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Abstract

Studies into the relationships between learning environment perceptions, approaches to studying, and academic outcomes have largely followed cross-sectional designs. As a result, knowledge is sparse with regards to whether, or to what degree, the established associations are consistent across years of study. This study aimed to (i) examine associations between occupational therapy students' academic performance, their approaches to studying and perceptions of the learning environment, while in their second and third years of study, and (ii) evaluate the consistency of the results across years of study. Occupational therapy students in Norway were assessed annually with regards to their perceptions of the learning environment, study approaches, and academic performance. Associations between variables, measured within each study year, were analyzed with linear regression analyses, and then compared year-over-year. In the second study year (n=162), better academic performance was associated with lower student autonomy, and higher scores on strategic approach. In the third study year (n=189), better academic performance was associated with being female and lower scores on surface approach. Having occupational therapy as the preferred line of education at enrollment was associated with better grades in both study years. Associations between grades and gender, perceptions of student autonomy, and study approaches were somewhat different between the two years. Implications for educational practice is discussed and various contents and emphasis in educational programs are proposed.

Keywords

Academic performance, approaches to studying, grade point average, learning environment, occupational therapy education

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Stable or Unstable Associations Between Learning Environment Factors, Study Approaches, and Exam Grades: Cross-Sectional Analyses Across Two Consecutive Program Years

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ABSTRACT

Studies into the relationships between learning environment perceptions, approaches to studying, and academic outcomes have largely followed cross-sectional designs. As a result, knowledge is sparse with regards to whether, or to what degree, the established associations are consistent across years of study. This study aimed to (i) examine associations between occupational therapy students' academic performance, their approaches to studying and perceptions of the learning environment, while in their second and third years of study, and (ii) evaluate the consistency of the results across years of study. Occupational therapy students in Norway were assessed annually with regards to their perceptions of the learning environment, study approaches, and academic performance. Associations between variables, measured within each study year, were analyzed with linear regression analyses, and then compared year-over-year. In the second study year (n=162), better academic performance was associated with lower student autonomy, and higher scores on strategic approach. In the third study year (n=189), better academic performance was associated with being female

and lower scores on surface approach. Having occupational therapy as the preferred line of education at enrollment was associated with better grades in both study years. Associations between grades and gender, perceptions of student autonomy, and study approaches were somewhat different between the two years. Implications for educational practice is discussed and various contents and emphasis in educational programs are proposed.

Introduction

Generally, the objective for educators in higher education is to support students' learning and thereby contribute to their academic success. To fulfil this objective, educators need to possess extensive knowledge of students' learning. Knowledge of factors that may influence students' learning outcomes, including their perception of the learning environment and adoption of appropriate study behaviors to support learning, is essential.

The exploration of associations between students' approaches to studying, perceptions of the learning environment and their academic performance has been a topic of interest for researchers for decades. In Biggs' (1987) presage, process and product model of learning (the 3P model), presage factors refer to individual factors that are present before the student enters the learning situation. These include the students' personality and sociodemographic background, their readiness for academic studying, their prior set of values and knowledge relating to their field of study, and the learning environment constituting the context in which learning takes place. Positive learning environment factors, such as the perception of 'good teaching', 'clear goals and standards', and an 'appropriate workload', have been found to be related to higher study satisfaction (Thygesen et al., 2020), while not independently related to exam grades among first year occupational therapy students (Bonsaksen et al., 2021).

The process factors concern how the students engage with the course content, often described using the analytic concepts of deep, strategic, and surface approaches to studying (Entwistle, 2018; Entwistle & Ramsden, 1983; Marton & Säljö, 1976). The deep approach relates to students actively engaging with the learning material. Students with a deep study approach aim to understand the meaning of the learning materials, leading to an extension of their knowledge. They seek to understand concepts and to get an overall understanding of the topics of interest. The contrasting surface approach refers to students intending to "get the task out of the way" minimizing efforts while appearing to meet course requirements (Biggs, 2011). The result is often fragmented pieces of knowledge but lacking an understanding of the bigger picture. The strategic approach refers to students aiming to achieve good grades. They put effort into organizing their studies and have a solid awareness of assessment demands, while their overall understanding of the learning materials may be superficial.

