

Personality, motives and learning environment as predictors of self-determined learning motivation

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This study investigates how well can personality, motives for studying and the perceived learning environment predict self-determined learning motivation in higher education. Previous research has predominantly focused on the interrelation between learning environment and self-determined motivation or on the outcomes of self-determined learning motivation. The question whether relatively stable personality dispositions preform self-determined learning motivation has been largely neglected. The theoretical basis of this study is the differential psychology model, the “Big Five” model (Goldberg, 1999; McCrae et al., 2000), as well as Deci and Ryan’s (2002a) self-determination theory. The data of 730 students were analyzed by means of regression analyses, with personality traits (Big Five), study motives and the perception of the teaching-learning environment as independent variables and self-determined learning motivation as a dependent variable. The results of hierarchical regression analyses show that the personality dimensions of conscientiousness, neuroticism and openness predict a large part of the variance of learning motivation and that additional predictors are motives to study and the perception of learning environments.

Key words: learning motivation, higher education, learning environment, personality, motives to study, self-determination, Big Five

Why do learners show different levels of learning motivation regarding their studies? Why some learners need external prompts or pressure to face their studies, while others self-determinedly engage in their learning and may even develop a strong personal interest in the material? Hence, we are dealing with the question of how interindividual differences in learning motivation can be explained. For example, if we ask teachers about the differences in learning motivation, the answers generally point towards primary socialisation, e.g. talent, lack of interest or specific personality traits. Students, on the other hand, often state that their learning motivation is influenced by the perceived instructional conditions, the subjective relevance or non-relevance of the subject matter, or by the teacher’s personality, whether s/he appears nice, competent or committed.

All in all, both parties certainly have their points. If we take a closer look at the developmental theory of learning

motivation, we find many approaches describing the genesis of learning motivation as a function of individual and environmental aspects. The respective focus, however, strongly varies. *Trait theories* underline personality traits which are stable over situations and which regulate the learning processes. This also includes the concept of causal attribution, which distinguishes between success-oriented and failure-oriented learners. *Cognitive theories of action* have provided extensive studies of the learning environment (cf. e.g. Heckhausen, 1989; Pintrich & Schunk, 1996). They highlight learners’ rational decision-making processes, integrating, for example, different dispositional aspects such as self-concept, self-efficacy or task- vs. ego-orientation, predicting inter-individual differences in learning motivation.

Yet, both of these theoretical concepts show a predominantly cognitive approach and, therefore, they neglect emotional aspects, which are often unconscious, but very crucial for the genesis and persistence of learning motivation (see for instance Krapp, 2005). One of the most prominent approaches, which systematically integrate emotional aspects, is the so-called *self-determination theory* (SDT) (Deci & Ryan, 2002a). A central aspect of this theory postulates that the satisfaction of basic psychological needs for competence, autonomy and social relatedness is associated with the internal processes, in the sense of an internal (self-determined) regulation. In other words: the experience of autonomy, competence and social relatedness enhances intrinsic (self-determined) motivation. The SDT made a crucial con-

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tribution for teaching-learning research and has served as a theoretical foundation for studies, which are, for example, investigating the interdependence of learning environment, emotional experiences, and learning motivation (see for instance Deci & Ryan, 2002b; Reeve, 2002; Lewalter, 2005). Particularly, emotional qualities and motivational orientation have been examined in relation to learning environments or learning results.

For our concern, however, it is also of interest to explore the question whether personality traits play a decisive role in intrinsic learning motivation, too. The starting point of this discussion is the noticeable stabilisation of learning motivation with age (e.g. at university or in further education). For example, learning motivation as well as subjective interest remain relatively stable at the university level in comparison to high school (cf. e.g. Fazey & Fazey, 1998; Müller & Palekčić, 2005a). We find many possible explanations for the growing stability of learning motivation in higher or further education, which are, directly and indirectly, of particular relevance for our research questions:

1. First, we certainly have to mention the subjective perception of the teaching-learning environment (cf. e.g. Prenzel, 1993, 1996). However, these only explain a moderate part of the variance of learning motivation. One of our Croatian studies showed that students' self-determined motivation remains stable over a period of three years, although the students' perception of the learning environment has grown more and more sceptical during this time (Müller & Palekčić, 2005b).

2. A further explanation lies in the opportunity of realising own interests and the autonomous study or subject choice at the university. Mature students have more choices. On the other hand, their personality and their interests are more stable and this enhances the possibility that the choice of studies actually improves the fit between the student and the environment. The second explanation states that the relatively stable internal dimensions significantly influence the person-environment interaction. This study investigates the assumption that personality (among other aspects) is one's basis of choice motives, as well as of motivational processes. Yet, it is also possible that, for instance, the personality traits of students are not of relevance solely regarding their learning motivation, but they also act in the perception of the teaching-learning environment. If we follow this assumption, we might find that the known correlations between the perceived environment and learning motivation have been overrated since they do not take learner's personality into account.

This study examines to what extent could the choice of study programme, as well as assessment of the teaching-learning environment, predict self-determined motivation on the basis of the learner's personality. It has been repeatedly emphasised that the motives for choosing the topics at university or in further education are crucial for experience and behaviour in learning settings (e.g. Heublein & Sommer, 2002; Kade & Seiter, 1995).

Big Five personality and learning. One of the most famous personality inventories, going back to the beginnings of differential psychology, is the adjective-trait model, which is based on the five personality factors (BIG FIVE): conscientiousness, openness, extraversion, agreeableness and neuroticism (see, for example, Costa & McCrae, 1995). According to the Five Factor Theory (FFT) (McCrae et al., 2000), the five personality factors are conceptualized as 'basic tendencies' which constitute an endogenous psychological foundation for the so called 'characteristic adaptations' like self-concept, personal strivings, habits or attitudes. These characteristic adaptations are associated with 'external influences' (like cultural norms or life event). For our research it is important to mention that characteristic adaptations and external influences are dynamically interlinked with the 'objective biography' (behaviour like emotional reactions or career shifts). Following this approach, behaviour and experience are a function of characteristic adaptations (including the self-concept) and external influences. But it has to be highlighted that these basic tendencies are absolutely independent of any external environmental factor. They are endogenous.

Personality, in the sense of the Big Five model, has been investigated in psychology and educational science in relation with learning performance, learning strategies, the attitude towards learning as well as motivation (cf. e.g. Blickle, 1996; De Raad & Schouwenburg, 1996). The dimensions conscientiousness, openness and neuroticism, in particular, have shown to be relevant predictors of aspects of learning processes and results. Conscientiousness correlates with learning discipline, dedication, high level of self-organised learning, but also with clear targets and better academic performance – for example, at university (Entwistle & Tait, 1996; De Fruyt & Mervielde, 1996). The fact that conscientiousness correlates with intrinsic motivation and a positive attitude towards learning (see, for example Entwistle, 1988) is of special interest for our study. Openness correlates with a deep approach to learning (Blickle, 1996), general interest in subject matters and contexts, as well as with the intrinsic motivation (Entwistle, 1988) or e.g. with flow experience and willingness to learn.

