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Study-related exhaustion: First-year students' use of self-regulation of learning and peer learning and perceived value of peer support

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Abstract

This study examines the profiles of self-regulation of learning, peer learning and peer support among students. The study investigates whether the profiles differ in terms of reported study-related exhaustion. Students completed a questionnaire regarding their use of self-regulation of learning and peer learning and perceived peer support and study-related exhaustion. Four different student profiles were found. The profiles differed in terms of self-reported study-related exhaustion. Self-regulated students with a low level of peer learning and low perceived value of peer support reported the lowest levels of study-related exhaustion whereas Students with self-regulation problems, a high level of peer learning and high perceived value of peer support reported the highest levels of study-related exhaustion. The results showed that problems in self-regulation were positively related to self-reported study-related exhaustion. Identifying different student profiles helps to recognise students who may need more support in studying.

Self-regulation of learning, peer learning, peer support and study-related exhaustion among university students

The transition to university is challenging for many students and even the most successful students experience this transition as difficult (Raidal and Volet, 2009; O'Keeffe, 2013; Xuereb, 2014; Putwain and Sander, 2016; Collings et al., 2016; Coertjens et al., 2017; Noyens et al., 2017). There is evidence that especially the first study year is critical (Brinkworth et al., 2009). One of the key challenges in the transition is the requirement for independent studying (Christie et al., 2013).

Self-regulation of learning is a process in which students independently plan, monitor and reflect upon their cognition, behaviour, motivation and emotions in order to reach their goals in studying (Zimmerman, 2000; Pintrich, 2004; Schunk and Zimmerman, 2012). The ability to plan, monitor and reflect on their own learning is related to successful studying (Warburton and Volet, 2012). Learning may also be externally regulated when a teacher regulates a student's learning (Vermunt, 2005). Especially problematic is the lack of regulation which refers to problems in the regulation of learning (Vermunt, 2005). Problems may occur in different phases of the learning process, such as when planning study or during studying. Problems may also be shown in different areas of the regulation of learning such as in the regulation of behaviour when a student has problems in time management. Self-regulation becomes even more important when students encounter challenges in studying such as combining study with personal life and work.

Self-regulation of learning may be difficult particularly at the beginning of university studies (Donche and Van Petegem, 2009; Donche et al., 2010; Heikkilä et al., 2012; Lindblom-Ylänne et al., 2015; Koivuniemi et al., 2017). However, there is a large variation in students' self-regulation skills. Some students regulate their own learning without problems but some experience major challenges in self-regulation (Lindblom-Ylänne et al., 2017). At the beginning of university studies students may not be prepared for the amount of independent studying that is required (Christie et al., 2016); it requires good self-regulation skills and students may find that external support is limited. Many first-year university students have difficulties in setting realistic goals that could be divided into manageable tasks (McCardle et al., 2017). In addition, many students simply have insufficient metacognitive regulation skills to regulate their learning (De Backer et al., 2015) and experience challenges in time management, which is also a factor in self-regulation (Van der Meer et al., 2010). Problems in self-regulation may affect studying in many ways. Difficulties in time-management as well as low self-efficacy for self-regulation may explain a slow study pace (Lindblom-Ylänne et al., 2015). In addition, problems in self-regulation during the first study year may negatively affect students' academic success (Vanthournout et al., 2012; Donche et al., 2014) and thus affect their ability to persist in their studies (Vanthournout et al., 2012).

When students try to take more responsibility for their own learning, their workloads may increase and they are then at risk for study-related exhaustion. The first study year can be especially stressful for many students (Bewick et al., 2010). *Study-related exhaustion* is considered a core component of study-related burnout. Study-related exhaustion refers to a lack of emotional energy, tiredness and chronic fatigue related to studying (Salmela-Aro et al., 2009) which develops because of long-term stress related to studying (Lin and Huang, 2014). The other components are *feelings of study-related cynicism* and *feelings of inadequacy as a student* (Schaufeli et al., 2002). Feelings of study-related cynicism refer to a situation in which a student loses interest in studying and distances oneself from studying. Feelings of inadequacy as a student refer to not having the emotional resources to respond to study-related demands (Salmela-Aro et al., 2009). There is evidence that particularly high-achieving university students who study hard experience exhaustion because they set high demands on themselves (Dickinson and Dickinson, 2015). Study-related exhaustion during university studies also predicts exhaustion in working life (Dahlin et al., 2010).

