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DRIVEN TO BE A NON-TRADITIONAL STUDENT: MEASUREMENT OF THE ACADEMIC MOTIVATION SCALE WITH ADULT LEARNERS AFTER THEIR TRANSITION TO UNIVERSITY

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Abstract

Non-traditional students represent an important group of university students, and that is why their motivation to study is an important factor that affects current university education. This study investigates the academic motivation of Czech students who are considered non-traditional because of their age (they are older than 26) and at the same time have experienced a break of at least one year in their formal educational trajectory. The Czech version of the Academic Motivation Scale (AMS) has been used to measure academic motivation. The purpose of this study is to examine the factor structure of the Czech version of the AMS on a sample of 1,885 first-year students at Masaryk University and determine if this tool is functional even on a specific group of non-traditional students and to identify differences in particular types of academic motivation between traditional and non-traditional students. The results of confirmatory factor analysis showed that the Czech version of the AMS is a valid scale with a factor structure corresponding to the original model, and based on measurement invariance analysis we can state that the Czech version of the AMS can be used to compare traditional and non-traditional students. The results of regression analyses suggest that non-traditional students had significantly higher values for all types of intrinsic motivation and lower values for most types of extrinsic motivation. In the case of amotivation, it was again the non-traditional students with significantly lower values, which suggests that the absence of a motivation to study tends to be more common in younger students who are continuously receiving formal education.

Keywords

non-traditional students, self-determination theory, Academic Motivation Scale, intrinsic motivation, extrinsic motivation, confirmatory factor analysis, measurement invariance

More and more people are meeting at European universities and, with regard to age, ethnicity, socio-economic status, and life roles, they are more diverse than ever before (Kobena Osam, Bergman, & Cumberland, 2017; Fairchild, 2003). Naturally, this brings challenges for not only "non-traditional" students (NTSs), but also universities and empirical research (Twigg-Flesner, 2018; Schuetze & Slowey, 2002). We can presume that much of what we know about traditional university students will not apply to the highly diverse student population of the present day.

In our study, we will focus on the academic motivation of NTSs. We consider this issue to be essential since accordance between what a university offers and the motivation to enter education affects not only the success rate, but also the student's will to keep studying (for example Nils & Vertongen, 2010; Viau, 2001). To measure academic motivation, we will use the Academic Motivation Scale (AMS; Vallerand, Pelletier, Blais, Brière, Senécal & Vallières, 1992, 1993; Vallerand & Thill, 1993) and we have instituted three main objectives: 1) examine the factor structure of the Czech version of the questionnaire on a sample of 1,885 first-year students at Masaryk University, 2) determine whether this tool is functional even on a specific group of NTSs, and 3) explore differences in individual types of academic motivation between traditional and non-traditional students.

In the following sections, we first focus on the problems of NTSs in the Czech context and explain how NTSs are operationalized in our study. Subsequently, we focus on self-determination theory, which is the basis for the AMS used in this study. Then we present the AMS in more detail and provide an overview of previous studies in which it was used to study the motivations of NTSs.

Non-traditional students in the Czech context

The concept of NTSs was introduced to describe under-represented groups in tertiary education (Bron & Lönnheden, 2004). This may concern students of higher ages, those coming from disadvantaged socio-economic conditions (lower socio-economic status or minority ethnic groups), or those with physical disabilities. It may also include students who are the first in their family to enter tertiary education (Thunborg, Bron, & Edström, 2012, 2013). The term NTS thus varies substantially in accordance with the social, geographic, and system context (Chung, Turnbull, & Chur-Hansen, 2014; Rosário, Pereira, Núñez, Cunha, Fuentes, Polydoro, Gaeta, & Fernández, 2014).

Based on foreign examples, in the context of Czech Republic we could talk about NTSs in such cases as students from minority ethnic groups, students with disabilities, students without academic experience in their

family, and also students of higher ages. The criterion of age seems to be especially important because the Czech Republic is among the four European countries with the lowest participation of adults in formal education (AES, 2016). For example, in the category of age over 30, participation specifically in tertiary education is very low, and between 2011 and 2016 it even decreased from approximately 4% to 1% (AES, 2016). Conversely, the number of adults returning to tertiary education keeps increasing in developed countries (e.g., Hagedorn, 1999; Pires, 2009; Chung, Turnbull, & Chur-Hansen, 2014). In this study, we therefore primarily choose the criterion of higher age to determine Czech NTSs.

Higher age is recognized as the most consistent feature of NTSs (Tilley, 2014), but the lower age limit varies from 23 to 26 in accordance with the particular educational context (Bennett, Evans, & Riedle, 2007; Bourgeois, De Viron, Nils, Traversa, & Vertongen, 2009; Chao & Good, 2004; Forbus, Newbold, & Mehta, 2011; Hart, 2003; Kim, 2002; Rosário et al., 2014; Scott & Lewis, 2012). Therefore, we use the definition of a student based on Czech legislation, in which a student is "a child until the end of compulsory schooling, and thereafter, not later than the age of 26, if he/she is continuously preparing for a future profession" (Czech Act No. 117/1995 Sb., on State Social Support, 1995, Section 11). At the same time, in the Czech Republic the age of 26 is the age at which students lose financial and tax advantages resulting from the status of student.

However, since diversity in educational paths is increasing, we consider the age criterion insufficient for differentiating between NTSs and students who are simply studying for longer, even though more or less continuously. Therefore, we propose to use two criteria to determine NTSs. We propose to complement the criterion of age (e.g., Milesi, 2010) with the condition of a break in educational trajectory (cf. Souto-Otero & Whitworth, 2017) of at least one year. In this study, the term NTS therefore covers adults over the age of 26 who were not enrolled in formal education for at least one year (Kasworm, 2018) and then returned to the formal education system, i.e., to a university.