On the other hand, learners showing a high level of neuroticism tend to adopt a surface approach to learning. They are more failure-oriented, show a higher degree of external motivation and poorer learning performance. We also find indications for subject specific accentuation of the Big Five dimensions. For instance, for the teaching profession, in addition to the mentioned dimensions, the extraversion scale was also identified as significant for the perceived competence in the classroom and the experience of success or problems in the class (e.g. Mayr, 2006; Urban, 1984, 1992).

However, the application of the Big Five personality model for the prediction of behaviour and experience is controversial. Critics have pointed out that a functional model of the development of personality is missing. Also,

they have criticised the conception as unspecific with respect to the situational context and they have underlined that individual differences of the stability of personality are ignored. It is possible that people describe their personality depending on their current social role. This means that the description of their personality (conducted by themselves, as well as by others) varies (e.g. Sheldon, Ryan, Rawsthorne & Ilardi, 1997).

Nevertheless, the Big Five model appears adequate for our explorative approach to investigate the significance of stable personality traits, motives and environment evaluations regarding learning motivation in higher education. Also because, for example, Barrick and Mount (1993) point out that in weak situations (high level of autonomy) the personality structure is of higher relevance for the prediction of behaviour than in repressive, firmly structured environments (strong situations). In higher education, we can speak of a weak situation, in particular if the student has chosen his/her's course of studies him/herself, or if we talk of rather open, not so structured studies, which we are likely to find in the faculties of Arts and/or Social Sciences.

Self-determination theory (SDT). The self-determination theory of motivation has been successfully reviewed and elaborated in the fields of psychology and educational sciences over the last two decades (cf. Deci & Ryan, 2002a). The SDT distinguishes between intrinsic and extrinsic motivation. Intrinsic motivation is self-determined and is not prompted by external contingencies. Extrinsic motivation, in contrast, is instrumental, and actions are perceived as externally controlled. This dichotomous conception of motivation (intrinsic vs. extrinsic), however, has been replaced within the SDT by a continuum of self-determination (see

Figure 1). Regulatory styles with different qualities are conceived regarding their respective level of self-determination. It differentiates between amotivation, four qualitative regulatory styles of extrinsic motivation and intrinsic regulation (intrinsic motivation).

Amotivation: Amotivation is defined by “non-regulation” and, according to the SDT, does not describe a motivated act as it lacks a target-oriented act. Deci and Ryan only speak of motivation when there is an intention to act.

External regulation: External regulation conforms with the traditional definition of extrinsic motivation (see above).

Introjected regulation: Introjected regulation includes acts aimed at contingencies that relate to one's self-esteem, such as learning in order to impress others or because “it is expected” to act in a certain way. The cause of action may be rooted in one's self, yet shows a very low level of self-determination. An example of introjected regulation would be, if a student only visits class, because he believes that a “proper” student has to regularly attend lectures. The learner, hence, has internalised external expectations and has relocated the act of control from the “outside” to the “inside”.

Identified regulation: Here, the focus lies on the personal relevance of an act. This is also the case, for example, when a learner identifies with the values and objectives of his/her studies and also integrates them, e.g. a student may not be interested in the subject, but is nevertheless personally interested in the exams since s/he wants to finish her/his degree successfully. In the words of the SDT, the learner regulates his/her behaviour due to his/her identification with the long-term objectives.

Integrated regulation: More than any other extrinsic regulatory style, integrated regulation depends on self-determination. This regulatory style results from an integration of the accepted values into the coherent sense of self. These values coexist harmoniously alongside other aspects of the self (Deci & Ryan, 1994, pp. 6-7). This regulatory style comes very close to intrinsic, self-determined regulation and is very difficult to empirically distinguish from intrinsic regulation.

Intrinsic regulation: Intrinsic motivation is the prototype of self-determined motivation (see Figure 1) and shows an inherent tendency to seek out novelties, challenges, knowledge and positive emotional experience (see the concept of flow). Following the SDT, we could say that people are intrinsically regulated, when they do what they want to do. Self-determination, hence, can be described as the subjectively perceived ‘fit’ between the self and the act.

The development and maintenance of self-determined regulation depends, according to the SDT, on satisfying one of three basic needs (for autonomy, competence and social relatedness) (Deci & Ryan, 2002a). These basic needs are essential for the optimal functioning of our psychological

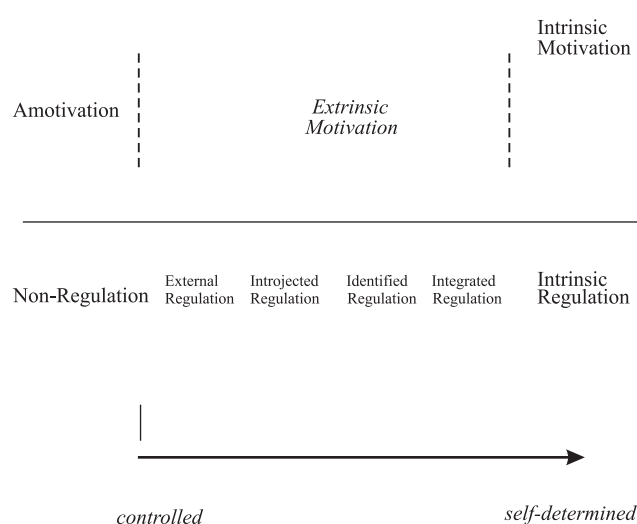


Figure 1. The continuum of self-determination (Deci & Ryan, 2002a, p. 16)

processing and control systems. Therefore, basic psychological needs are to be understood as a part of an integral system of functioning and they inform us about the quality and function of the person-environment interaction. If this system is disturbed and the person is not able to change the person-environment interaction, then the quality of internal regulation changes. For example, the learner is no longer intrinsically, but rather extrinsically motivated. If we follow this approach, we will find that the emotional state, the satisfaction of autonomy, competence and social relatedness, is crucial for the development and maintenance of the self-determined forms of learning motivation.

The relevance for educational science and the practical educational relevance of the SDT became apparent on two different levels:

1. Self-determined regulatory styles in educational settings correlate with the emotional and cognitive qualities of the learning processes and their outcomes. This research approach regards motivation as an independent variable (for a concise summary see e.g. Reeve, 2002; Schiefele & Schreyer, 1994). Correlation studies in educational psychology showed that autonomous motivation is associated with academic achievement (in particular long-term), as well as with the high level of self-perceived competence (e.g. Black & Deci, 2000; Cote & Levine, 2000, Schiefele & Schreyer, 1994). Furthermore, intrinsic motivation involves more complex processes of understanding and learning strategies (Schiefele, 1996). It is followed with a higher level of course adjustment (Black & Deci, 2000), general satisfaction with studies (Heise, Westermann, Spies & Schiffler, 1997), as well as with well-being (e.g. Levesque, Zuehlke, Stanek, & Ryan, 2004), creativity (Amabile, 1985) and higher self-esteem (Deci & Ryan, 2002a, Crocker, Luhtanen, Cooper & Bouvrette, in press). Self-determined learning motivation can result in a long-term thematic dispositional interest, even after graduation (Krapp, 2002).