One way to support undeveloped self-regulation skills is through peer learning. *Peer learning* refers to a reciprocal learning activity in which students learn in interaction with each other (Boud and Lee, 2005; Boud, 2014). Peer learning may occur during informal or formal learning situations (Boud, 2014). During peer learning, students may also regulate their learning with their peers (Hadwin et al., 2011). *Peer support* plays an important role in peer learning. Peer support refers to the identification and active use of social resources in studying (Boud, 2014). There is evidence that peer support enhances a successful transition to university (Vinson et al., 2010; Collings et al., 2016) and engagement in studying

(Cavanagh, 2011). Peer support is particularly important at the beginning of university studies when students need to learn how to study at the university (Wilcox et al., 2005). Emotional support can play a key role during studies (Boud, 2014). Students may also need informational support, which means asking for advice from peers in study-related matters and for coping with stressful situations. There is evidence that peer support helps students who experience challenges in self-regulation. However, there is variation in how university students engage in peer support activities.

There is some evidence that self-regulation of learning is positively related to university students' well-being. University students who have good self-regulation skills experience lower levels of stress and study-related exhaustion compared to students who have problems in regulating their learning (Heikkilä et al., 2011, 2012). Furthermore, self-regulation of learning is positively related to academic resilience; therefore, students with good self-regulation skills can cope better with challenges in studying (Martin and Marsh, 2006). There is evidence that being able to set realistic goals for studying decreases students' experiences of stress (Dickinson and Dickinson, 2015).

Peer support is also positively related to students' well-being. Peer support provides a buffering effect against stress and burnout through providing resources for coping with stress. Lack of social support and insufficient support, can lead to loneliness (Lin and Huang, 2012) which is negatively related to well-being. Thus, the match between needed and received support is important (Wolff et al., 2013). There is also evidence that particularly first-year students, who have low levels of well-being, use and need peer support (Collings et al., 2016). Students are more likely to seek help from their peers than from other sources and one reason may be that they feel shame related to their personal difficulties (Laidlaw et al., 2016). However, many students do not seek help even though they experience such difficulties (Laidlaw et al., 2016). In addition, not all students have peers from whom they could ask support when they need it. Learning to use peer support during university studies has such an important role that it is also related to well-being later in working life. A study showed that individuals who sought social support and advice from their peers during university studies, showed lower levels of burnout 10 years later in their careers than individuals who avoided and withdrew from social situations at the university (Salmela-Aro et al., 2011).

Self-regulation of learning, peer learning, peer support and study-related exhaustion have mostly been examined separately. Thus, a comprehensive picture of the interrelationships among all these aspects is lacking. There is also a need to explore the relationship between these aspects at an individual level using a person-oriented approach and to investigate whether different student profiles could be identified among students and whether the profiles differ in terms of reported study-related exhaustion.

First, it is hypothesised that there will be variation in how first-year university students combine self-regulation of learning, peer learning and peer support in their studying and that different profiles will be found (Hypothesis 1). Second, it is hypothesised that students who report problems in regulating their learning will report needing other students' support in studying to be able to cope with their studies (Hypothesis 2). Third, it is hypothesised that the profiles will differ in self-reported study-related exhaustion in such a way that self-regulated students will report lower levels of study-related exhaustion than students who report problems in self-regulation and that perceived peer support will be positively related to well-being (Hypothesis 3).

Methods

Participants and context

The data were collected at the University of Helsinki in Finland. The participants consisted of 188 first-year university students from three different disciplines and six different degree programmes: biosciences including biology (*n*=40), aquatic sciences (*n*=6) and environmental sciences (*n*=10); dentistry and medicine (*n*=108) and mathematics (*n*=24). The students completed a questionnaire at the end of their first study-year in 2013. The students in biology, aquatic sciences, environmental sciences and mathematics aim for the degree of Master of Science. The duration of studies is five years including bachelor's studies (three years) and master's studies (two years). The students in dentistry and medicine aim for the degree of Licentiate of Dentistry or Licentiate of Medicine. The duration of studies is six years. Studies include a preclinical phase (1st and 2nd years of study) and a clinical phase (from 3rd to 6th years of study).

The mean age of the participants was 23 years (SD=4.43; Min–Max: 17–45 years). Of the 188 participants, 104 were female (55.3%) and 83 were male (44.4%). One student did not report gender. Students in Finland graduate from upper-secondary school at the age of 19; because of demanding entrance examinations, they enter university on average at an older age than students in many other European countries. Thus, regarding age, the sample well represented the Finnish student population. The response rate among the students at the degree programme of biology was 100% because all 40 first-year students completed the questionnaire as part of their personal study plan and gave permission to use their responses in the study. Regarding other degree programmes, only those students who participated in one lecture of the compulsory course could be reached. Therefore, it is difficult to estimate the actual response rate from these degree programmes.