Theoretical framework for the Academic Motivation Scale: Self-determination theory

Motivation is a construct used to describe internal and/or external forces affecting the initiation, direction, intensity, and persistence of behaviour (Vallerand & Thill, 1993, p. 18; Carré, 2001, p. 15). The concept of academic motivation used in this work originates in self-determination theory (SDT), which emphasizes the importance of people's inherent inner sources for healthy development, effective functioning, and optimal outcomes (Deci &

Ryan, 1985; Ryan, Kuhl, & Deci, 1997; Vallerand, Pelletier, & Koestner, 2008). In terms of SDT, people's needs are "innate psychological nutriments that are essential for the ongoing psychological growth, integrity and well-being" of all people (Ryan & Deci, 2000, p. 229). The key psychological needs in accordance with SDT are competence, autonomy, and relatedness. The need for competency represents the feeling of self-confidence or self-effectiveness acquired through activity, the search for appropriate challenges, and positive feedback. The need for autonomy represents the feeling of being the origin of one's actions (Ryan & Deci, 2000). The need for relatedness, i.e., the sense of appreciation by significant others, strengthens intrinsic motivation (Brahm, Jenert, & Wagner, 2017, p. 461), but in some situations, it is perceived as less central than the other two (Deci & Ryan, 2000). If all three needs are satisfied, the person is internally motivated and acts in a self-determining manner.

SDT discerns two basic types of motivation: intrinsic and extrinsic. In SDT, intrinsic motivation is characterized by pleasure from a task originating in the task itself or in its performance (Kover & Worrell, 2010). In contrast, extrinsic motivation refers to an action or activity performed for a purpose separable from the activity as such. These types of motivation do not function synergically. It has been discovered that extrinsically motivated behaviour decreases the degree of intrinsic motivation (Deci, Koestner, & Ryan, 1999). Both intrinsic and extrinsic motivation are further divided into types which can be arranged in accordance with the degree of self-determination from activities performed with a feeling of one's own will and choice (Deci & Ryan, 2000) to activities performed from the feeling of duty (Boiché & Sarrazin, 2007, pp. 418–419; Rotter, 1966). The positioning of the motivation types on the motivation continuum is used by the AMS (Vallerand et al., 1992), which is referred to as an SDT measuring tool (Hegarty, 2010).

The Academic Motivation Scale and research on non-traditional students

During the construction of the AMS, Vallerand et al. (1992) defined three types of intrinsic motivation on the basis of empirical background (Vallerand, Blais, Brière, & Pelletier, 1989) and joined three known types of extrinsic motivation and an "amotivation" (Deci & Ryan, 1985). Within intrinsic motivation, the first type is *intrinsic motivation toward knowledge* (IMk), which appears when we experience pleasure and satisfaction during learning, discovery, or an effort to understand something new (Vallerand et al., 1992, p. 1005). Another type, *intrinsic motivation toward accomplishment* (IMa), appears when we derive pleasure from creating or achieving something and surpassing

ourselves. We speak of the last type, *intrinsic motivation toward stimulating experiences* (IMse), when we engage in something for the stimulating sensations this action brings. Students attending classes in order to experience excitement from stimulating discussion or students reading books for the intense feelings of cognitive pleasure experience this very type of motivation (Vallerand et al., 1992, p. 1006).

In accordance with Deci and Ryan (1985), extrinsic motivation also has three types. The closest to intrinsic motivation on the self-determination continuum is *identified regulation* (EMidr). In the case of EMidr, we perceive our behaviour, although motivated, for example, by a reward, to be important and in accord with our values. In the case of *introjected regulation* (EMintr), an external impulse (e.g., a mark on an exam) is the motivation for activity and the activity itself is partially internalized (Vallerand et al., 1993, p. 1006). In the case of *external regulation* (EMer), the behaviour is regulated exclusively by external means. Apart from intrinsic and extrinsic motivation, the AMS also measures amotivation (AM), i.e., the feeling of incompetence, uncontrollability, or indecision when we perceive our behaviour to be a consequence of forces out of our control (Vallerand et al., 1993, p. 1007).

The AMS is used primarily for its original purpose, i.e., measuring academic motivation in university students. However, it has been used with satisfactory results even on high school students (Stover, de la Iglesia, Boubeta, & Liporace, 2012) and adults enrolling in tertiary education at higher ages (van Rhijn, 2012). The AMS is often distributed to students in their first year (Fazey & Fazey, 2001), but some studies have also tried to answer the question of whether the motivational structure of students develops as they progress into the following years of study (Sheldon & Krieger, 2004). Those studies imply that the motivational structure measured by the AMS is relatively stable (Bailey & Phillips, 2016). Therefore, Jacobs and Newstead (2000) stated that the AMS is too general to capture motivations connected to a specific study programme and those which can be changed by the curriculum of a particular year.

The AMS has also been used in research on NTSs several times. Most findings regarding the motivational structure of NTSs are in accord with measurements by other tools (Francois, 2014; Bye, Pushkar, & Conway, 2007) and confirm higher levels of intrinsic motivation in NTSs (Shillingford & Karlin, 2013; Fazey & Fazey, 2001). A study of Sudanese NTSs at an Australian university where predominantly extrinsic motivation was measured represents an exception to the rule (Gately, Ellis, Britton, & Fleming, 2017). This result can be explained by the subsequent qualitative inquiry revealing perceptions of studies as means to support a family in this ethnically specific group of NTSs. Fazey and Fazey (2001) show that age can be an important factor even in the levels of individual types of external motivation. EMer

was significantly lower in older students than in their younger colleagues, but older students had the highest levels of EMintr, while younger students had the highest levels of EMidr, i.e., a regulation higher on the self-determining continuum. These results suggest that describing motivation types on their continuum and not only in the binary terms of internal and external motivation can be beneficial for research on NTSs.

In addition to the original French version, the AMS is available in many other languages, for example English, Spanish, and Turkish (Bailey & Phillips, 2016; Fazey & Fazey, 2001; Vallerand et al., 1992). The Czech version of the questionnaire was prepared by Slezáčková and Bobková (2015), who did not describe the process of the Czech adaptation of the foreign research tool in their article. For a sample of 403 Czech university students, they calculated the internal consistency of the tool as a whole ($\alpha = .86$), but they did not perform more detailed psychometric analyses.