2. The concept of basic psychological needs can predict the development and stabilisation of internal regulation (e.g. intrinsic regulation). Hence, the genesis and maintenance of self-determined motivation depends on the satisfaction of the three basic needs (see, for example, Krapp, 2005). At this point, it becomes apparent how educational sciences can profit from basic needs research. The basic needs can be emphasised, complemented and clarified by the principles of constructivist approach to teaching and learning, which emphasises the importance of being an active learner and learning as a social activity. Bringing together the SDT with constructivist approaches seems very promising - as the SDT underlines the emotional qualities - whereas a constructivist teaching-learning philosophy focuses on situational knowledge acquisition (see, e.g., Stark & Mandl, 2000).

Even though we still lack empirical findings for the verification of the theoretical connection, especially in real, practical environments, there are some favourable results mostly deriving from correlational research. Learning environments which support autonomy support the maintenance

and enhancement of self-determined learning motivation (for example, offering a choice regarding the objectives or providing learning organisation and cooperation, as well as enthusiastic teachers - as motivated role models) (e.g. Deci & Ryan, 2002b; Black & Deci, 2000; Lewalter, 2005; Levesque Zuehlke, Stanek & Ryan, 2004; Patrick, Hisley & Kempler, 2000; Williams & Deci, 1998). Informative feedback, which is not perceived as 'policing', as well as appropriate challenges or the direct experience and acknowledgement of effectiveness and learning progress, are of relevance in supporting competence. Learning environments in which the practical context, multiple perspectives and social learning are emphasised, where the focus is on problem solution and where the subjective relevance of the contents is underlined (Ramseier, 2001), show a higher level of positive correlation) with self-determined learning motivation, although it varies depending on the setting (cf. e.g. Prenzel, Kramer & Drechsel, 2001; Müller & Louw, 2004).

Certainly, the conditions of instruction and interactions within the learning setting itself are strong indicators of motivational learning processes. However, they only predict a moderate part of the variance of (self-determined) learning motivation. Intra- and interindividual differences in learning motivation also depend on personality traits, such as rational assessments and decisions, or can be predicted by the motives to study, individual objectives and plans, initial interests or the general and subject-related pre-knowledge (Tobias, 1994). This study focuses on the interdependence of personality traits, motives of studying and the perception of the study environment and investigates their relevance for self-determined learning motivation.

METHOD

Study design

This study assumes that personality, motives to study and the perception of the learning environment are decisive pre-conditions for learning motivation at the university level (dependent variable). A hierarchical regression analysis reviews the question of how the motives for the choice of studies and

Table 1

Content structured trait blocks of the hierarchic regression analysis (dependent variable: self-determination index of motivation: SDI)

| 1. Personality | 2. Motives of studying | 3. Perceived learning environment (basic needs) |
|-------------------|------------------------|---|
| Conscientiousness | Moratorium | |
| Neuroticism | Low requirements | Social relatedness |
| Extraversion | External motives | Support of competence |
| Agreeableness | Social motives | Support of autonomy |
| Openness | Personal interest | |

the perception of the environment can further increase the accounted variance of personality regarding the criteria of self-determined learning motivation (see Table 1).

The following assumptions are based upon these theoretical considerations and our own research findings (Müller & Louw, 2003; Müller, Palekčić, & Radeka, 2006):

1. The personality traits *conscientiousness* and *openness* should reveal a positive and *neuroticism* a negative account for the variance of self-determined motivation (SDI¹).

2. Due to the conceptual connection of the constructs, the motive to study something of *personal interest* should show a high additional explanatory value for self-determined motivation. Here, we assume that for the group of students of Arts and Social Sciences the correlation between the *social motive* (like helping others) and learning motivation is positive. We expect the opposite regarding the relation between the motive of *low requirement* ("because it is easy") and self-determined learning motivation (see appendix).

3. Following the self-determination theory, we assume for the teaching-learning environment that the perceived support of the three basic needs can account for the additional variance of the SDI. Furthermore, we expect a higher prediction score of social relatedness regarding self-determined motivation, than for the support of autonomy and competence (see also Müller & Palekčić, 2005a, 2005b) – not only because of the different fields of studies, but also because of the rather collective-oriented culture in South-East-European countries (see, e.g. Hofstede, 2001).

Instruments

The English versions of all scales were translated in Croatian. To prevent translation inaccuracy, as well as potential difficulties in understanding the items, the Croatian version was then re-translated into English, followed by a few adjustments of some items. In the following sections, we introduce the sample instruments and the central statistical value of the scales. Items of the respective scale can be found in the appendix.

1. *Personality questionnaire (BigFive)*. For the assessment of the aspects of the Big-Five personality model, we used a reduced version of a Big Five inventory (Goldberg, 1999). We used a reduced version of the Big Five (34 items)². Due to the eigenvalue plot of a factor analysis (varimax ro-

tation) (eigenvalue for the first 7 main components: 6.70 (1), 2.92 (2), 2.57 (3), 2.14 (4), 1.91 (5), 1.28 (6), 1.10 (7)) and the factor structure we were able to compute a five factor solution, which accounts for 47.8% of the total variance. The instrument altogether reveals satisfactory characteristics (see also Table 3 Results section and Appendix).

2. *Questionnaire assessing the motives of studying*³. The motives for studying were assessed using five scales (two to five items each) (Müller, Louw, & Müller, 2001; see also Heublein & Sommer, 2002; Windolf, 1994). Following are examples of items used:

- (1) moratorium ('...because I want to gain other experiences before a routine job');
- (2) low requirements ('...because the field of study has the reputation of not being too difficult');
- (3) external motives ('...in the expectation of a good income');
- (4) social motives ('...because my studies provided me with the possibility of helping other people'); and
- (5) personal interest ('...because the field of studies corresponds to my talents and leanings') (see also appendix).

The principal component analysis provides the following eigenvalue plot: 2.63 (1), 2.62 (2), 1.50 (3), 1.37 (4), 1.37 (5), 0.95 (6), 0.72 (7). The total account of variance is 69.7%.

The motives for studying were collected in retrospect. However, a three year longitudinal study revealed that these motives remained relatively stable over three time points (1st to 3rd year at the university) in a sample of $N = 104$ Croatian university students (for the description of this sample see also Müller & Palekčić, 2005b). The scales, therefore, hardly measure the socialising effects of studying.