The study followed the ethical guidelines of the Finnish Advisory Board on Research Integrity (2012). Data collection was conducted in collaboration with the participating degree programmes. The students were informed about the study at a lecture in March 2013. The participation was voluntary and the anonymity of the participants was ensured during all stages of the study. The students were not given any incentives for participating in the study.

Instrument description

***Self-regulation of learning*.** Self-regulation of learning was measured using four scales (self-regulation of process, self-regulation of content, external regulation and lack of regulation) from the Inventory of Learning Styles (ILS, Vermunt, 1994). The original questionnaire was shortened, translated and modified for the Finnish context.

The original questionnaire included four scales including a total of 28 items: seven items measure the *self-regulation of process* and four items measure the *self-regulation of content*, 11 items measure *external regulation* and six items measure *lack of regulation*. First, all the items were carefully discussed; some items that seemed difficult to modify into the Finnish context or seemed to resemble other items when they were translated were excluded. Second, the remaining items were translated and some items were modified so that they would better fit the Finnish context. For example, in the original questionnaire there was an item “To test my learning progress when I have studied a text book, I try to formulate the main points in my own words”. The item was modified as follows: “To test my learning progress, I try to formulate the main points in my own words” because in many courses students do not read textbooks. Finally, before the data collection, the modified questionnaire was piloted among 37 students who studied in the degree programme of biology. The students were told about the pilot study at a lecture and they were asked to complete the questionnaire and comment on the items. Based on the pilot study, the questionnaire was further shortened based on the students’ comments and factor loadings. A cut-off point of .30 for communalities was used. In addition, cross-loadings were considered to be problematic. In addition, a minimum of .60 for Cronbach’s alphas was required.

The shortened version included altogether 15 items: four items measured the self-regulation of process, which referred to students’ ability to regulate their own learning process (e.g., “When I have difficulty grasping particular subject matter, I try to analyse why it is difficult for me”). Three items measured the self-regulation of content, which means how students searched for additional literature (e.g., “In addition to the course requirements, I study other literature related to the content of the course”). The scale for external regulation included four items that measured the extent to which a teacher regulates a student’s learning. The option stated: “I experience the instructions and assignments given by the teacher as indispensable guidelines for my studies”. The scale for lack of regulation indicated problems in self-regulation and included four items such as “I notice that I have trouble processing a large amount of subject matter”. The students responded to all the items in this study on a 7-point Likert scale ranging from 1=totally disagree to 7=totally agree.

To examine these scales, an exploratory factor analysis (EFA) using principal axis factoring and a direct oblimin rotation was conducted because the questionnaire was shortened, modified and translated into a Finnish context. The exploratory factor analysis showed that the factor structure was like that in previous studies regarding the factors that were used in this study (Vermunt, 2005) and included four factors: the self-regulation of process; self-regulation of content; external regulation and lack of regulation. Analysis of the items showed that three items had low communalities and loadings. These items were not included in the factors. The factor loadings are presented in Table 1. The reliabilities

were tested with Cronbach's Alpha which was .67 for the self-regulation of process scale, .71 for the self-regulation of content scale, .61 for the external regulation scale and .76 for the lack of regulation scale. The reliability of all the scales was above .60, which can be considered to be acceptable.

<<Table 1>>

***Peer learning and peer support*.** Peer learning and peer support were measured using items that were modified from the Proactive Strategy scale (Pietarinen et al., 2013; Pyhältö et al., 2015). The scale comprised ten items similar to the response "I ask for help from my peers on questions related to studying".

To examine the scale, an exploratory factor analysis using principal axis factoring and direct oblimin rotation was conducted because the scale had not been previously used in a university context. The exploratory factor analysis showed that based on the loadings and communalities, a two-factor solution was the clearest. The interpretability of the factors was also assessed. The two-factor solution included items 24, 25 and 27 in the first factor, which measured the perceived value of peer support in studying; items 28 and 33 in the second factor measured engaging in peer learning. Some items loaded on the third factor but the loadings and communalities were lower. In addition, the third factor was more difficult to interpret theoretically. Based on the exploratory factor analyses, we decided to continue the analysis by using items 24, 25, 27, 28 and 33; they clearly loaded on different factors and had both high loadings and communalities. The other five items were excluded from further analysis. The factor loadings are presented in Table 2. The Cronbach's Alpha was .88 for the scale that measured the perceived value of peer support and .81 for the scale that measured engaging in peer learning.

<<Table 2>>

Study-related exhaustion. The study-related exhaustion subscale from the Finnish version of the Study-Burnout Inventory was used to measure university students' feelings of study-related exhaustion (SBI; Salmela-Aro et al., 2009). It includes three factors: study-related exhaustion, feelings of cynicism related to studying and feelings of inadequacy as a student. A study-related exhaustion subscale that included three items was used: "I feel overwhelmed by my study work".