Methods

Participants and procedure

Data collection took place within the first wave of the *Na cestě studiem* (Study Roadmap) long-term survey realized by the Strategy Office of Masaryk University (MU) in cooperation with researchers from the Faculty of Arts of MU and the Faculty of Social Studies of MU. The questionnaire also contained other items; the AMS constituted only a part of the research tool.

The collection took place between October and November 2017 (25 October to 22 November) through an online questionnaire which was distributed via email to all Czech and Slovak students in the first year of both bachelor's and master's programmes. By the end of data collection, 2,323 of the total 6,802 students had completed the survey. For the purpose of this study, only students who filled in all of the items in the AMS have been included. The final sample analysed in this study thus consists of 1,885 students, 1,256 of which (66.6%) were women. At the time of investigation, a total of 124 (6.6%) students in the sample were over the age of 26, and 271 (14.4%) students had reported a break in their formal educational trajectory. From our definition, 100 students (5.3%) could be considered as NTSs (i.e., had the combination of age and a break in educational trajectory).

Measures

As suggested above, the AMS (Vallerand et al., 1992, 1993), specifically the university version containing a total of 28 items, has been used to measure academic motivation. The AMS consists of a total of seven subscales that jointly measure three types of intrinsic motivation (IMk, IMa, and IMse),

three types of extrinsic motivation (EMidr, EMintr, and EMer), and AM. Each subscale consists of four items. All items are scored on a seven-point Likert scale measuring agreement ranging from 1 (*Does not correspond at all*) to 7 (*Corresponds exactly*). The Czech and English wordings of the items are available in Appendix A alongside basic descriptive statistical data in the form of averages, standard deviations, and coefficients of kurtosis and skewness. The Appendix B contains a correlation matrix of all AMS items.

Statistical analysis

A confirmatory factor analysis and a measurement invariance analysis have been performed to validate the Czech version of the AMS. Linear regression was used to determine any differences in motivations between traditional and non-traditional students. All analyses were carried out in the R statistical environment (R Core Team, 2018), mostly using the specialized *lavaan* (Rosseel, 2012) and *semTools* (Jorgensen, Pornprasertmanit, Schoemann, & Rosseel, 2018) packages.

For all models within the confirmatory factor analysis and measurement invariance analysis, the weighted least squares with means and variances adjusted method has been used for model estimation, especially because this method of estimation is considered more suitable for work with ordinal scales (Beauducel & Herzberg, 2006). Several commonly used (see, for example, Kline, 2016) model fit indicators and cut-off criteria have been used to assess model suitability, specifically: the goodness-of-fit test (χ^2), root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), comparative fit index (CFI), and non-normed fit index (NNFI). For the RMSEA and SRMR, the closer the indicator is to zero, the more the considered model fits the data. For the RMSEA and SRMR, a value of .05 can be considered a basic rough rule for the assessment of model and data agreement, where values below this limit indicate a good fit. Values below .08 can still mean an acceptable fit, but values above .1 indicate poor agreement between the model and data. For the CFI and the NNFI (sometimes also referred to as the Tucker–Lewis index), the closer the value is to 1, the better the model fits the data. Values above .95 are considered to be an acceptable fit, and values above .97 are already considered to be a good fit.

Results

Confirmatory factor analysis

The test of the original seven-factor model (Model 1) using all 28 items was the first step in the confirmatory factor analysis. The model exhibited a relatively good fit: $\chi^2 = 1{,}512.7$, $df = 329$, $p < .001$, RMSEA = .047, SRMR

= .055, CFI = .97, NNFI = .97. For Model 1, the standardized parameter estimates (standardized factor loadings) ranged from .46 and .88 (see Table 2). If we consider values above .7 to be good values for the standardized parameters and values above .55 to be acceptable (cf. Tabachnick & Fidell, 2001; Hair, Black, Babin, & Anderson, 2010), then for the original model only one item (item 1) within EMer exhibited an unacceptable value and 22 of the 28 items exhibited good values for the standardized parameters. For the sake of completeness, squared multiple correlations (R^2) were also calculated in order to evaluate the degree to which the individual units were suitable as values for the given factor. In this case, .5 is usually considered to be the limit (cf. Kline, 2016), which in the case of Model 1 applies to 21 of the 28 items.

With regard to the fact that SDT originally worked with only five types of motivation (Deci & Ryan, 1985; Ryan & Deci, 2000) and the fact that even within the AMS some studies work only with a five-factor solution (e.g., Alivernini & Lucidi, 2008), we also tested a model in which all three types of intrinsic motivation form a single factor. As Table 1 clearly shows, the goodness-of-fit indicators suggest that this five-factor model (Model 2) exhibited a significantly worse fit than the original seven-factor model. Also, the test of difference in χ^2 clearly shows that the original seven-factor model was statistically significantly better than the five-factor model ($\chi^2_{diff} = -1{,}603.8$, $df_{diff} = -11$, $p < .001$).

Table 1
Goodness-of-fit measures for all models

Fit Measure	Model 1	Model 2	Model 3
	Original 7-factor model, all 28 items.	*5-factor model, all 28 items.*	*Final 7-factor model, 24 items.*
χ^2	1,512.7	3,116.5	861
df	329	340	231
p	< .001	< .001	< .001
RMSEA	.047	.068	.042
SRMR	.055	.079	.049
CFI	.97	.94	.98
NNFI	.97	.93	.97

Even though the original model (Model 1) exhibited a relatively good match with the data, we focused our attention on a more detailed investigation of the modification indices and standardized residuals in order to improve the model. This led to a discovery of particularly high values of ithe modification indices for items 11 (IMse), 18 (IMse), 1 (Emer), and 6 (IMa) and

relatively high standardized residuals for items 11 (IMse), 18 (IMse), 27 (IMa), 28 (EMintr), 1 (EMer), 22 (EMer), 3 (EMidr), and 10 (EMidr). For this reason, we have decided to respecify the model and exclude items 1 (EMer), 10 (EMidr), 11 (IMse), and 27 (IMa). The respecified model containing only 24 items (Model 3) exhibited a significantly better fit (χ^2 = 861, df = 231, p < .001, RMSEA = .042, SRMR = .049, CFI = .98, NNFI = .97) and it was significantly better than Model 1 (χ^2_{diff} = −651.7, df_{diff} = −98, p < .001). Let us add that in the final model, all standardized parameter estimates can be considered acceptable (i.e., .55 and higher) and that 18 of the 24 values of standardized parameters can be considered good (i.e., .7 and higher). In total, 17 of the 24 items reach the limiting value of R^2 (i.e., .5).