The product factors relate to two levels, an objective and a subjective (Biggs, 1987). The objective level refers to exam grades or other indications of the quality of the students' performance. The subjective level refers to the students' own experience, for example, the felt satisfaction with whatever level of performance was attained in the

learning process. In practical terms, the 3P model proposes that students' ways of relating to the study materials will largely impact their subsequent learning outcomes, often expressed in the form of exam results (Biggs, 1987). Therefore, a comprehensive understanding of student learning involves understanding several influencing factors and the relationships between them.

Previous research, including research on occupational therapy students, supports the idea of a close relationship between students' perception of their learning environment and their approaches to studying. For example, a recent study found that higher scores on generic skills were associated with higher scores on the deep and strategic approach scales, while lower scores were associated with higher surface approach scale scores (Mørk et al., 2020). Moreover, lower scores on clear goals and standards, and lower scores on appropriate workload, were associated with higher surface approach scores. Also, in other fields and disciplines, students' positive perceptions of the learning environment have been found to be associated with higher scores on the desirable deep and strategic approaches to studying, and with lower scores on the surface approach to studying (Sun & Richardson, 2016). In turn, the adoption of desirable study approaches, namely the deep and strategic approaches, have been linked with better academic and clinical performance outcomes in fields such as psychology (Diseth & Martinsen, 2003), medicine (Ward, 2011), occupational therapy (Bonsaksen et al., 2017; Bonsaksen et al., 2021), and health sciences education more in general (Salamonson et al., 2013).

Research into associations between students' academic performance, approaches to studying and perceptions of the learning environment holds a dual purpose. From a theoretical perspective, it is important to explore these associations to reveal determinants of students' academic success and construct a body of in-depth knowledge about these matters. Secondly, taking determinants of students' academic success into account is important from an educational and pedagogic perspective, and knowledge of success factors should influence the planning, conducting and evaluation of study courses and programs. However, studies into the relationships between learning environment perceptions, approaches to studying, and academic outcomes have largely followed cross-sectional designs. As a result, knowledge is sparse when it comes to whether, or to what degree, the established associations are stable or unstable across years of study. A substantial degree of stability in the associations detected across different years of study would indicate that findings are relatively uniform for students in different stages of their education. If this is the case, teaching strategies to strengthen the factors that link with high student performance would be largely the same, irrespective of the students' progression in the study program. Conversely, different patterns of associations may indicate that factors of importance for students' academic performance vary according to the students' advancement throughout the study program. In that case, teaching strategies to promote high student performance would need to take into account the study progression. Advancing the knowledge in this particular area would have implications for curriculum design and teaching strategies for healthcare students in different years of study.

Study Aim

The aim of the current study was to (i) examine associations between occupational therapy students' academic performance and their approaches to studying and perceptions of the learning environment while in their second and third years of study, and (ii) evaluate the consistency of the results across years of study.

Methodology

Design and Study Context

The study is part of a larger study of occupational therapy students' academic performance, in context of their perceptions of the learning environment and approaches to studying. In the current study, two consecutive cross-sectional analyses were conducted based on data from the students when they were enrolled in the second and third years of the study program. One cohort of students was studied. However, the students were asked to participate at each time of data collection (i.e., in each study year), which led to an unequal number of students participating in each of the study years.

Participants and Recruitment

Occupational therapy students in all six relevant higher education institutions in Norway were approached in the classroom for possible inclusion in the study. All students enrolled in any of the involved study programs were eligible for participation. The researchers explained to the students that participation in the study was voluntary. Furthermore, they were ensured anonymity and that their decision to participate or not, would not affect their relation to educators, the educational program, nor to the university. There were 305 eligible participants, and 168 students (response rate 55.1 %) chose to participate in the second year, whereas 200 students (response rate 65.6 %) chose to participate in the third year. There was a high level of overlap between students opting to participate in the different study years, with 142 students participating in both study years. Students with missing values on one or more of the employed variables were removed from the analyses, rendering sample sizes of 162 students in the second year and 189 students in the third year.

Measurement

Sociodemographic Variables

Age (in years) and time spent on independent studying (average hours during a typical week) were registered as continuous variables. Gender (male/female), having prior experience from higher education (yes/no) and having occupational therapy as the highest prioritized line of education at the time of enrollment (yes/no) were registered as categorical variables.