To investigate the study-related exhaustion scale, an exploratory factor analysis using principal axis factoring and direct oblimin rotation was conducted. The three items clearly loaded on a single factor. The factor loadings are presented in Table 3. The Cronbach's Alpha for the scale was .79.

<<Table 3>>

Data analyses

First, latent profile analysis (LPA) was used to classify different students' profiles related to self-regulation of learning, peer learning and perceived value of peer support. LPA models are finite mixture models in which the observed distributions of the continuous clustering variables are expressed as composites of component distributions, one in each latent class (Masyn, 2013). As the number of latent classes is initially unknown, the method aims to detect the smallest number of latent classes that adequately describes the relations among observed continuous variables (Muthén and Muthén, 1998–2012). A series of LPAs based on both the scale mean scores and single items regarding self-regulation of learning and peer support were conducted using MPlus 7 (Muthén and Muthén, 1998–2012). The final analysis was based on single items for two reasons.

First, when performing an LPA, it is assumed that the observed variables function as indicators of categorical latent variables, whereas the scale mean scores are simple operationalisations of continuous latent variables. Second, using single items retains the unique information contained in each item in the analysis; this information would be lost when first calculating scale mean scores. The

Bayesian Information Criterion (BIC), Akaike Information Criterion (AIC), a Vuong-Lo-Mendell-Rubin likelihood ratio test (VLMR) and Lo-Mendel-Rubin Adjusted LRT were used as the statistical criteria for choosing the best-fitting model. The model with a lower BIC and AIC value is considered to provide a better fit and a low *p*-value of VLMR and Lo-Mendel-Rubin Adjusted LRT test suggests that the model with one fewer class should be rejected in favour of the estimated model.

LPA models with 2-4 latent classes were formed to examine whether different profiles of self-regulation of learning, peer learning and peer support could be found (k=2–4). The likelihood ratio tests favoured a three-class model, whereas the information criteria were the lowest for the four-class model (Table 4). The four-class model was deemed more readily interpretable.

<<Table 4>>

Second, the students were assigned to their most likely latent classes. One-way ANOVAs were used to investigate differences among the profiles in reported study-related exhaustion. Third, in order to examine in more detail the relationship among self-regulation of learning, peer learning, peer support and study-related exhaustion, a Pearson's correlation was used. Finally, to complete the person-oriented analyses, a linear regression analysis was carried out using a step-wise method and, scale mean scores. Furthermore, a linear regression analysis with demographic variables, age and gender, was conducted.

Results

Self-regulated students with a low level of peer learning and low perceived value of peer support (*n*=31) scored the highest of all the profiles on items measuring self-regulation of process and content; they were close to the average on items measuring external regulation and low on items measuring lack of regulation (Figure 1). They scored low on most items measuring engaging in peer learning and perceived value of peer support.

Self-regulated students with a high level of peer learning and high perceived value of peer support (*n*=97) scored above average on items measuring self-regulation of process and close to the average on self-regulation of content. They scored above average on items measuring external regulation, below average on most items measuring lack of regulation and above average on items measuring peer learning and perceived value of peer support.

Students with self-regulation problems, high level of peer learning and high perceived value of peer support (*n*=16) scored near to the average on most items measuring self-regulation of process and low on most items measuring self-regulation of content. They scored the highest of all the profiles on items measuring external regulation and lack of regulation. They also scored the highest on items measuring peer learning and perceived value of peer support.

Students with self-regulation problems, low level of peer learning and average perceived value of peer support (*n*=44) scored close to the average on items measuring self-regulation of process and low on most items measuring self-regulation of content. They scored above average on external regulation and lack of regulation. They scored low on items measuring peer learning and average on items measuring the perceived value of peer support. The greatest differences among the student profiles were shown in lack of regulation, peer learning and perceived value of peer support.

<<Figure 1>>

Differences in reported study-related exhaustion

A relationship between profiles of self-regulation of learning, peer learning, peer support and self-reported study-related exhaustion was found, ($F(3, 184) = 12.568$, $p < 0.000$, $\eta^2=.17$) (see Figure 2). The effect-size can be considered large (Cohen, 1988). The Bonferroni post hoc test showed that *Self-*

regulated students with a high level of peer learning and high perceived value of peer support reported more study-related exhaustion than *Self-regulated students with a low level of peer learning and low perceived value of peer support. Students with self-regulation problems, high level of peer learning and high perceived value of peer support* reported more study-related exhaustion than *Students with self-regulation problems, low level of peer learning and average perceived value of peer support*.