Table 2

Standardized factor loadings, t-values, and squared multiple correlations (R^2) for the final model (Model 3) and the original model (Model 1, in parentheses)

Factor		Beta	*t*-values	R^2
IMse		.56 (.58)	23.39 (24.33**)	.32 (.34)
IMse	11	–(.77)	–(39.07**)	–(.59)
IMse	18	.67 (.74)	30.23 (36.79**)	.45 (.55)
IMse	25	.84 (.86)	39.07 (42.54**)	.7 (.74)
IMa	6	.75 (.73)	38.04 (36.87**)	.56 (.53)
IMa	13	.81 (.79)	37.65 (36.27**)	.66 (.62)
IMa	20	.69 (.70)	32.96 (35.62**)	.47 (.49)
IMa	27	–(.74)	–(38.06**)	–(.54)
IMk	2	.72 (.72)	26.23 (26.3**)	.52 (.52)
IMk	9	.83 (.84)	38.57 (39.25**)	.68 (.70)
IMk	16	.82 (.81)	30.71 (30.33**)	.66 (.65)
IMk	23	.77 (.76)	25.48 (25.28**)	.59 (.58)
EMidr	3	.66 (.71)	19.98 (22.18**)	.44 (.50)
EMidr	10	–(.69)	–(20.08**)	–(.47)
EMidr	17	.63 (.63)	20.44 (20.69**)	.4 (.40)
EMidr	24	.71 (.73)	21.05 (22.44**)	.5 (.53)
EMintr	7	.7 (.69)	31.88 (31.29**)	.49 (.48)
EMintr	14	.79 (.79)	40.95 (40.91**)	.62 (.63)
EMintr	21	.69 (.68)	32.9 (32.67**)	.47 (.47)
EMintr	28	.85 (.85)	40.92 (41.28**)	.72 (.73)
EMer	1	–(.46)	–(16.49**)	–(.22)
EMer	8	.83 (.86)	30.03 (32.94**)	.69 (.75)
EMer	15	.81 (.83)	27.31 (28.74**)	.65 (.68)
EMer	22	.75 (.78)	29.23 (32.25**)	.56 (.61)
AM	5	.87 (.88)	29.7 (29.64**)	.76 (.77)
AM	12	.71 (.71)	26.7 (26.38**)	.51 (.50)
AM	19	.75 (.75)	24.9 (24.74**)	.57 (.57)
AM	26	.83 (.82)	27.69 (27.42**)	.68 (.68)

The relationships among the factors correspond to a high degree with the continuum of individual types of motivation as described by SDT. As can be seen in the correlations among factors in the final model (Table 3), there was a strong connection among the individual types of intrinsic motivation and simultaneously a weaker connection among the individual types of intrinsic motivation and individual types of extrinsic motivation. A certain exception is the relatively strong correlation between IMa and EMintr (.67), which was somewhat contrary to the expected continuum, since EMintr should be closer to EMidr and EMer than to IMa. The very strong correlation between EMidr and EMer (.8) represents a similar case since based on the SDT continuum a rather stronger relationship can be expected between these variables and EMintr, which lies between them on the continuum. As for AM, we can add that it exhibited a statistically significant negative correlation with all of the other factors, which is in accordance with expectations of SDT.

Let us conclude this section with an assessment of internal consistency. We used Raykov's ω (see Raykov, 2001) as a measure of internal consistency. Raykov's ω for individual factors ranged from .71 to .87 within the final model, which could be considered an indication of good internal consistency (specifically: for IMse ω was .74, for IMa .79, for IMk .87, for EMidr .71, for EMintr .84, for EMer .84, and for AM .87).

Table 3
Factor correlations—final model (Model 3)

	IMse	IMa	IMk	EMidr	EMintr	EMer	AM
IMse	1						
IMa	.81**	1					
IMk	.79**	.72**	1				
EMidr	.31**	.36**	.5**	1			
EMintr	.43**	.67**	.35**	.46**	1		
EMer	−.02	.20**	.14**	.84**	.52**	1	
AM	−.32**	−.37**	−.59**	−.56**	−.18**	−.26**	1

Measurement invariance analysis

After the confirmatory factor analysis, a measurement invariance analysis was also completed. Its primary goal was to examine whether the AMS exhibits a similar factor structure and whether the individual scores of the measured constructs have the same meaning even in the context of NTSs. Specifically, we tested measurement invariance with regard to four variables, with the first three concerning NTSs and their operationalization in this study (i.e., age, a break in educational trajectory, and a combination of these two variables) and the fourth variable corresponding to respondent gender.

Generally, measurement invariance analysis is performed by estimating several models in which individual model parameters are gradually constrained or fixed. As Kline (2016) stated, we can speak of four basic types of measured invariance. The first type is *configural invariance*, within which the number of factors is fixed and items are assigned to the corresponding factors (i.e., the same form) but other model parameters are estimated freely. The second type is *weak invariance*, which requires equality of the factor loadings (i.e. the unstandardized coefficients) across the individual groups. The third type, *strong invariance*, comprises an additional restriction of intercepts. If intercept equality is ensured, the scale of the given indicator can be considered identical across the individual groups. This means that, for example, traditional and non-traditional students with the same level of a specific type of motivation should achieve the same score for the corresponding items. The last type is *strict* or *residual invariance*, which can be considered the highest level of measurement invariance. In addition to what holds for strong invariance, in this case the equality of residual variances is also expected, which means that the individual items measure the corresponding factors across groups with the same degree of accuracy. All of the aforementioned measurement invariance types were tested for each of the aforementioned variables.