3. *Assessment of the teaching-learning environments: basic needs*. According to the SDT, the three basic needs are not to be perceived as separate dimensions (see also Prenzel, 1996). Hence, social relatedness, support of autonomy and support of competence are intercorrelated (Table 5). The descriptive statistics of these scales is shown in Table 4.

4. *Qualities of learning motivation* (cf. Vallerand, Pelletier, Blais, Briere, Senecal & Vallieres, 1992). Following the self-determination theory, we included the dimension of amotivation, as well as three motivational regulatory styles of extrinsic motivation (external, introjected and identified) and intrinsic learning motivation (see Table 4 and appendix). The principal component analysis shows a

1 For this study, we computed the so-called Self Determination-Index (SDI), which shows the level of perceived self-determination at the university (cf. Levesque, Zuehlke, Stanek & Ryan, 2004). It is based upon the following calculation: $SDI = (2 \times \text{intrinsic motivation}) + \text{identified regulation} - \text{introjected regulation} - (2 \times \text{external regulation})$. High scores of the SDI indicate self-determination, whereas low results indicate perceived control.

2 In a pilot study with Croatian university students we tested this reduced version of the battery (34 items) and found high correlations

with the original scales from the 'ipip-page' from Goldberg (1999) (50 items).

3 Motives for studying are reasons for the decision to choose a certain field of study. By contrast, learning motivation describes the perceived quality of an experience in a learning process.

five factor structure consistent with the theory (eigenvalue: 4.8 (1), 2.4 (3), 1.3 (3), 1.2 (4), 1.1 (5), 0.7 (6); total account of the variance: 61.1%). Not only does the questionnaire fit the specific Croatian sample, but factor analysis results also provide evidence for the simplex structure of motivational regulatory styles; on the continuum of self-determination, adjacent regulatory styles show a higher intercorrelation, whereas regulatory styles lying further apart show negative or no association (see also Table 5).

Participants

From 2003 to 2006, the questionnaires were administered to 730 students of Arts and Social Sciences at a Croatian university (see Table 2). The students had a mean age of 20.78 ($SD = 2.1$), 83% of them were female. Ten percent of the students had been at university for four years. The rest of the participants were studying from 1 to 3 years. The students were told that their data would remain anonymous and they were also offered the option of declining participation in the study.

Table 2
Students' fields of studies

| | <i>n</i> | valid % |
|--|----------|---------|
| Cultural sciences | 9 | 1.2 |
| Psychology | 41 | 5.7 |
| Croatian language | 52 | 7.2 |
| Language studies (English, German or French) | 354 | 48.9 |
| Sociology | 32 | 4.4 |
| Educational science | 74 | 10.3 |
| History | 90 | 15.1 |
| Geography | 30 | 4.2 |
| Philosophy | 21 | 3.0 |
| Missing | 27 | - |
| Total | 730 | 100 |

RESULTS

Table 3 presents the scale scores for the Big-Five personality questionnaire. Since few original items were dropped out, the level of mean scores cannot be interpreted. In this sample we expected a higher score of agreeableness compared to other dimensions of the Big Five model. We also found a significant difference between the group of psychologists, sociologists and students of educational sciences ($N = 119$; $M = 4.15$, $SD = 0.45$) and the rest of the students ($M = 4.01$, $SD = 0.61$; $t(586) = 7.57$; $p < .02$) regarding their agreeableness scores.

The results of the descriptive statistics in Table 4 reveal that students are hardly amotivated and show mean scores

Table 3
Descriptive statistics of personality dimensions

| Personality | <i>M</i> | <i>SD</i> | α | items | skewness | <i>n</i> |
|-------------------|----------|-----------|----------|-------|----------|----------|
| Conscientiousness | 3.54 | 0.72 | .76 | 6 | -.22 | 712 |
| Neuroticism | 2.48 | 0.69 | .79 | 8 | .54 | 715 |
| Extraversion | 3.71 | 0.66 | .83 | 8 | -.23 | 710 |
| Agreeableness | 4.08 | 0.58 | .77 | 7 | -1.04 | 716 |
| Openness | 3.80 | 0.81 | .74 | 5 | -.67 | 713 |

Note. Scales: 1=disagree, 5=agree.

Table 4
Descriptive statistics

| Variables | <i>M</i> | <i>SD</i> | α | items | <i>n</i> |
|---|----------|-----------|----------|-------|----------|
| Motivational Regulations | | | | | |
| Amotivation | 1.68 | 0.78 | .80 | 3 | 722 |
| External regulation | 2.81 | 0.89 | .60 | 3 | 719 |
| Introjected regulation | 3.48 | 0.76 | .74 | 4 | 723 |
| Identified regulation | 4.01 | 0.70 | .75 | 3 | 721 |
| Intrinsic motivation | 3.37 | 0.89 | .90 | 3 | 722 |
| Self-Determination-Index (SDI) ¹ | 1.64 | 3.36 | - | - | 715 |
| Motives to study | | | | | |
| Moratorium | 2.47 | 0.95 | .71 | 3 | 723 |
| Low requirements | 1.67 | 0.79 | - | 2 | 723 |
| External motives | 3.10 | 0.98 | .78 | 3 | 721 |
| Social motives | 3.20 | 1.09 | - | 2 | 723 |
| Personal interest | 4.37 | 0.66 | .74 | 3 | 721 |
| Perceived learning environment (basic needs) | | | | | |
| Support of autonomy | 2.98 | 0.79 | .83 | 4 | 720 |
| Support of competence | 3.24 | 0.74 | .78 | 4 | 718 |
| Social relatedness | 3.60 | 0.69 | .78 | 4 | 722 |

Note. Scales: 1=disagree, 5=agree (does not apply to SDI). ¹SDI can score a maximum of +12 (highest level of self-determination) and a minimum of -12 (highest level of perceived control).

below the mid-point of the scale regarding extrinsic regulation. Furthermore, on the continuum of self-determination we found higher mean scores for the introjected regulatory style, related to self-esteem contingencies. Most of the participants perceive themselves as highly identified, regulated, as well as rather intrinsically motivated in their studies. The so-called self-determination index (SDI) is computed from all of the five motivation variables and it demonstrates that most of the students are moderately self-determined (see table footnote).