<<Figure 2>>

The results showed that a lack of regulation was statistically significantly positively related to study-related exhaustion. The relationships between other factors and study-related exhaustion were not statistically significant (see Table 5).

<<Table 5>>

It was found that a lack of regulation explained a significant amount of reported study-related exhaustion, $F(6, 178)=21.507$, $p < .000$, $R^2=.65$, $R^2_{Adjusted}=.40$. When an analysis that included gender and age was conducted, it was found that gender and age did not significantly predict study-related exhaustion. However, a lack of regulation significantly predicted study-related exhaustion, $F(8, 169)=15.388$, $p < .000$, $R^2=.65$, $R^2_{Adjusted}=.39$ (Table 6). Finally, when an analysis within the profiles was conducted, the relationships remained the same.

<<Table 6>>

Discussion and conclusion

This study examined profiles of the self-regulation of learning, peer learning and peer support among first-year university students. The study also investigated how self-regulation of learning, peer learning and peer support were related to reported study-related exhaustion. Four different student profiles were found. One, self-regulated students with a low level of peer learning and low perceived value of peer support. Two, self-regulated students with a high level of peer learning and high perceived value of peer support. Three, students with self-regulation problems, a high level of peer learning and high perceived value of peer support. Four, students with self-regulation problems, low level of peer learning and average perceived value of peer support.

Self-regulated students with a low level of peer learning and low perceived value of peer support (16%) reported the highest levels of all the students in self-regulation of learning and the lowest levels in lack of regulation. It seemed that peer support and peer learning did not play an important role in these students' studying. These students know what the best way for them to study is; they are able to regulate their learning independently and have good metacognitive skills. Furthermore, they are not sensitive to the changes in the learning environment. The students in this profile may have good skills for peer learning and they could have peers from whom they could ask for support in their studying but they do not necessarily engage in these activities because they do not feel they are necessary.

Self-regulated students with a high level of peer learning and high perceived value of peer support (52%) formed the largest group, which suggests that most of the students in this study experienced that they had good self-regulation skills, they engaged in peer learning and asked for support from their peers when needed; this is an important aspect of the regulation of learning (Pintrich, 2004). Although these students experienced that they had good self-regulation skills, they also reported some problems in regulating their learning. For these students, peer learning may provide a possibility to further develop their regulation skills, for example through co-regulation of learning (Hadwin et al., 2011).

Students with self-regulation problems, a high level of peer learning and high perceived value of peer support (9%) reported problems in self-regulation more than any of the other students. These students reported the highest levels of all the students in peer learning and the importance of peer support.

Research shows that even highly selected and well-motivated students may face problems in self-regulation in the first study year (Donche and Van Petegem, 2009; Donche et al., 2010). Research also indicates that first-year students may experience more stress from their workload than students in later phases during their studies because they do not yet have the required self-regulation skills to cope with the university study workload.

Students with self-regulation problems, a low level of peer learning and average perceived value of peer support (23%) reported self-regulation problems; they felt that peer support would be important in studying but they reported low levels in engaging in peer learning. It may be that they did not engage in peer learning although they needed it and instead tried to manage alone. Another explanation could be that these students did not have peers with whom they could study. This result is worrying because research shows that loneliness has increased among university students in many countries. It is also related to experiences of burnout (Lin and Huang, 2012).

Differences among the profiles in terms of study-related exhaustion were found. Self-regulated students with a low level of peer learning and low perceived value of peer support reported the lowest levels of study-related exhaustion, whereas interestingly, Students with self-regulation problems, a high level of peer learning and high perceived value of peer support reported the highest levels of study-related exhaustion. They may have such difficulties in self-regulation that even peer support and peer learning do not help them in studying; consequently, they may experience study-related exhaustion. Students with self-regulation problems, a low level of peer learning and average perceived value of peer support also reported rather high levels of study-related exhaustion. It is worrying that these students did not report that they placed a high value on peer support although they experienced exhaustion. These results were contrary to research that shows that first-year students who have challenges in well-being, use peer support (Collings et al., 2016). The results showed that a lack of regulation was positively related to study-related exhaustion which are in line with studies by Heikkilä et al. (2011, 2012) that also showed that a lack of regulation was related to higher levels of experienced study-related exhaustion.

Peer learning and peer support were not statistically significantly related to study-related exhaustion. The results are contrary to the research in which peer support was positively related to students' well-being and a lack of social support and inadequate support from peers were negatively related to students' well-being (Lin and Huang, 2012). The reason that the relationship between peer support, peer learning and study-related exhaustion was not statistically significant may be that the individual regulation of learning has such an important function in studying that it plays a more important role in study-related exhaustion than do peer learning or peer support. The results suggest that students who study independently may have more resilience as learners. In addition, it may be that not all students benefit from collaborative learning practices. Another reason may be related to the way that peer learning and experiences of peer support were measured in this study.