As regards measurement invariance concerning age, two groups of respondents were compared with regard to the determination of NTSs noted above, i.e., students under and over the age of 26. As Table 4 suggests, four criteria for weak invariance were met, but there was a statistically significantly worse model for strong invariance ($p < .001$). However, if we pay attention to the stated goodness-of-fit indicators (RMSEA, SRMR, CFI, NNFI), we can see that in the case of strong invariance in comparison to weak invariance, no change in model fit was registered on even a single indicator. Furthermore, since there is no significant model worsening in the case of strict invariance, the measurement can be considered strictly invariant with regard to the groups under and over the age of 26.

Table 4
Model fit testing measurement invariance with regard to age

	χ^2	*df*	*p*	RMSEA	SRMR	CFI	NNFI
Configural invariance	992.8	462		.043	.050	.976	.972
Weak invariance	1,018.9	479	.666	.042	.051	.976	.973
Strong invariance	1,041.7	496	< .001	.042	.051	.976	.973
Strict invariance	1,056.8	520	.116	.041	.051	.976	.974

Subsequently, measurement invariance was tested with regard to the existence of a break in formal education for at least a year after finishing high school. Once again, two groups were compared (i.e., students with/without a break in educational trajectory), and similarly to the age situation we can again perceive statistically significant ($p = .009$) worsening of the model for strong invariance. Since there was no significant worsening of the model fit indicators (RMSEA and SRMR were the same, CFI worsened only by .001, and NNFI even increased by .001), not even for strict invariance, we can once again speak of strictly invariant measurement, this time with regard to a break in educational trajectory.

Table 5
Model fit testing measurement invariance with regard to a break in educational trajectory

	χ^2	*df*	*p*	RMSEA	SRMR	CFI	NNFI
Configural invariance	967.6	462		.043	.050	.977	.972
Weak invariance	1,007.0	479	.169	.042	.051	.977	.973
Strong invariance	1,022.3	496	.009	.042	.051	.976	.974
Strict invariance	1,044.6	520	.004	.041	.051	.976	.975

In the context of this study, NTSs were determined using the criteria of age and a break in educational trajectory. That is why we performed additional measurement invariance analysis using a combination of the two corresponding variables. Two groups of students have been compared once again, with the comparison concerning students under the age of 26 and without a break in educational trajectory (traditional students) and students over the age of 26 who have interrupted their formal education for at least a year (NTSs). With regard to the data in Table 6, we can conclude that measuring motivation using the AMS is strictly invariant across traditional and non-traditional students.

Table 6
Model fit testing measurement invariance with regard to traditional versus non-traditional students (i.e., a combination of age and a break in educational trajectory)

	χ^2	*df*	*p*	RMSEA	SRMR	CFI	NNFI
Configural invariance	996.1	462		.043	.050	.976	.972
Weak invariance	1,034.5	479	.327	.043	.050	.976	.973
Strong invariance	1,056.5	496	< .001	.042	.051	.976	.973
Strict invariance	1,074.0	520	.059	.041	.051	.976	.974

Finally, we tested measurement invariance with regard to respondent gender. Despite statistically significant worsening for strong invariance ($p < .001$) and strict invariance ($p < .001$), we consider the measurement to be strictly invariant with regard to gender since there was no, or only minimal, worsening in the other indicators of model fit.

Table 7
Model fit testing measurement invariance with regard to gender

	χ^2	*df*	*p*	RMSEA	SRMR	CFI	NNFI
Configural invariance	967.7	462		.043	.050	.977	.972
Weak invariance	994.3	479	.68	.042	.050	.977	.974
Strong invariance	1,030.2	496	< .001	.042	.051	.976	.974
Strict invariance	1,062.9	520	< .001	.041	.052	.976	.974

Academic motivation in non-traditional students

Based on the established measurement invariance, it was possible to approach a determination of the differences among individual types of academic motivation between traditional students and NTSs. Since the measurement invariance analysis pointed at strict invariance with regard to all of the tested variables (i.e., age, break in educational trajectory, status of [non-]traditional student, and gender), the following analyses use summation scores for individual subscales of motivation, which were in most cases closer to the normal distribution than the latent factor scores. At the same time, all summation scores were standardized in order to have an average of 0 and a standard deviation of 1.

Before the linear regression, basic research on the variables was carried out and basic descriptive statistics calculated for the entire sample and individual subgroups. Table 8 states the averages and standard deviations for all of the types of motivation and all of the investigated subgroups (i.e., traditional vs. non-traditional students, men vs. women, age below vs. above 26, and the existence vs. non-existence of a break in educational trajectory). There are several basic trends in the data. Primarily, for all types of intrinsic motivation, NTSs had above-average values, while traditional students had slightly below-average values. The situation was completely the reverse for extrinsic motivation and amotivation, i.e., NTSs had below-average values. Simultaneously, higher variability can be perceived among NTS, as suggested by the higher standard deviations (except for amotivation, which is exactly the opposite). For all types of motivation, women had higher values in comparison to men, while men had higher values for amotivation.

As regards age and the existence of a break in educational trajectory, similar differences to the case of traditional students and NTSs are apparent, which, among other factors, supports the use of these two criteria as defining characteristics of NTSs.

Table 8

Averages and standard deviations (in brackets) of individual types of motivation within groups in accordance with a division into traditional/non-traditional students, gender, age, and the (non-)existence of a break in educational trajectory

	Student		Gender		Age		Break in educational trajectory	
	TS	NTS	Female	Male	< 26	> 26	No	Yes
IMse	−.02 (.99)	.37 (1.13)	.01 (.98)	−.02 (1.04)	−.03 (.98)	.42 (1.15)	−.04 (.99)	.23 (1.04)
IMa	−.03 (.99)	.49 (1)	.06 (.97)	−.12 (1.04)	−.03 (.99)	.47 (1.01)	−.04 (.99)	.25 (1)
IMk	−.02 (1)	.28 (1.01)	.02 (.97)	−.05 (1.06)	−.02 (.99)	.33 (1.05)	−.03 (1)	.17 (1)
EMidr	.02 (.98)	−.43 (1.27)	.06 (.95)	−.12 (1.09)	.02 (.98)	−.33 (1.25)	.06 (.96)	−.34 (1.14)
EMintr	.01 (1)	−.09 (1.06)	.07 (.97)	−.15 (1.05)	.00 (1)	−.04 (1.07)	.01 (1)	−.05 (1.02)
EMer	.04 (.98)	−.63 (1.19)	.02 (.96)	−.03 (1.08)	.04 (.97)	−.56 (1.21)	.07 (.96)	−.43 (1.11)
AM	.02 (1.01)	−.34 (.79)	−.03 (.98)	.06 (1.03)	.03 (1.01)	−.36 (.77)	.02 (1)	−.12 (.96)