It seems that personal interest and social motive are far more important for the motives to study that are moratorium or low requirements (Table 4, see also appendix). External motives, such as status associated with the degree or the expectation of a higher income, hold an intermediate position. As expected, a group-related assessment regarding social study motives displays higher scores for the combined group of psychologists, sociologists and educationists ($N = 121$; $M = 3.82$, $SD = 0.84$) compared to the rest of the students ($M = 3.03$, $SD = 1.08$; $t(593) = 7.57$; $p < .001$). The evaluation of perceived basic needs varies (Table 4). The learners feel especially socially related and supported

Table 5
Pearson correlation matrix of all relevant variables

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|-----------------------------|--------------------------------|--------------|---------------|--------------|--------------|--------|--------|--------|-------|-------|--------------|--------------|-------|
| Personality | | | | | | | | | | | | | |
| 1 | Conscientiousness | - | | | | | | | | | | | |
| 2 | Neuroticism | -.24** | - | | | | | | | | | | |
| 3 | Extraversion | .29** | -.41** | - | | | | | | | | | |
| 4 | Agreeableness | .37** | -.31** | .26** | - | | | | | | | | |
| 5 | Openness | .09* | -.10* | .22** | .18** | - | | | | | | | |
| Motives of studying | | | | | | | | | | | | | |
| 6 | Moratorium | -.07* | -.02 | .11** | .08* | .04 | - | | | | | | |
| 7 | Low requirements | -.12** | .10** | -.06 | -.07 | -.11** | .31** | - | | | | | |
| 8 | External motives | .17** | -.04 | .21** | .03 | -.09* | .17** | .15** | - | | | | |
| 9 | Social motives | .26** | -.05 | .14** | .29** | .13** | .04 | .01 | .18** | - | | | |
| 10 | Personal interest | .29** | -.24** | .23** | .19** | .11** | -.12** | -.28** | .17** | .10** | - | | |
| Learning environment | | | | | | | | | | | | | |
| 11 | Social relatedness | .38** | -.32** | .41** | .33** | 10** | .05 | -.09* | .14** | .18** | .39** | - | |
| 12 | Support of competence | .11** | -.14** | .06 | .13** | .12** | .08* | -.04 | .01 | .12** | .16** | .39** | - |
| 13 | Support of autonomy | .04 | -.12** | .05 | .03 | .02 | .11** | .04 | .08* | .10** | .05 | .30** | .58** |
| 14 | Self-determination index (SDI) | .48** | -.30** | .22** | .25** | .20** | -.13** | -.28** | .01 | .29** | .39** | .44** | .25** |

Note. * $p < .05$; ** $p < .01$; relevant correlations above .30 are printed bold.

in their competence, yet show lower scores in the perceived support of autonomy.

Table 5 provides an overview on intercorrelations of all sample variables. We will only briefly discuss a few relevant correlations: the Big Five dimension conscientiousness, in particular, correlated with the social motives of study choice ($r = .26$), the motive "personal interest" ($r = .29$), as well as with perceived social relatedness ($r = .38$), and in particular with the self-determination coefficient (SDI) ($r = .48$). Neuroticism showed negative correlations with the motive "personal interest" ($r = -.24$), social relatedness ($r = -.32$) and the SDI ($r = -.30$). For extraversion, we found relations with the external ($r = .21$) and the interest-related motive for studying ($r = .23$), and especially with social relatedness ($r = .41$) and the SDI ($r = .22$). Agreeableness showed similar relations with extraversion and correlated with social ($r = .29$) and personal motives to study ($r = .19$), with social relatedness ($r = .33$) and the SDI. In contrast to other reference studies, we found lower correlations between openness and variables in the learning situation (e.g. with SDI: $r = .20$).

Also observed are the intercorrelations between personal interest, perceived social relatedness and the SDI with scores between .39 and .44, as well as between the motive of "low requirements" ($r = -.28$), the social motive ($r = .29$) and the SDI. Here, we expected it to be a moderate predictor in accounting for the SDI.

The results of the hierarchical regression analysis (Table 6) indicate that the personality variables of the Big Five model (block 1) account for 28.4% of the variance of self-determined motivation (SDI). If we add the motives to study and the perceived basic needs, we find that each significantly enhances the prediction of the SDI to 40.1%, and finally to a total of 44.3%.

The standardised beta coefficients in Table 7 show for the first model of regression analysis that the personality dimensions conscientiousness (beta = .41), neuroticism (beta = -.188) and openness (beta = .15) predict a significant part of the variance of the self-determination index (SDI), respectively. These results confirm our hypotheses (cf. hypothesis 1). The results of regression analysis give an impressive demonstration of the importance of the scale conscientiousness for internal motivational regulation.

In addition, model 2 shows that the study motive "personal interest" (beta = .22), the social motives (beta = .21), as well as the motive "low level of requirements" (beta = -.13), provide a strong variance for the SDI criteria. The external motives (status, money) also show significant explanatory effects (beta = -.08).

Model 3 integrates all sample variables into a regression model. For the three theoretically relevant aspects of environment perception (needs), only social relatedness provides significant explanatory account (beta = .18).

Table 6
Results of the hierarchical regression analysis (1)

| Step | Predictors | R^2 | ΔR^2 | df_1 | df_2 | Changes in F sign. |
|------|---------------------------|-------|--------------|--------|--------|----------------------|
| 1 | block 1 | .28 | | 5 | 666 | $p < .01$ |
| 2 | block 1, block 2 | .40 | .12 | 5 | 661 | $p < .01$ |
| 3 | block 1, block 2, block 3 | .44 | .04 | 3 | 658 | $p < .01$ |

Note. Dependent variable: Self-determination index (SDI). Block 1: personality (Big Five); Block 2: motives to study; Block 3: perceived study environment (basic needs).

In a second regression analysis we included sex and studies (humanities / non-humanities) as control variables (dummy variables). The results show that the variables sex and studies predict a negligible part of the variance of the SDI (beta: .03 and .04, n.s.).

Table 7
Results of the hierarchical regression analysis (2)

| | Variables | beta | t | p | |
|---|----------------------------|-----------------------|-------|-------|------|
| Model 1 | (constant) | | -4.37 | .001 | |
| | Personality | | | | |
| | Conscientiousness | .41 | 11.23 | .001 | |
| | Neuroticism | -.19 | -5.08 | .001 | |
| | Extraversion | -.02 | -0.45 | .653 | |
| | Agreeableness | .04 | 1.01 | .312 | |
| | Openness | .15 | 4.40 | .001 | |
| Model 2 | (constant) | | -5.20 | .001 | |
| | Personality | | | | |
| | Conscientiousness | .32 | 9.17 | .001 | |
| | Neuroticism | -.16 | -4.75 | .001 | |
| | Extraversion | -.02 | -0.58 | .562 | |
| | Agreeableness | -.02 | -0.44 | .660 | |
| | | Openness | .10 | 3.19 | .002 |
| | Motives of studying | | | | |
| | Moratorium | -.03 | -0.93 | .353 | |
| | Low requirements | -.13 | -3.99 | .001 | |
| | External motives | -.08 | -2.44 | .015 | |
| | Social motives | .21 | 6.35 | .001 | |
| | | Personal interest | .22 | 6.49 | .001 |
| | Model 3 | (constant) | | -6.38 | .001 |
| Personality | | | | | |
| Conscientiousness | | .28 | 8.23 | .001 | |
| Neuroticism | | -.13 | -4.00 | .001 | |
| Extraversion | | -.05 | -1.41 | .159 | |
| Agreeableness | | -.04 | -1.05 | .296 | |
| | | Openness | .10 | 3.09 | .002 |
| Motives of studying | | | | | |
| Moratorium | | -.06 | -1.77 | .077 | |
| Low requirements | | -.134 | -4.18 | .001 | |
| External motives | | -.084 | -2.62 | .009 | |
| Social motives | | .186 | 5.92 | .001 | |
| | | Personal interest | .169 | 4.99 | .001 |
| Perceived learning environment (basic needs) | | | | | |
| | | Social relatedness | .179 | 4.67 | .001 |
| | | Support of competence | .045 | 1.20 | .232 |
| | Support of autonomy | .069 | 1.88 | .061 | |