It was worrying that many students reported problems in regulating their own learning and reported study-related exhaustion already at the end of their first study year. One explanation for these problems can be related to the transition to university when students may have to develop their study skills (Coertjens et al., 2017). In addition, many first-year students experience high levels of stress at the beginning of their studies (Bewick et al., 2010). It is worrying because research shows that students who have problems in self-regulation and experience exhaustion may be at risk of not graduating on time or even dropping out (Vanthournout et al., 2012). There is also evidence that exhaustion during university studies predicts exhaustion in working life (Dahlin et al., 2010).

The study described here provides new knowledge about the relationship between self-regulation of learning, peer learning and the perceived importance of peer support among first-year students. Through applying a person-oriented approach, evidence of different combinations of self-regulation of learning, peer learning and perceived importance of peer support could be identified. In addition, the results indicated that there were differences in experienced study-related exhaustion among different profiles.

The study has certain methodological limitations. First, the measures of self-regulation of learning, peer learning, perceived value of peer support and study-related exhaustion were based on students' self-reports rather than measuring their actual behaviours/performance. Second, while the scales measuring self-regulation and study-related exhaustion have been validated in a university context, the

scale measuring peer learning and peer support has not been previously used in such a context. Still, further development of the scale is needed in university contexts to capture peer learning and peer support more profoundly. Third, only one research-intensive university in one particular country and cultural context, three disciplines and six degree programmes were represented. The participants were undergraduates, and it may be the case that self-regulation of learning, peer learning, perceived value of peer support and study-related exhaustion is different in the postgraduate population, as well as in different disciplines and contexts in the undergraduate population. Therefore, the findings cannot be generalised as such to other countries and contexts.

Future studies could examine students' self-regulation of learning, peer learning, peer support and study-related exhaustion in other contexts, including that of other disciplines and in other countries. In addition, it would be important to examine self-regulation of learning, peer learning and peer support in different study modes, for example in problem-based learning and also among non-traditional learners. It is important to notice that students may experience different kinds of challenges in studying during university studies and that students who have good regulation skills and well-being during the first study year may also experience difficulties later during in their university careers. Therefore, it would be important to conduct longitudinal research to explore the stability and change in students' well-being during studies and to examine how changes in self-regulation of learning, peer learning and peer support are related to changes in well-being.

The practical implications of this study are related to identifying different student profiles as well as differences among the profiles in study-related exhaustion. Identifying different student profiles helps to recognise students who may need more support in studying. Special attention should be paid to students who have problems in regulating their own learning at the beginning of university studies. Even though students might ask for support from their peers or engage in peer learning, this alone may not support their learning if they have severe problems in self-regulation. Problems in self-regulation may have further negative effects on their well-being.

Since the development of self-regulation skills is a long process, students are given opportunities to develop these skills already from the beginning of their studies. Self-regulation skills can be enhanced through tasks in which students need to reflect on their own studying and learning as well as through self-assessment. Thus, students are supported to recognise challenges related to their own studying. Increasing students' awareness of their own study skills helps to support them. In addition, opportunities for peer learning are provided to students and also to those students who do not engage in peer learning by themselves because it may help them to develop the regulation and collaborative learning skills that are also needed in working life.

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Table 1. Factor loadings of self-regulation of learning, external regulation and lack of regulation

Items	Factors				
	Self-regulation of process	Lack of regulation	External regulation	Self-regulation of content	
	F1	F2	F3	F4	h^2
6. To test my learning progress, I try to formulate the main points in my own words.	**0.830**	0.059	-0.060	-0.170	0.591
4. To test whether I have mastered the subject matter, I try to think of examples and problems besides the ones given in the study material or by the teacher.	**0.576**	0.017	0.025	0.248	0.507
1. When I am studying, I also pursue learning goals that have not been set by the teacher, the course or degree but by myself.	**0.378**	-0.220	0.021	0.268	0.414
5. I have noticed that I have trouble processing a large amount of subject matter.	0.025	**0.736**	-0.022	-0.070	0.563
12. I realise that the objectives of the course are too general for me to offer any support.	0.010	**0.677**	-0.006	-0.039	0.473
9. It is difficult for me to determine whether I have mastered the subject matter sufficiently.	-0.042	**0.631**	-0.052	-0.027	0.408
15. I realise that I miss someone to fall back on in case of difficulties in studying.	0.012	**0.584**	0.128	0.120	0.358
3. I study according to the instructions given in the study material or provided by the teacher.	0.011	-0.187	**0.797**	-0.008	0.598
8. I experience the instructions and assignments given by the teacher as indispensable guidelines for my studies.	-0.058	0.137	**0.519**	0.018	0.336
14. The instructions and the course objectives given by the teacher are important to me in order to know exactly what to do.	0.135	0.087	**0.452**	-0.027	0.302
7. In addition to the course requirements, I study other literature related to the content of the course.	-0.099	0.063	-0.089	**0.912**	0.759
13. I do more than I am expected to do in a course.	0.049	-0.089	-0.027	**0.587**	0.419