Table 9 presents the results of a series of linear models in which the individual types of motivation played the role of dependent variable while gender, an indicator of (non-)traditional students, and interactions between these variables played the role of independent variables. The results adhere to the trends suggested in the previous descriptive table to a considerable degree. In all types of intrinsic motivation, NTSs had significantly higher values than traditional students did, while the largest difference (.51) can be perceived for IMa. For this type of intrinsic motivation, there was also a statistically significant difference between men and women, where men had on average .18 lower levels of motivation than women did. For extrinsic motivation, the difference between traditional and non-traditional students was not statistically significant in case of EMintr, even though men had lower levels there as well. For the remaining two types of extrinsic motivation, the difference between traditional students and NTSs was statistically significant.

For EMidr and EMintr, there was a significant difference between men and women, where all men had lover levels of motivation. None of the models showed the interaction term as statistically significant.

Table 9
Effects of the gender and traditionality of a student upon individual types of motivation

	b	SE	*z*	*p*
IMse				
NTS	.3	.13	2.34	.019
Gender (male)	−.04	.05	−.79	.431
NTS × gender	.27	.22	1.24	.214
IMa				
NTS	.51	.13	4.07	< .001
Gender (male)	−.18	.05	−3.6	< .001
NTS × gender	.02	.21	.1	.92
IMk				
NTS	.3	.13	2.37	.018
Gender (male)	−.07	.05	−1.36	.175
NTS × gender	< .01	.22	< .01	.998
EMidr				
NTS	−.33	.13	−2.64	.008
Gender (male)	−.17	.05	−3.33	.001
NTS × gender	−.34	.22	−1.6	.109
EMintr				
NTS	−.12	.13	−.97	.33
Gender (male)	−.23	.05	−4.54	< .001
NTS × gender	.07	.22	.33	.738
EMer				
NTS	−.62	.13	−4.92	< .001
Gender (male)	−.04	.05	−.87	.384
NTS × gender	−.15	.21	−.71	.477
AM				
NTS	−.42	.13	−3.32	.001
Gender (male)	.08	.05	1.64	.101
NTS × gender	.17	.22	.8	.424

In Table 10, we have used variables for age groups (under and over 26) and for the (non-)existence of a break in educational trajectory instead of an indicator of (non-)traditional students as we did in Table 9. This allowed us to determine which of these two definition criteria for NTSs played the primary role in individual types of motivation. As the model results in the table suggest, there really are differences among the individual types of motivation when it comes to the effect of individual defining characteristics

of NTSs. For example, in case of IMk, only age was statistically significant (students over the age of 26 had greater motivation), while a break in educational trajectory did not play an important role. Similarly, in the case of IMse, the difference for a break in educational trajectory approached statistical significance. For IMa, both criteria were statistically significant. The situation was similar for EMer, where students over the age of 26 and students with a break in educational trajectory had statistically significantly lower values. For EMidr, age did not play any role and everything depended on whether or not the student had interrupted their studies after high school. On the other hand, in case of AM, a break in educational trajectory played no role and age was the only important factor.

Table 10

Effects of the age, break in educational trajectory, and gender of a student upon individual types of motivation

	B	SE	*z*	*p*
IMse				
Age 26+	.35	.11	3.27	.001
Break in educational trajectory	.15	.08	1.95	.052
Gender (male)	−.03	.05	−.62	.539
IMa				
Age 26+	.4	.11	3.74	< .001
Break in educational trajectory	.16	.08	2.07	.039
Gender (male)	−.18	.05	−3.78	< .001
IMk				
Age 26+	.29	.11	2.73	.006
Break in educational trajectory	.09	.08	1.24	.214
Gender (male)	−.07	.05	−1.46	.143
EMidr				
Age 26+	−.11	.11	−1.02	.306
Break in educational trajectory	−.35	.07	−4.65	< .001
Gender (male)	−.17	.05	−3.62	< .001
EMintr				
Age 26+	−.01	.11	−.11	.909
Break in educational trajectory	−.04	.08	−.55	.582
Gender (male)	−.22	.05	−4.56	< .001
EMer				
Age 26+	−.34	.11	−3.18	.002
Break in educational trajectory	−.38	.07	−5.05	< .001
Gender (male)	−.04	.05	−.85	.396
AM				
Age 26+	−.38	.11	−3.52	< .001
Break in educational trajectory	−.02	.08	−.21	.832
Gender (male)	.09	.05	1.91	.057

Discussion and conclusion

The evaluation of the AMS in the Czech environment was the primary objective of this study. Specifically, we have focused on the examination of the factor structure of the Czech version of the questionnaire and especially on finding out whether the AMS was usable even in case of NTSs, for whom various specifics can be expected in comparison to traditional students (Brücknerová & Rabušicová, 2019).[1] The secondary objective was to discover whether there are differences in motivation (or its particular types) between traditional and non-traditional students and if so what they are. In order to fulfil these goals, we have used data from 1,885 first-year students at MU and carried out confirmatory factor analysis, measurement invariance analysis, and linear regression.

The confirmatory factor analysis confirmed that, as regards the tool dimensionality, the original seven-factor solution exhibits the best compliance with the data and is statistically significantly better than the alternative five-factor solution in the Czech context. At the same time, the results support the conception of Vallerand et al. (1992) regarding the three basic components of motivation (i.e., intrinsic motivation, extrinsic motivation, and amotivation), as suggested by the significantly higher positive correlations among factors of intrinsic motivation (in comparison to the factors of extrinsic motivation) and also the negative correlations between amotivation and the remaining factors. However, the theoretical outcomes of the tool's factor structure slightly impair the relatively high positive correlations between EMitr and the individual factors of internal motivation, especially IMa. Similar results have been achieved by several other authors (for example Can, 2015; Cokley, Bernard, Cunningham, & Motoike, 2001; Fairchild, Horst, Finney, & Barron, 2005; Utvær & Haugan, 2016).

