38*(1), 82–98. https://doi.org/10.2202/1949-6605.1130

Staneva, M. (2015). Studieren und Arbeiten: die Bedeutung der studentischen Erwerbstätigkeit für den Studienerfolg und den Übergang in den Arbeitsmarkt. *RePEc: Research Papers in Economics*. https://EconPapers.repec.org/RePEc:diw:diwrup:70de

Talib, N. & Zia-ur-Rehman, M. (2012b). Academic performance and perceived stress among university students. *Educational Research Review*, *7*(5), 127–132. https://doi.org/10.5897/err10.192

Taylor, A. & Sandoval, C. B. (2023). Fitting work? Students speak about campus employment. *Vocations And Learning*, *17*(1), 1–19. https://doi.org/10.1007/s12186-023-09333-y

The Education Price Index 2022 — a Study by N26. (n.d.). N26. Retrieved on 6 October 2024, from https://n26.com/en-eu/the-education-price-index

Thoits, P. A. (2011). Mechanisms Linking Social Ties and Support to Physical and Mental Health. *Journal Of Health And Social Behavior*, *52*(2), 145–161. https://doi.org/10.1177/0022146510395592

Triventi, M. (2014). Does Working during Higher Education affect Students' academic Progression? *Economics of Education Review*, *41*, 1–13. https://doi.org/10.1016/j.econedurev.2014.03.006

Tynjälä, P., Salminen, R. T., Sutela, T., Nuutinen, A. & Pitkänen, S. (2005). Factors related to study success in engineering education. *European Journal Of Engineering Education*, *30*(2), 221–231. https://doi.org/10.1080/03043790500087225

Unger, M., Binder, D., Dibiasi, A., Engleder, J., Schubert, N., Terzieva, B., Thaler, B., Zaussinger, S. & Zucha, V. (2019). Studierenden-Sozialerhebung 2019; Kernbericht. *Austrian Institute Of Advanced Studies*. https://irihs.ihs.ac.at/id/eprint/5383/

Universität Leipzig: Double Degrees and Studying at Two Universities. (n.d.). Universität Leipzig. Retrieved on 3 October 2024, from https://www.uni-leipzig.de/en/studying/current-students/double-degrees-and-studying-at-two-universities

University of Graz. (n.d.). Retrieved on 3 October 2024, from https://www.uni-graz.at/en

Upton, J. (2013). Psychosocial factors. In *Springer eBooks* (pp. 1580–1581). https://doi.org/10.1007/978-1-4419-1005-9_422

Ushey, K., Allaire, J., Wickham, H., Ritchie, G. (2024). rstudioapi: *Safely Access the RStudio API [R package version 0.16.0]*. https://CRAN.R-project.org/package=rstudioapi

Usslepp, N., Hübner, N., Stoll, G., Spengler, M., Trautwein, U. & Nagengast, B. (2020). RIASEC interests and the Big Five personality traits matter for life success—But do they already matter for educational track choices? *Journal Of Personality*, *88*(5), 1007–1024. https://doi.org/10.1111/jopy.12547

Van den Berg, M. N. & Hofman, W. H. A. (2005). Student Success in University Education: A Multi-measurement Study of the Impact of Student and Faculty Factors on Study Progress. *Higher Education*, *50*(3), 413–446. https://doi.org/10.1007/s10734-004-6361-1

Webber, K. L., Krylow, R. B. & Zhang, Q. (2013). Does Involvement Really Matter? Indicators of College Student Success and Satisfaction. *Journal Of College Student Development*, *54*(6), 591–611. https://doi.org/10.1353/csd.2013.0090

Venables, W. & Ripley, B. (2003). *Modern Applied Statistics with S*. Springer Science & Business Media.

Wenz, M. und Yu, W. (2010). Term-Time Employment and the Academic Performance of Undergraduates, *Journal of Education Finance*, *35*(4), 358–373. https://doi.org/10.1353/jef.0.0023

Wickham, H. (2016). ggplot2: Elegant Graphics for Data Analysis. Springer-Verlag New York.