Note. Dependent variable: Self-determination index (SDI)

DISCUSSION AND CONCLUSION

Students of Arts and Social Sciences, participants in this study, were found to have relatively stable personality traits determining internal processes of learning motivation. Students, who are conscientious and emotionally stable and open to new experiences, are more self-determinedly motivated. If we include descriptions of the Big Five dimensions (see Ostendorf & Angleitner, 2004), it is easier to interpret our findings. Hence, 'conscientiousness' is connected to a high level of belief in one's competence, aspiration or self-discipline. Students with high scores in this trait set clear goals, they are focused and able to continue their actions even when they feel bored. In other words: these individuals motivate themselves and are able to organise themselves, as well as their environment. According to SDT, they demonstrate the skill to create a person-environment interaction, which they experience as positive.

Students scoring higher on the 'neuroticism' scale tend to be easily distracted, to have problems in controlling

their competing needs and show low frustration tolerance. A student who is strongly occupied with his/her emotions and him/herself in general, cannot invest as much energy in other actions. This obviously minimises self-determined learning motivation (cf. also the concept of autotelic personality of Csikszentmihalyi, 1993).

The trait 'openness' provides a low, yet significant contribution in accounting for the variance of the SDI. Students with higher scores feel the need, and have the incentive, to try new activities. They describe themselves as inquisitive, intellectual, interested in theory and culture (see Ostendorf & Angleitner, 2004). These traits seem to be good preconditions for a strong learning motivation, especially for students of the Arts and Social Sciences.

One's motives for studying influence one's further experience and behaviour during studying at university (cf. e.g. Snyder & Cantor, 1998; Bogler & Somech, 2002). We found the same indications in our study for learning motivation: as expected, the study motives 'personal interest' and 'low requirements' predict self-determined learning motivation. The relatively high importance of social motives can be ascribed to the specificity of this population. All this demonstrates that external motives are – to a certain extent – intraindividually consistent with self-determined motivation. A certain level of extrinsically caused choice does not necessarily undermine self-determined learning motivation (see also the correlations of certain forms of extrinsic motivation with intrinsic motivation: e.g. Lepper & Henderlong, 2000).

For the perception of the environment, only social relatedness seems to explain a part of the variance of the SDI. At first glance, the fact that support of competence plays only a minor role in educational settings comes as a surprise. However, it is important to point out that we need to understand the basic needs as an integral function system. Also, in our study the three basic needs are intercorrelated (see Table 5). Hence, the regression analysis could also underestimate the relevance of the support of autonomy and competence.

The results of this study are limited to students of the faculties of Arts and Social Sciences. Furthermore, in this sample, women are clearly overrepresented. However, the number of participants is large enough to state meaningful findings, at least for a Croatian higher education setting.

Theoretical conclusion. We chose an approach in this study which incorporated personality within the tradition of the adjective-trait-approach (Big Five Dimensions are basic tendencies). Although the Big Five has been criticised for its non-situational approach and the lack regarding the role of personality in learning, these findings provide some important information for further empirical research and conceptual discussions. The central challenge is the integration of 'basic tendencies' (as traits) into a model of the genesis of learning motivation. For the future, it is important to conduct further research about stable traits, such

as personality (non-specific situation aspects) and the motives to study (content specific aspects), as two important aspects of learning motivation. Another interesting issue for further research is the correlation between traits, motives and the perception of learning environments. In the sense of a person-environment fit, it is crucial to further investigate whether specific personality traits can be related to learning motivation in specific environments. It is also necessary to investigate whether personality traits of 'conscientiousness', 'openness' and 'neuroticism' are of relevance to learning motivation in other fields of study at university.

The relevance of relatively stable traits, such as personality, demonstrates that learning motivation is difficult to change. Indeed, from early adulthood on, personality traits are very stable. The stability of traits also limits a change in learning motivation. This is particularly the case in higher education, where the possibility to directly influence the learner is restricted. Hence, it is crucial to take a closer look at personality, at least in career counseling. As a first step, we need to gain information on the prognostic validity of specific personality and interest related profiles regarding experience and behaviour variables for students of different faculties. On the other hand, we should not miss-interpret our findings in the way that the learning environment is less important. If students perceive less social relatedness, less support of autonomy and competence, self-determined learning motivation will decrease.