The measurement invariance analysis showed that the AMS can be used with both traditional and non-traditional students in the Czech context. Within the analysis, we tested invariance with regard to groups under and over the age of 26, the existence or non-existence of a break in educational trajectory, whether the student is traditional or non-traditional (i.e., a combination of the criteria of age and a break in educational trajectory), and student gender. In all four cases, the highest possible level of measurement invariance (strict invariance) has been recorded, which suggests that the AMS

[1] Among other reasons, we have attempted to examine the tool because we also plan to use the AMS in a prepared study focusing specifically on NTSs in pedagogical fields at Czech universities.

works well even with the subpopulation of NTSs. At the same time, the determination of strict invariance enables using the AMS, or summation scores of individual subscales, to measure and compare individual types of motivation between traditional and non-traditional students.

With regard to differences in motivations in traditional and non-traditional students, the results of regression analyses suggest that NTSs had significantly higher values for all types of intrinsic motivation (cf., for example, Shillingford & Karlin, 2013; Fazey & Fazey, 2001). On the other hand, for EMidr and EMer NTSs had significantly lower values than traditional students did. The exception to the rule was EMintr, where no statistically significant difference between traditional and non-traditional students was found. For amotivation, in comparison to traditional students NTSs once again had significantly lower values. This suggests that younger students who have continuously been a part of formal education and who therefore do not have any experience with "non-student", i.e., working, life for the time being tended to report the absence of motivation to study more often. These findings are in accordance with foreign studies on the motivation of NTSs (Bye, Pushkar, & Conway, 2007; Eppler, Carsen-Plentl, & Harju, 2000; Francois, 2014). Therefore, we can assume that even though NTSs are a comparatively smaller proportion of students in the Czech Republic than they are in other European countries (AES, 2016), in some characteristics they will be very similar to their foreign colleagues.

In this study, we have used age over 26 together with a break in educational trajectory as the criteria to define an NTS. That is why we have focused on the degree to which the individual types of motivations were connected to age and to a break in educational trajectory (cf. Schuetze & Slowey, 2002; Souto-Otero & Whitworth, 2017). Generally, we can conclude that age plays a more important role than a break in educational trajectory, which corresponds with the fact that we consider age to be primary in the definition of an NTS. A break in educational trajectory seemed to be statistically significant for several types of motivation. Moreover, in the case of one type of extrinsic motivation, specifically EMidr, this was even the only one of the two criteria that made the difference between traditional and non-traditional students statistically significant (i.e., age did not play a role). On this empirical basis, we propose using a combination of the aforementioned two criteria while defining Czech NTSs.

The analyses showed that it is necessary to consider student gender while investigating the motivation of university students. In the investigated sample of students, women had higher levels than men did for all types of motivation, and this difference was statistically significant in three types (specifically IMa, EMidr, and EMintr).

However, the aforementioned findings have certain limitations. Primarily, it is necessary to mention the relatively small size of the NTS group in comparison to the number of traditional students. Only 5.3% of respondents were NTSs in the analysed sample. We have tried to partially compensate for this limit by working with groups of students in accordance with the individual defining characteristics of NTSs (i.e., age and a break in educational trajectory) separately from the division into traditional students and NTSs. The fact that the sample only contains students at MU can be considered yet another limit. On one hand, the situation may be more or less different at other universities in the Czech Republic, but on the other hand, based on foreign studies (Schuetze, 2014), we can expect a rather larger proportion of NTSs at smaller regional universities than at a large traditional university such as MU. Last but not least, we can warn of a lack of balance in the sample with regard to respondent gender because women constituted 66.6% of respondents. With regard to the representation of women in the population of first-year students at MU (60.4%), this imbalance can be considered minor.

Regardless of the limits, we have shown that the Czech version of the AMS is a valid tool that can be used to research traditional students and NTSs operationalized on the basis of age and a break in educational trajectory. From the sample of MU students, it is evident that Czech NTSs had greater intrinsic motivation and lower amotivation than their younger colleagues who had not interrupted their formal educational trajectory. Therefore, it seems that at least from the point of view of academic motivation, a break in the educational trajectory and mature age can be beneficial in a transition to university.

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References

AES. (2016). *Adult Education Survey 2016*. Luxemburg: Eurostat.

Alivernini, F., & Lucidi, F. (2008). The Academic Motivation Scale (AMS): Factorial structure, invariance, and validity in the Italian context. *TPM-Testing, Psychometrics, Methodology in Applied Psychology, 15*(4), 211–220.

Bailey, T. H., & Phillips, L. J. (2016). The influence of motivation and adaptation on students' subjective well-being, meaning in life and academic performance. *Higher Education Research & Development*, *35*(2), 201–216.

Beauducel, A., & Herzberg, P. Y. (2006). On the performance of maximum likelihood versus means and variance adjusted weighted least squares estimation in CFA. *Structural Equation Modeling*, *13*(2), 186–203.

Bennett, S., Evans, T., & Riedle, J. (2007). Comparing academic motivation and accomplishments among traditional, nontraditional, and distance education college students. *Psi Chi Journal of Undergraduate Research, 12*(4), 154–161.

Boiché, J., & Sarrazin, P. (2007). Motivation autodéterminée, perceptions de conflit et d´instrumentalité et assiduité envers la pratique d´une activité physique: une étude prospective sur six mois. *Psychologie française, 52,* 417–430.

Bourgeois, É., De Viron, F., Nils, F., Traversa, J., & Vertongen., G. (2009). Valeur, espérance de réussite, et formation d'adultes: pertinence du modèle d'expectancy-value en contexte de formation universitaire pour adultes. *Savoirs, 2*(20), 119–133.

Brahm, T., Jenert, T., & Wagner, D. (2017). The crucial first year: a longitudinal study of students' motivational development at a Swiss Business School. *Higher Education, 73*(3), 459–478.