The Learning Environment

The Course Experience Questionnaire (CEQ) was used to measure aspects of the learning environment. The original CEQ consists of 30 items clustered into five scales: 'clear goals and standards', 'emphasis on independence', 'good teaching', 'appropriate workload', and 'appropriate assessment' (Ramsden, 1991). One additional item assesses the students' general satisfaction with the course. In this study, the validated Norwegian translation of the CEQ (Pettersen, 2007) was used. The scales assess the degree to which the course is perceived to have: (1) goals that are clearly disseminated; (2) high levels of student autonomy; (3) teaching that engages and involves the students; (4) an appropriate workload; and (5) assessment forms that promote learning. In the current study, internal consistency measures were 0.73 ('clear goals and standards'), 0.63 ('emphasis on independence'), 0.70 ('good teaching'), 0.69 ('appropriate workload'), and 0.45 ('appropriate assessment'). In view of the internal consistency results, the 'appropriate assessment' scale was removed from the subsequent analyses (Bonsaksen et al., 2019).

Approaches to Studying

The Approaches and Study Skills Inventory for Students (Tait et al., 1998) was used to assess study approaches, and a previously validated Norwegian translation of the instrument was used (Diseth, 2001). The instrument consists of 52 statements to which the respondent rates his or her level of agreement (1 = disagree, 2 = disagree somewhat, 3 = unsure, 4 = agree somewhat, 5 = agree). The instrument has a three-factor structure which has been replicated in the current sample (DaLomba et al., 2020) as well as in a cross-cultural study of undergraduate occupational therapy students (Bonsaksen, Småstuen, et al., 2019). The items are organized accordingly into three main scales (the deep, strategic, and surface approaches to studying). Scale scores are calculated by adding the scores on the relevant items. In the present study sample, the internal consistency between scale items was 0.71 ('deep approach'), 0.84 ('strategic approach'), and 0.76 ('surface approach').

Exam Grades

The students' average exam grade scores were based on the qualitative descriptors related to the students' exam grades (The Norwegian Association of Higher Education Institutions, 2011): fail = 1, sufficient = 2, satisfactory = 3, good = 4, very good = 5, and excellent = 6. More detailed description of the performance associated with each grade is shown in Table 1. As the exam grade measures, we used the mean of the students' exam grades obtained within each of the study years.

Table 1*The General Qualitative Descriptors of Grades in Norwegian Higher Education*

Grade	Description	Qualitative Description of Evaluation Criteria
A	Excellent	An excellent performance, clearly outstanding. The candidate demonstrates excellent judgement and a high degree of independent thinking.
B	Very good	A very good performance. The candidate demonstrates sound judgement and a very good degree of independent thinking.
C	Good	A good performance in most areas. The candidate demonstrates a reasonable degree of judgement and independent thinking in the most important areas.
D	Satisfactory	A satisfactory performance, but with significant shortcomings. The candidate demonstrates a limited degree of judgement and independent thinking.
E	Sufficient	A performance that meets the minimum criteria, but no more. The candidate demonstrates a very limited degree of judgement and independent thinking.
F	Fail	A performance that does not meet the minimum academic criteria. The candidate demonstrates an absence of both judgement and independent thinking.

Data Analysis

Each yearly sample was described with means and standard deviations on continuous variables, and with frequencies and percentages on categorical variables. To assess the strength of associations between the independent variables and the students' grade point average (GPA), two consecutive hierarchical linear regression analyses were performed, using GPA in the relevant study year as outcome. Independent variables and outcomes were measured concurrently, i.e., time spent on independent studying, perceptions of the learning environment and approaches to studying measured in the second study year were used to predict GPA in the second study year. Similarly, independent variables measured in the third study year were used as predictors for GPA in the third year.

In Block 1, representing the background variables, age, gender, educational priority, prior higher education, and time spent on independent study were included as independent variables. In Block 2, representing the perceived learning environment, clear goals and standards, student autonomy, good teaching, and appropriate workload were included. In Block 3, representing the study approaches, the deep approach scale, strategic approach scale, and surface approach scale were included as independent variables. The strength of associations was assessed with the standardized β coefficient. The regression models were also used to assess the outcome variance

proportions accounted for by each of the models and by all variables together. All analyses were performed with SPSS for Windows, version 26 (IBM Corporation, 2019), and results were considered statistically significant if $p < 0.05$.