REFERENCES

- Amabile, T. M. (1985). Motivation and creativity. Effect of motivational orientation on creative writers. *Journal of Personality and Social Psychology*, 48, 393-399.
- Barrick, M. R., & Mount, M. K. (1993). Autonomy as a moderator of the relationships between the Big Five personality dimensions and job performance. *Journal of Applied Psychology*, 78, 111-118.
- Black, A. E., & Deci, E. L. (2000). The effects of instructors' autonomy support and students' autonomous motivation on learning organic chemistry: A self-determination theory perspective. *Science Education*, 84, 740-756.
- Blickle, G. (1996). Personality traits, learning strategies, and performance. *European Journal of Personality*, 10, 337-352.
- Bogler, R., & Somech, A. (2002). Motives to Study and Socialisation Tactics among University Students. *The Journal of Social Psychology*, 142, 233-248.
- Costa, P. T., & McCrae, R. R. (1995). Domains and facets. Hierarchical personality assessment using the Revised NEO Personality Inventory. *Journal of Personality Assessment*, 64, 21-50.
- Cote, J. E., & Levine, C. G. (2000). Attitude versus aptitude. Is intelligence or motivation more important for positive higher education outcomes? *Journal of Adolescent Research*, 15, 58-80.
- Crocker, J., Luhtanen, R., K., Cooper, L. M., & Bouvrette, A. (in press). Contingencies of self-worth on college students: Theory and measurement. *Journal of Personality and Social Psychology*.
- Csikszentmihalyi, M. (1993). *Flow. Das Geheimnis des Glücks [Flow – the psychology of optimal experience]*. Stuttgart: Klett.
- Deci, E. L., & Ryan, R. M. (1994). Promoting self-determined education. *Scandinavian Journal of Educational Research*, 38, 3-14.
- Deci, E. L., & Ryan, R. M. (2002a). Overview of self-determination theory: An organismic dialectical perspective. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 3-33). Rochester: University of Rochester Press.
- Deci, E. L., & Ryan, M. R. (2002b). The paradox of achievement: The harder you push, the worse it gets. In J. Aronson (Ed.), *Improving academic achievement: Impact of psychological factors on education*. New York: Academic Press.
- De Fruyt, F., & Mervielde, I. (1996). Personality and interest as predictors of educational steaming and achievement. *European Journal of Psychology*, 10, 405-425.
- De Raad, B., & Schouwenburg, H. C. (1996). Personality in learning and education: A review. *European Journal of Personality*, 10, 303-336.
- Entwistle, N. (1988). Motivational factors in students approaches to learning. In R. R. Schmeck (Ed.), *Learning strategies and learning styles* (pp. 21-49). New York: Plenum.
- Entwistle, N., & Tait, H. (1996). *Approaches and study skills inventory of students*. Centre for Research on Learning and Instruction. University of Edinburgh.
- Fazey, D., & Fazey, J. (1998). Perspectives on motivation: The implications for effective learning in higher education. In S. Brown, S. Armstrong, & G. Thompson (Eds.), *Motivating students* (pp. 59-72). Kogan Page: Staff and Educational Development Association.
- Goldberg, L. R. (1999). International personality item pool: A scientific collaboratory for the development of advanced measures of personality and other individual differences [online]. Available: <http://ipip.ori.org/new-NEODomainsKey.htm>.
- Heckhausen, H. (1989). *Motivation und Handeln [Motivation and action]*; 2. Aufl. Berlin: Springer.
- Heise, E., Westermann, R., Spies, K., & Schiffler, A. (1997). Studieninteresse und berufliche Orientierungen als Determinanten der Studienzufriedenheit [Study interest and vocational orientations as determinants of study satisfaction]. *Zeitschrift für Pädagogische Psychologie*, 11, 123-132.
- Heublein, U., & Sommer, D. (2002). Studienanfänger 2000/2001: Fachinteresse und berufliche Möglichkeiten

- bestimmen die Studienfachwahl [Study interest and job opportunities determine the choice of the field of study at university]. Bericht aus der Reihe Kurzinformationen A 2/2002 des Hochschul-Informations-Systems (HIS). Hannover: HIS Verlag.
- Hofstede, (2001). *Culture's consequences: Comparing values, behaviors, institutions and organizations across nations*. Thousand Oaks CA: Sage Publications.
- Kade, J., & Seiter, W. (1995). *Teilnahmemotive [Reason for choosing courses in further education]*. In REPORT 35: Literatur- und Forschungsbericht Weiterbildung [Literature and research report 'further education'], Deutsch Institut für Erwachsenenbildung: Frankfurt/M., pp. 29-37.
- Krapp, A. (2002). An educational-psychological theory of interest and its relation to self-determination theory (SDT). In E. L. Deci, & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 405-427). Rochester: University of Rochester Press.
- Krapp, A. (2005). Basic needs and the development of interest and intrinsic motivational orientations. [Special issue] *Learning and Instruction*, 15, 381-395.
- Lepper, M., & Henderlong, J. (2000). Turning "Play" into "Work" and "Work" into "Play": 25 years of research on intrinsic versus extrinsic motivation. In C. Sansone, & J. M. Harackiewicz (Eds.), *Intrinsic and extrinsic motivation* (pp. 157-307). San Diego et al.: Academic Press.
- Levesque, C., Zuehlke, A. N., Stanek, L. R., & Ryan, R. M. (2004). Autonomy and competence in German and American university students: A comparative study based on the self-determination-theory. *Journal of Educational Psychology*, 96, 68-84.
- Lewalter, D. (2005). Emotionale Erlebnisqualitäten und Lernmotivation [Emotions and learning motivation]. *Zeitschrift für Pädagogik*, 51, 642-655.
- McCrae, R. R., Costa, P.T. (Jr), Ostendorf, F., Angleitner, A., Hřebíčková, M., Avia, M. D., Sánz, J., Sanchez-Bernardos, M. L., Kusdil, M. E., Woodfield, R., Saunders, P. R., & Smith, P. B. (2000). Nature over nurture: temperament, personality, and life span development. *Journal of Personality and Social Psychology*, 78, 173-186.
- Mayr, J. (2006, March). *Kompetenzentwicklung von LehrerInnen [Development of competences of teachers]*. Paper presented at the German Educational Research Association, Frankfurt a. M.
- Müller, F. H., & Louw, J. (2003, September). *Conditions of learning motivation and study interest*. Paper presented at the European Conference of Educational Research, Hamburg, Germany.
- Müller, F. H., Louw, J., & Müller, M. (2001). Why do they study? Study motives and study goals of South African psychology students. Unpublished paper. University of the Federal Armed Forces Germany, Munich: Faculty of Education.
- Müller, F. H., & Palekčić, M. (2005a). Bedingungen und Auswirkungen selbstbestimmt motivierten Lernens bei kroatischen Hochschulstudenten [Conditions and effects of self-determined motivation of Croatian university students]. *Empirische Pädagogik*, 19, 134-165.
- Müller, F. H., & Palekčić, M. (2005b). Continuity of motivation in higher education. A three-year follow-up study. *Review of Psychology*, 12, 31-43.
- Müller, F.H., Palekčić, M., & Radeka, I. (2006). Determinanten der Lernbereitschaft und der Leistung im Studium [Determinants of learning motivation and achievement in studies]. *Odgojne znanosti*, 4, 401-419.
- Ostendorf, F., & Angleitner, A. (2004). *NEO-PI-R: Persönlichkeitsinventar nach Costa und McCrae [NEO-PI-R Personality inventory of Costa and McCrae - appendix]*. Göttingen: Hogrefe.
- Patrick, B. C., Hisley, J., & Kempler, T. (2000). What's everybody so excited about? The effect of teacher enthusiasm on student intrinsic motivation and vitality. *The Journal of Experimental Education*, 68, 217-236.
- Pintrich, P. R., & Schunk, D. H. (1996). *Motivation in education: Theory, research and applications*. Englewood Cliffs: Prentice Hall.
- Prenzel, M. (1993). Autonomie und Motivation im Lernen Erwachsener [Autonomy and learning motivation of adults]. *Zeitschrift für Pädagogik*, 93, 239-253.
- Prenzel, M. (1996). Bedingungen für selbstbestimmt motiviertes und interessiertes Lernen im Studium [Conditions of self-determined and interest based learning in higher education]. In J. Lompscher, & H. Mandl (Eds.), *Lehr- und Lernprobleme im Studium [Problems of instruction and learning in higher education]* (pp. 11-22). Bern: H. Huber.
- Prenzel, M., Kramer, K., & Drechsel, B. (2001). Selbstbestimmt motiviertes und interessiertes Lernen in der kaufmännischen Erstausbildung: Ergebnisse des Gesamtprojektes. [Self-determined and interest based learning in vocational education: results of the research project] In K. Beck, & V. Krumm (Eds.), *Lehren und Lernen in der beruflichen Erstausbildung [Teaching and learning in vocational education]* (pp. 37-61). Opladen: Leske + Budrich.
- Ramseier, E. (2001). Motivation to learn as an outcome and determining factor of learning at school. *European Journal of Psychology of Education* 16, 421-439.
- Reeve, J. (2002). Self-determination theory applied to educational settings. In E. L. Deci, & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 184-203). Rochester: University of Rochester Press.
- Schiefele, U. (1996). *Motivation und Lernen mit Texten [Motivation and learning with texts]*. Göttingen: Hogrefe.