Note. Factor loadings in each factor shown in bold. h2 = communalities.

Table 2. Factor loadings of peer learning and peer support

Items	Factors		
	Perceived value of peer support F1	Engaging in peer learning F2	h^2
25. Conversations with peers support me in my studying.	**0.935**	0.050	0.799
24. Peer support is important in studying.	**0.830**	-0.093	0.714
27. I ask for help from my peers concerning questions related to studying.	**0.613**	-0.141	0.702
28. I often prepare for the exam together with peers.	0.073	**0.877**	0.767
33. I often do study tasks together with peers.	-0.051	**0.778**	0.673

Note. Factor loadings in each factor shown in *bold*. h^2 = communalities.

Table 3. Factor loadings of study-related exhaustion

Items	Factor	
	Study-related exhaustion F1	h^2
3. I often brood during my free time over matters related to my study work.	**0.814**	0.663
1. I feel overwhelmed by my study work.	**0.715**	0.511
2. I often sleep badly because of matters related to my study work.	**0.709**	0.502

Note. h2 = communalities.

Table 4. Fit indices for different class solutions

Number of classes	Information criteria			Likelihood ratio tests p-values	
	AIC	BIC	aBIC	VLMR	aVLMR
2	14 815.847	15 017.953	14 824.689	0.0202	0.0209
3	14 462.521	14 733.392	14 473.603	0.0410	0.0423
4	14 363.572	14 703.812	14 377.492	0.4376	0.4384

Note: AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; aBIC = Sample adjusted BIC; VLMR = Vuong-lo-Mendell-Rubin Likelihood ratio test; aVLMR = Vuong-Lo-Mendell-Rubin adjusted LRT test.

Table 5. Descriptive statistics and latent factor correlations

	1.	2.	3.	4.	5.	6.	7.
1. Self-regulation of process	-						
2. Self-regulation of content	0.440**	-					
3. External regulation	-0.015	-0.104	-				
4. Lack of regulation	-0.222**	-0.250**	0.204**	-			
5. Perceived value of peer support	0.108	-0.071	0.209**	0.160*	-		
6. Peer learning	-0.018	-0.120	0.072	0.003	0.612**	-	
7. Study-related exhaustion	-0.077	0.121	0.136	0.638**	0.033	-0.066	-
M	4.75	3.11	4.42	3.55	4.98	3.53	3.25
SD	1.14	1.35	1.13	1.19	1.37	1.77	1.43

Note: *p < 0.05, **p < 0.01.

Table 6. The results of a regression analysis

	B	*SE B*	ß	*t*	*p*
Self-regulation of process	0.062	0.084	0.049	0.734	0.464
Self-regulation of content	0.027	0.072	0.026	0.377	0.707
External regulation	0.037	0.077	0.029	0.479	0.633
Lack of regulation	0.795	0.078	0.639	10.152	0.000 *
Perceived value of peer support	-0.127	0.082	-0.122	-1.545	0.124
Peer learning	0.006	0.061	0.008	0.106	0.916
Gender	-0.272	0.176	-0.095	-1.546	0.124
Age	-0.003	0.019	-0.008	-0.138	0.890

Note: *p < 0.05.