Wickham, H., Averick, M., Bryan, J., Chang, W., McGowan, L. D., François, R., Grolemund, G., Hayes, A., Henry, L., Hester, J., Kuhn, M., Pedersen, T. L., Miller, E., Bache, S. M., Müller, K., Ooms, J., Robinson, D., Seidel, D. P., Spinu, V.,

Takahashi, K., Vaughan, D., Wilke, C., Woo, K., Yutani, H. (2019). Welcome to the tidyverse. *Journal of Open Source Software*, *4*(43), 1686. https://doi.org/10.21105/joss.01686

Wickham, H., Bryan, J. (2023). readxl: *Read Excel Files [R package version 1.4.3]*. https://CRAN.R-project.org/package=readxl

Wickham, H., François, R., Henry, L., Müller, K., Vaughan, D. (2023). dplyr: *A Grammar of Data Manipulation [R package version 1.1.4]*. https://CRAN.R-project.org/package=dplyr

Wickham H, Miller E, Smith D (2023). haven: *Import and Export 'SPSS', 'Stata' and 'SAS' Files [R package version 2.5.4]*. https://CRAN.R-project.org/package=haven

Zajacova, A., Lynch, S. M. & Espenshade, T. J. (2005). Self-Efficacy, Stress, and Academic Success in College. *Research in Higher Education*, *46*(6), 677–706. https://doi.org/10.1007/s11162-004-4139-z

Zeigler-Hill, V., & Shackelford, T. K. (Eds.). (2020). Encyclopedia of Personality and Individual Differences. 2439–2441. https://doi.org/10.1007/978-3-319-24612-3

Zucha, V., Engleder, J., Haag, N., Thaler, B., Unger, M., Zaussinger, S. (2023). Studierenden-Sozialerhebung 2023 – Kernbericht. Retrieved on 29 December 2024, from *https://www.sozialerhebung.at/index.php/en/*

Zuckerstätter, S., Kafenda, L., Muckenhuber, M. & Russinger, R. (2023). Austria: Policies dealing with the inflation crisis. *Wirtschaft und Gesellschaft*, *48*(4), 578–598. https://doi.org/10.59288/wug484.167

ANNEX

Table 5

Listing of the six items used in the survey out of a total of ten items of the PSS, marked with a cross. Items that had to be inverted are marked as such.

Used (x)	Test item
x	Wie oft waren Sie im letzten Monat aufgewühlt, weil etwas unerwartet passiert ist?
	Wie oft hatten Sie im letzten Monat das Gefühl, nicht in der Lage zu sein, die wichtigen Dinge in Ihrem Leben kontrollieren zu können?
x	Wie oft haben sie sich im letzten Monat nervös und gestresst gefühlt?
x	Wie oft waren Sie im letzten Monat zuversichtlich, dass Sie fähig sind, ihre persönlichen Probleme zu bewältigen? **(inverted)**
	Wie oft hatten Sie im letzten Monat das Gefühl, dass sich die Dinge zu Ihren Gunsten entwickeln? **(inverted)**
x	Wie oft hatten Sie im letzten Monat den Eindruck, nicht all Ihren anstehenden Aufgaben gewachsen zu sein?
	Wie oft waren Sie im letzten Monat in der Lage, ärgerliche Situationen in Ihrem Leben zu beeinflussen?
x	Wie oft hatten Sie im letzten Monat das Gefühl, alles im Griff zu haben? **(inverted)**
	Wie oft haben Sie sich im letzten Monat über Dinge geärgert, über die Sie keine Kontrolle hatten? **(inverted)**
x	Wie oft hatten Sie im letzten Monat das Gefühl, dass sich so viele Schwierigkeiten angehäuft haben, dass Sie diese nicht überwinden konnten?

Table 6

Listing of the 30 items used in the survey out of a total of 60 items of the AIST-R, marked with a cross. The corresponding RIASEC orientation that covers the item is also provided.