Research Ethics

The Data Protection Official at the Norwegian Center for Research Data approved the study on October 12, 2017 (project no. 55875). The participants provided informed consent prior to the commencement of the study and were assured that their information would be treated in confidence.

Results

Participants

The demographic characteristics of the study participants are displayed in Table 2. The mean age of the participants while in their second year of study was 23 years. The sample was composed predominantly by female students. More than half of the sample had occupational therapy as their preferred line of education at the time of enrollment, while less than half of the sample had prior experience from higher education before enrollment.

Table 2

Sociodemographic Characteristics of the Study Participants

Variables	2 nd year <i>n</i> = 162	3 rd year <i>n</i> = 189
Age [M (SD)]	23.1 (3.8)	24.5 (4.3)
Female sex [<i>n</i> (%)]	130 (80.2)	145 (76.7)
Occupational therapy was preferred education program at the time of entry [<i>n</i> (%)]	101 (62.3)	122 (64.6)
Had prior higher education [<i>n</i> (%)]	63 (38.9)	76 (40.2)

Factors Associated with Exam Grades in the Second Year

The results from the regression analyses are displayed in Table 3. Adjusting for all variables in the final model of predictors of exam grades in the second study year, having occupational therapy as the preferred line of education at the time of enrollment was associated with obtaining better exam results ($\beta = 0.18$, $p < 0.05$). Among the learning environment scales, perceiving higher student autonomy was associated with poorer grades ($\beta = -0.19$, $p < 0.05$). Among the study approach scales, better exam grades were associated with higher scores on strategic approach ($\beta = 0.20$, $p < 0.05$). The full model explained 16.2 % of the variance in exam grades, with the sociodemographic variables accounting for the largest proportion (7.1%).

Table 3*Factors Associated with the Participants' Grade Point Average*

Independent variables	GPA 2 nd year		GPA 3 rd year	
	Std. β	p	Std. β	p
<i>1) Demographics</i>				
Age	-0.04	0.62	-0.11	0.15
Gender	0.14	0.09	0.23	< 0.01
Educational priority	0.18	< 0.05	0.19	< 0.01
Prior higher education	0.05	0.58	0.12	0.11
Time spent on self-study	-0.06	0.49	-0.07	0.33
Explained variance	7.1%	< 0.05	11.6%	< 0.001
<i>2) The learning environment</i>				
Clear goals and standards	-0.17	0.08	-0.05	0.57
Student autonomy	-0.19	< 0.05	-0.11	0.18
Good teaching	0.06	0.56	0.02	0.82
Appropriate workload	0.11	0.20	-0.02	0.84
R ² change	5.3%	0.06	1.4%	0.57
Explained variance	12.4%	< 0.05	13.0%	< 0.01
<i>3) Study approach scales</i>				
Deep approach score	-0.05	0.59	0.05	0.52
Strategic approach score	0.20	< 0.05	0.02	0.78
Surface approach score	-0.08	0.39	-0.21	< 0.05
R ² change	3.8%	0.09	3.6%	0.06
Explained variance	16.2%	< 0.01	16.6%	< 0.01

Note. Table content is standardized β weights and p -values associated with them. Variable coding: female = 1, male = 0; occupational therapy was preferred education program at the time of entry = 1, occupational therapy was not top priority = 0, prior higher education = 1, no prior higher education = 0. On continuous variables, including GPA, higher scores indicate higher levels.

Factors Associated with Exam Grades in the Third Year

Adjusting for all variables in the final model of predictors of exam grades in the third study year, being female ($\beta = 0.23$, $p < 0.01$) and having occupational therapy as the preferred education program at the time of entry ($\beta = 0.19$, $p < 0.01$) were associated with obtaining better exam results. None of the learning environment scales were associated with the outcome. Among the study approach scales, higher scores on

surface approach ($\beta = -0.21$, $p < 0.05$) were associated with poorer exam grades. The full model explained 16.6 % of the variance in exam grades, with the sociodemographic variables accounting for the largest proportion (11.6 %).