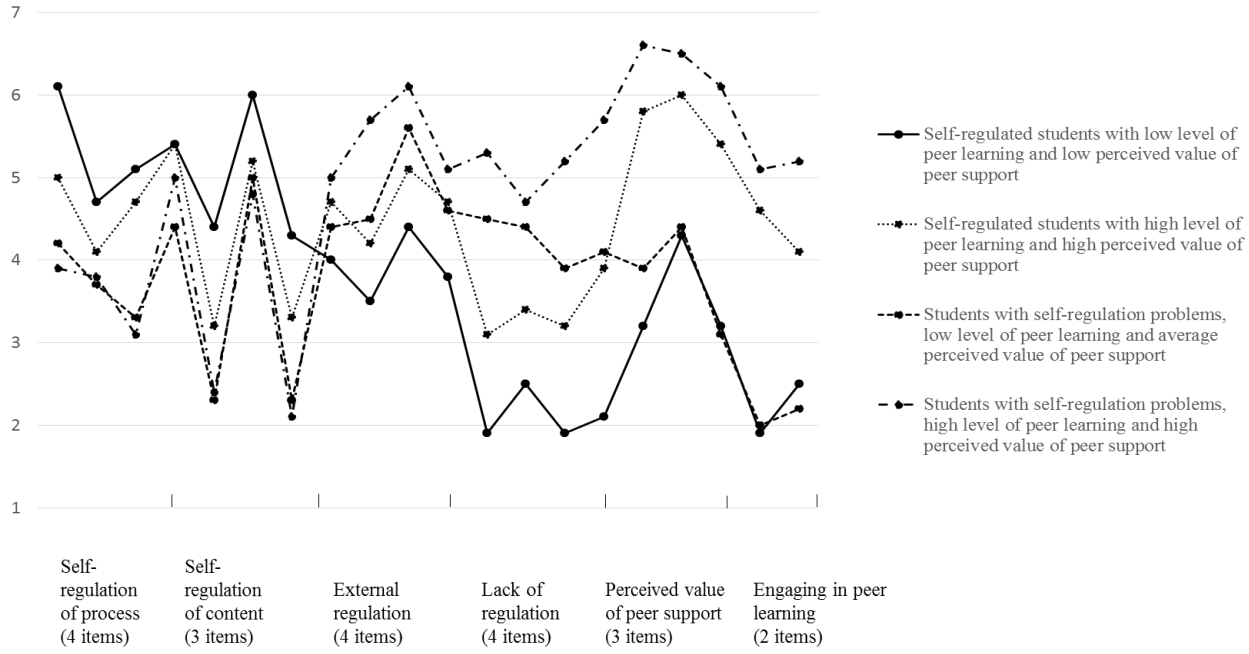


Figure 1. Item-level mean scores on self-regulation of learning, peer learning and perceived peer support in different student profiles

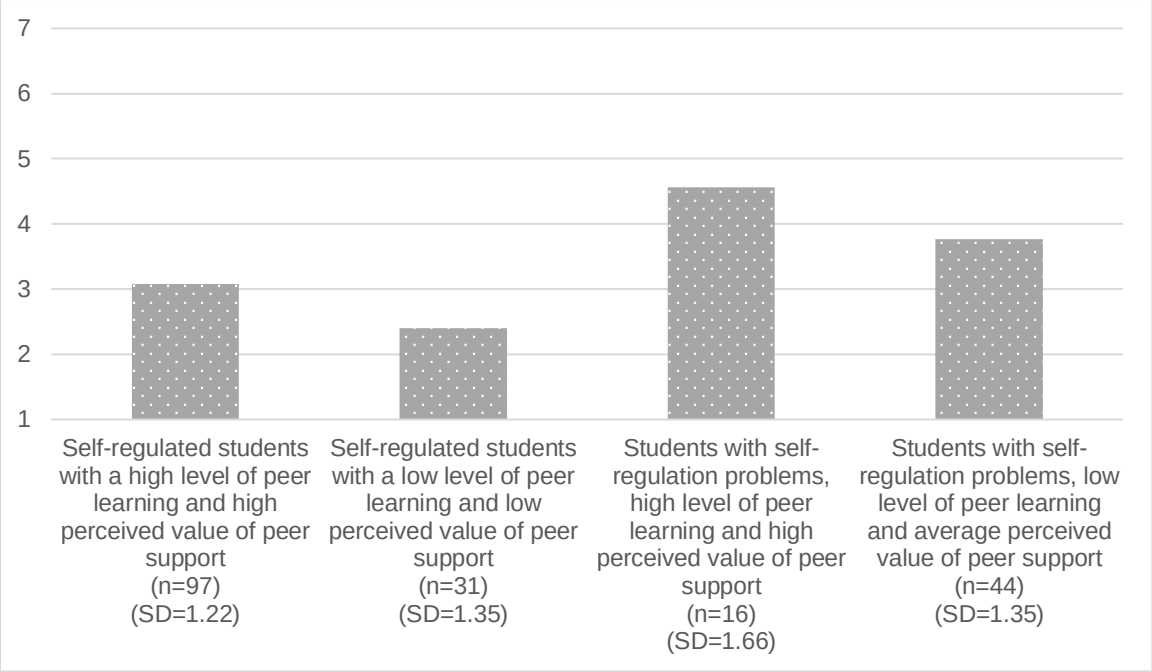


Figure 2. Mean differences in reported study-related exhaustion between the profiles