- Schiefele, U., & Schreyer, I. (1994). Intrinsische Lernmotivation und Lernen [Intrinsic motivation and learning]. *Zeitschrift für Pädagogische Psychologie*, 8, 1-13.
- Sheldon, K. M., Ryan, M. R., Rawsthorne, L. J., & Ilardi, B. (1997). "Trait" self and "true" self: Cross-role variation in Big-Five personality traits and its relations with psychological authenticity and subjective well-being. *Journal of Personality and Social Psychology*, 73, 1380-1393.
- Snyder, R., & Cantor, N. (1998). Understanding personality and social behavior: A functionalist strategy. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology (4th ed.)* (Vol. 1, pp. 635-679). Boston: McGraw-Hill.
- Stark, R., & Mandl, H. (2000). Konzeptualisierung von Motivation und Motivierung im Kontext situierten Lernens [Conceptualizing of motivation and situated learning approach]. In U. Schiefele, & K.-P. Wild, (Eds.): *Interesse und Lernmotivation [Interest and learning motivation]* (pp. 95-116). Münster: Waxmann.
- Tobias, S. (1994). Interest, prior knowledge, and learning. *Review of Educational Research*, 64, 37-54.
- Urban, W. (1984). *Persönlichkeitsstruktur und Unterrichtskompetenz [Personality and competence to teach]*. Wien: Österreichischer Bundesverlag.
- Urban, W. (1992). Untersuchungen zur Prognostizierbarkeit der Berufszufriedenheit und Berufsbelastung bei österreichischen Hauptschullehrern [Determinates of job satisfaction and load in Austrian secondary school teachers]. *Empirische Pädagogik*, 6, 131-148.
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The Academic Motivation scale. A measurement of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, 52, 1003-1017.
- Williams, G. C., & Deci, E. L. (1998). The importance of supporting autonomy in medical education. *Annals of Internal Medicine*, 129, 303-308.
- Windolf, P. (1994). Selektion und Selbstselektion an deutschen Hochschulen. In L. Rosenstiel, T. Lang & E. Sigl (Eds.), *Fach- und Führungskräftenachwuchs finden und fördern* (pp. 39-70). Stuttgart: Schäffer + Poeschl.

APPENDIX: scales and items

Scaling: We presented a response format with 5 options for all items

1=is not the case at all; 2= is hardly the case; 3=is partly the case; 4=is rather the case; 5=is absolutely the case

1. Learning motivation:

Amotivation

- I often wonder what I am supposed to do at University
- I am very uncertain whether I have chosen the proper field of study
- I really feel I'm wasting my time in university

External regulation

- I have to force myself to learn
- Without pressure from outside I would do less
- I am learning primarily for the examinations

Introjected regulation

- I do my work otherwise I would have a guilty conscience
- I do my work, because it is the right and proper thing for a good student to do

- I have to give myself an inner push in order to study
- I must push myself in order to do the work in my studies

Identified regulation

- I am committed to my studies, because they are personally very important for me
- I really want to become more competent and to develop my skills further
- I am committed in my studies, because I want to realise the goals I set myself

Intrinsic motivation

- I really have great fun studying
- I really enjoy learning and working here
- I find that learning here is really exciting

2. Motives to study:

I have chosen the field of study ...

Moratorium

- ... because I want to gain other experiences before the routine of a job

- ... because I would like to gain time in order to obtain clarity
- ... because I like to be together with students
- Low requirements
- ... because the field of study has the reputation of not being too difficult
- ... because the field of study is the lesser evil of the choices
- External motives
- ... because professional prospects of getting a job are good
- ... in order to obtain an executive professional position later
- ... in expectation of a good income
- Social motives
- ... in order to be able to contribute to social changes
- ... because my studies provided me with the possibility of helping other people
- Personal interest
- ... because it corresponds to my talents and leanings
- ... because of a personal interest in the subject
- ... I'm very uncertain whether these studies are right for me (-)
3. Perceived learning environment:
- Social relatedness
- I have the feeling of being accepted by my fellow students.
 - I feel like a part of the department.
 - I have a good rapport with the lecturers.
 - I am taken seriously by the lecturers.
- Support of autonomy
- Ideas and suggestions of the students are taken into account in the courses.
 - In the courses, we are encouraged to bring our own ideas to the courses.
 - It is possible to organise the studies in accordance with one's own ideas and interests.
 - I'm giving the opportunity to deepen contents of personal interest.
- Support of competence
- When questions arise, the lecturers give me accurate and academically competent advice.
 - The advice provided by the lecturers is very helpful for my own learning process.
 - In assessing my performance (speeches, seminar examinations, and exams) I am informed objectively and constructive of what I might still improve (feedback).
- In the courses, I am taught important theoretical knowledge.
4. Personality (Big Five)
- Openness
- Believe in the importance of art
 - Am not interested in abstract ideas (-)
 - Avoid philosophical discussions (-)
 - Do not enjoy going to art museums (-)
 - Do not like art (-)
- Neuroticism
- Have frequent mood swings
 - Am not easily bothered by things (-)
 - Dislike myself
 - Seldom feel blue (-)
 - Panic easily
 - Feel comfortable with myself (-)
 - Am often down in the dumps
 - Often feel blue
- Extraversion
- Am the life of the party
 - Am skilled in handling social situations
 - Make friends easily
 - Know how to captivate people
 - Keep in the background (-)
 - Do not talk a lot (-)
 - Feel comfortable around people
 - Have little to say
- Agreeableness
- Respect others
 - Insult people (-)
 - Believe that others have good intentions
 - Accept people as they are
 - Get back at others (-)
 - Cut others to pieces (-)
 - Have a good word for everyone
- Conscientiousness
- Make plans and stick to them
 - Do just enough work to get by
 - Find it difficult to get down to work (-)
 - Waste my time (-)
 - Get chores done right away
 - Shirk my duties (-)