Used (x)	Test item	Orientation
x	mit Maschinen oder technischen Geräten arbeiten	R
x	in einem Versuchslabor Experimente durchführen	I
	etwas nach künstlerischen Gesichtspunkten gestalten	A
x	andere Personen betreuen oder pflegen	S
x	eine Gruppe bei der Arbeit leiten	E
x	eine Buchhaltung führen	C
	Arbeiten ausführen, bei denen man geschickte Hände und Finger haben muss	R
x	wissenschaftliche Artikel lesen	I
x	Geschichten oder Reportagen schreiben	A
x	jemanden unterrichten oder erziehen	S
	ein Geschäft oder Unternehmen führen	E
x	Arbeiten verrichten, für die es klare Regeln gibt	C
	Metall/Holz bearbeiten, etwas aus Metall/Holz herstellen	R
	sich mit unerforschten Dingen beschäftigen	I
	Dichtungen/Literatur lesen und interpretieren	A
	andere Menschen beraten	S
x	eine Diskussion leiten	E
	Geschäftsbriefe schreiben	C
x	Arbeiten verrichten, bei denen man sich körperlich anstrengen muss	R
x	etwas genau beobachten und analysieren	I
x	Dinge tun, bei denen es auf Kreativität und Fantasie ankommt	A
x	sich die Probleme anderer Menschen anhören	S
	für eine Sache Werbung betreiben	E
	für andere Menschen Geld anlegen oder verwalten	C
x	in einen Computer neue Teile einbauen	R
	das Verhalten von Tieren oder Pflanzen untersuchen	I
	sich mit philosophischen Fragen beschäftigen	A

Continuation of Table 6. Listing of the 30 items used in the survey out of a total of 60 items of the AIST-R, marked with a cross. The corresponding RIASEC orientation that covers the item is also provided.

Used (x)	Test item	Orientation
	andere Menschen bedienen, für andere sorgen	S
x	eine Veranstaltung organisieren	E
x	Angebote einholen und vergleichen	C
x	Konstruktionspläne zeichnen	R
x	über längere Zeit an der Lösung eines Problems arbeiten	I
x	Dinge schön gestalten (formen, verzieren, schmücken)	A
	sich für Menschen einsetzen, die benachteiligt sind	S
x	die Verantwortung für eine Aufgabe übernehmen	E
x	Statistiken anlegen und auswerten	C
	herausfinden, warum ein Gerät nicht funktioniert	R
	chemische, physikalische oder biologische Versuche durchführen	I
	sich mit Mode und Design beschäftigen	A
	zu Schutz und Sicherheit anderer Menschen beitragen	S
	für eine Sache in der Öffentlichkeit auftreten	E
	über etwas Aufzeichnungen oder Listen führen	C
	auf einer Baustelle arbeiten	R
	die Eigenschaften von Bodenproben oder Mineralien untersuchen	I
	in einer Schauspiel- oder Musikgruppe spielen	A
	hilfsbedürftige Kinder oder Erwachsene betreuen	S
x	andere von etwas überzeugen oder zu etwas veranlassen	E
x	Dinge sammeln, ordnen oder verwalten	C
x	Servicearbeiten durchführen (reinigen, instand halten, reparieren)	R
	die Ursachen eines Problems erforschen	I
x	Bilder malen, Zeichnen	A
x	Kranke oder Verletzte versorgen	S
	mit anderen Menschen verhandeln	E
	die Einhaltung von Richtlinien überwachen	C

Continuation of Table 6. Listing of the 30 items used in the survey out of a total of 60 items of the AIST-R, marked with a cross. The corresponding RIASEC orientation that covers the item is also provided.

Used (x)	Test item	Orientation
	etwas nach einem Plan oder einer Skizze anfertigen	R
x	untersuchen, wie etwas funktioniert	I
x	etwas mit sprachlichen Mitteln künstlerisch gestalten	A
x	sich in die Situation anderer Menschen hineindenken	S
	das Amt des Sprechers in einer Gruppe übernehmen	E
	eine Abrechnung kontrollieren	C