Discussion

In this study, we examined associations between students' academic performance, approaches to studying and perceptions of the learning environment in the second and third years of study, with the aim of evaluating the consistency of these associations across years of study. We found that having occupational therapy as the preferred education program at the time of entry was associated with better grades in both study years, whereas associations between grades and gender, perceptions of student autonomy, and the strategic and surface study approaches were somewhat different between the two years.

In this study, having occupational therapy as the preferred education program at the time of enrollment was found to be consistently associated with better academic performance. The group of students, for whom the current study program was the most highly preferred at enrollment, performed better in both study years. These results differ from the results found during the students' first year of study (Bonsaksen et al., 2021), where no associations emerged between having occupational therapy as the preferred education program at the time of entry and the students' academic performance. In combination, these findings offer new insights into the importance of preferences for the study program at the time of entry and the impact this might have on students' academic success. While high initial motivation for the chosen study program may not be important for academic achievements in the early stage of the study program, high initial motivation for the study program appears to become increasingly important for academic achievements during the later stages of the study program.

Our finding contributes to an ambiguous field of research. Early research indicated that new students might be confused and unsure of academic demands during their first year of study (Biggs, 1987). This might be due to the students' general lack of confidence concerning their studies, further causing them problems in performing successfully, even though they might have high study motivation. In more recent years, researchers have examined associations between studying in the preferred department and the students' approaches to studying in different years of study (Karagiannopoulou & Christodoulides, 2005). Differences in study approaches between students enrolled in preferred versus not preferred departments were found in the first study year, but not in the last. Productive study approaches were more often found among students who studied in preferred departments, compared to their counterparts (Karagiannopoulou & Christodoulides, 2005). While not addressing associations with academic grades directly, this suggests that studying in the preferred department – and thus, possibly higher study motivation – was more important for study behaviors during the early stages of the study program, compared to during the later stages. As this appears to contrast the findings in our study, more research is needed to explore the significance of early study motivation for study behaviors and outcomes in various stages of the study program.

Being female was associated with better academic performance in the third study year, and this association was also found in the first year (Bonsaksen et al., 2021). The results revealed a tendency for this association also in the second year, although the association was not statistically significant. A majority of the students entering the occupational therapy profession are female, and the potential reasons and consequences of this female predominance has been discussed in the profession for years (Andonian, 2017; Bonsaksen et al., 2016; Pollard & Walsh, 2000; Yu et al., 2021). The majority of occupational therapists working within universities as educators for new generations of occupational therapists, are similarly female (Pollard & Walsh, 2000). Thus, major gender differences in occupational therapy education programs may render the needs of the male gender minority less well attended. In addition, male students may generally be less prone to seek help, compared to female students (Morgan & Robinson, 2003). If this is the case, such differences may contribute to explain the relatively consistent gender difference in academic grades throughout the education program.

Students experiencing less autonomy in their study situation performed better in the second study year, but not in the third year. Similarly, in the first study year, there was no indication of an association between students' experiences of autonomy in the study situation and their academic performance (Bonsaksen et al., 2021). Therefore, this study does not provide support for these factors being consistently associated during the study program. The association detected in the second study year indicates that students perceiving a higher degree of structure imposed by the teacher are more likely to achieve higher grades. Conversely, students feeling more autonomous – possibly more 'on their own' – in the study process were more likely to achieve poorer grades. While student autonomy has been theoretically assumed to predict better outcomes (Evans & Boucher, 2015; Ramsden, 1991; Wilson et al., 1997), and higher autonomous motivation has been empirically linked with higher academic achievement among medical students (Feri et al., 2016), the results of this study put the general value of higher student autonomy into question. Rather, occupational therapy students experiencing their study situation as much influenced by their educators may need this type of externally imposed structure to perform better at exams. Alternatively, it may be that the higher performing students, academically superior and independent, feel that they are given too little freedom to shape their course of study according to their own ideas. They may also feel that they have too little freedom to choose the learning activities that suit them best, at their preferred time, and they may want to combine studies with part-time work in a way that is hindered by the organized curriculum. These students would indicate student autonomy as low, while still receiving good grades. Both might explain the association between low autonomy and better performance ratings in the second study year.

While we may theoretically suggest that students become more autonomous over time, research has shown that students' own perceptions of autonomy may not increase over time, because students' perceived autonomy is relative to their increasing expectations towards themselves (Henri et al., 2018). Moreover, perceptions of autonomy may also be relative to how students perceive the difficulty of the assignments with which they are

involved. Possibly, the study results may indicate that the gap between task difficulty and perceived resources to cope with them, was larger in the second study year, suggesting that high perceived autonomy at that time might be inappropriate and lead to poorer results. Assuming a smaller gap between task difficulty and perceived resources in the third study year, the level of perceived autonomy would be less important for the students' performance.

Study approaches were also found to be inconsistently associated with the students' academic performance during the study program. In the second year, higher strategic approach was associated with better academic performance, while in the third year, higher surface approach ratings were associated with poorer performance. In the first year, higher ratings on the strategic approach as well as lower ratings on the surface approach were associated with better grades (Bonsaksen et al., 2021). The most important difference between the study years is likely the longer time spent writing the bachelor thesis during the third year (Gramstad et al., 2020), but other assignments in the third study year also require more independent work and the ability to integrate pieces of knowledge into a coherent understanding. Possibly, students leaning towards a surface study approach may conduct and report less coherent and less in-depth inquiries, compared to students leaning towards deep and strategic approaches. Thus, differences in the types of assignments introduced in different stages of the study program may contribute to explain why study approaches may relate differently to academic performance in different stages of the education program.

Study Strengths and Limitations

The study sample consisted of occupational therapy students in Norway. Thus, the study is limited in its scope, and generalizations to other fields of study and geographical regions, should be done with caution. All associations reported in this study are cross-sectional. Thus, due to the nature of the study design, no causal associations should be inferred. However, a strength of the study is the series of analyses performed annually throughout the study program. This strategy moves the field beyond establishing associations between variables at a single point in time and allows for examining consistency and change in these associations over time. A high number of statistical tests were performed, rendering a higher risk of Type I error (i.e., falsely assuming an association in the population where none exists).

Replication of the findings is needed to substantiate the results. Possibly, the results could be due to the different samples used at each time of data collection. However, as many as 142 students participated in both the second and in the third study year. The 142 students represented 87.7% of the students participating in the second study year, and 75.1% of the students participating in the third study year. Thus, while it cannot be verified, the high degree of student overlap between the two study years indicates that the results of the study are not likely due to statistical artefacts (i.e., due to who was part of each sample).

The study samples were relatively small in both study years, and in particular, the number of males was low. While the gender proportions were similar to what has been found in other studies of occupational therapy students (Andonian, 2017; Yu et al., 2021), the low number of males represents a limitation for the gender comparisons, which should be interpreted cautiously. For example, the lack of a statistically significant association between gender and GPA in the second study year might be due to low statistical power.

Implications for Occupational Therapy Education

This study found that having occupational therapy as the preferred line of education at enrollment was associated with better grades in both study years. Associations between grades and gender, perceptions of student autonomy, and study approaches were somewhat different between the two years. However, the results from all three study years combined clearly indicate that better grades are associated with higher strategic approach and lower surface approach ratings.

Students with different levels of initial motivation may profit from differentiated guidance during the early stage of the study program. Faculty may support the highly motivated students, who may be disappointed by the early results they obtain, by conveying the message that their high motivation is a valuable resource. However, motivation may not be a direct source of better academic outcomes until later in the study program, once the students have adapted to the culture and requirements of higher education. Conversely, students who did not have occupational therapy as their preferred line of education might benefit from efforts to increase their motivation and sustain their higher initial levels of academic performance. In order to support both groups of students effectively, further qualitative research may be of importance to gain in-depth knowledge about eventual changes in how students perceive academic demands and how they manage them.

Occupational therapy education programs may be largely aligned with the needs and requirements of female students and may therefore work better for female students than for males. Extra attention directed at the male group of students may improve their academic performance during their time in the education program and may improve their chances of becoming successful occupational therapists. Occupational therapy educators should balance the value of student autonomy with their need for an externally imposed structure. The maturity of the students should be considered when adapting the study curriculum to a particular group of students. To support students' academic performance, the curriculum should preferably encourage strategic and discourage surface study approaches among students, with more emphasis being placed on the discouragement of surface approaches towards the later stage of the study program.

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