Bron, A., & Lönnheden, C. (2004). Higher education for non-traditional students in Sweden: A matter of inclusion. *Journal of Adult and Continuing Education: Adult Education and Social Inclusion/Exclusion: Citizen Perspectives*, *7*, 175–188.

Brücknerová, K., & Rabušicová, M. (2019). Netradiční vysokoškolští studenti: Charakterisitky a potenciál odloženého studia. *Studia paedagogica*, *24*(1), 33–49.

Bye, D., Pushkar, D., & Conway, M. (2007). Motivation, interest, and positive affect in traditional and nontraditional undergraduate students. *Adult Education Quarterly, 57*(2), 141–158.

Can, G. (2015). Turkish version of the Academic Motivation Scale. *Psychological Reports*, *116*(2), 388–408.

Carré, P. (2001). *De la motivation à la formation*. Paris: L'Harmattan.

Chao, R., & Good, G. E. (2004), Nontraditional students' perspectives on college education: A qualitative study. *Journal of College Counseling*, *7*(1), 5–12.

Chung, E., Turnbull, D., & Chur-Hansen, A. (2014). Who are non-traditional students? A systematic review of published definitions in research on mental health of tertiary students. *Educational Research and Reviews*, *9*(22), 1224–1238.

Cokley, K. O., Bernard, N., Cunningham, D., & Motoike, J. (2001). A psychometric investigation of the Academic Motivation Scale using a United States sample. *Measurement and Evaluation in Counseling and Development*, *34*, 109–119.

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin, 125*(6), 627–668.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behaviour.* New York: Plenum.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the selfdetermination of behavior. *Psychological Inquiry, 11*(4), 227–268.

Eppler, M. A., Carsen-Plentl, C., & Harju, B. L. (2000). Achievement goals, failure attributions, and academic performance in nontraditional and traditional college students. *Journal of Social Behavior and Personality, 15*(3), 353–372.

Fairchild, A. J., Horst, S. J., Finney, S. J., & Barron, K. E. (2005). Evaluating existing and new validity evidence for the Academic Motivation Scale. *Contemporary Educational Psychology*, *30*(3), 331–358.

Fairchild, E. E. (2003). Multiple roles of adult learners. *New Directions for Student Services, 102*, 11–16.

Fazey, D. M., & Fazey, J. A. (2001). The potential for autonomy in learning: Perceptions of competence, motivation and locus of control in first-year undergraduate students. *Studies in Higher Education*, *26*(3), 345–361.

Forbus, P., Newbold, J. J., & Mehta, S. S. (2011). A study of non-traditional and traditional students in terms of their time management behaviors, stress factors, and coping strategies. *Academy of Educational Leadership Journal*, *15*(Special Issue), 109–125.

Francois, E. J. (2014). Motivational orientations of non-traditional adult students to enroll in a degree-seeking program. *New Horizons in Adult Education and Human Resource Development*, *26*(2), 19–35.

Gately, N. J., Ellis, S., Britton, K., & Fleming, T. (2017). Understanding and overcoming barriers: Learning experiences of undergraduate Sudanese students at an Australian university. *International Journal of Higher Education*, *6*(2), 121–132.

Hagedorn, L. (1999). Factors related to the retention of female graduate students over 30. *Journal of College Student Retention, 1*(2), 99–114.

Hair, J. F., Black W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis*. Upper Saddle River: Prentice Hall.

Hart, N. K. (2003). Best practices in providing nontraditional students with both academic and financial support. *New Directions for Higher Education, 121*, 99–106.

Hegarty, N. (2010). Application of the Academic Motivation Scale to graduate school students. *The Journal of Human Resource and Adult Learning, 6*(2), 48–56.

Jacobs, P. A., & Newstead, S. E. (2000). The nature and development of student motivation. *British Journal of Educational Psychology*, *70*(2), 243–254.

Jorgensen, T. D., Pornprasertmanit, S., Schoemann, A. M., & Rosseel, Y. (2018). *semTools: Useful tools for structural equation modeling*. R package version 0.5-1. Retrieved from https://CRAN.R-project.org/package=semTools

Kasworm, C. E. (2018). Adult students: A confusing world in undergraduate higher education. *The Journal of Continuing Higher Education, 66*(2), 77–87.

Kim, K.A. (2002). ERIC review: Exploring the meaning of "nontraditional" at the community college. *Community College Review, 30*(1), 74–89.

Kline, R. B. (2016). *Principles and practice of structural equation modeling*. New York: Guilford Press.

Kobena Osam, E., Bergman, M., & Cumberland, D. M. (2017). An integrative literature review on the barriers impacting adult learners' return to college. *Adult Learning, 28*(2), 54–60.

Kover, J. D., & Worrell, C. F. (2010). The influence of instrumentality beliefs on intrinsic motivation: A study of high-achieving adolescents. *Journal of Advanced Academics, 21*(3), 470–498.

Milesi, C. (2010). Do all roads lead to Rome? Effect of educational trajectories on educational transitions. *Research in Social Stratification and Mobility*, *28*(1), 23–44.

Nils, F., & Vertongen, G. (2010). Les motifs de reprise d'études universitaires en fonction du niveau des programmes: développement professionnel, motifs identitaires, vocationnels et/ou intérêt intrinsèque?. *21ème colloque de l'ADMEE-Europe*, p. 8. Retrieved from https://www.researchgate.net/publication/329130859_Les_motifs_de_reprise_d'etudes_universitaires_en_fonction_du_niveau_des_programmes_Developpement_professionnel_motifs_identitaires_vocationnels_etou_interet_intrinseque.

Pires, A. L. S. (2009). Higher education and adult motivation towards lifelong learning: An empirical analysis of university post-graduates perspectives. *European Journal of Vocational Training, 1*(46)*,* 129–150.

R Core Team (2018). *R: A language and environment for statistical computing*. Vienna: R Foundation for Statistical Computing. Retrieved from https://www.R-project.org/

Raykov, T. (2001). Estimation of congeneric scale reliability using covariance structure analysis with nonlinear constraints. *British Journal of Mathematical and Statistical Psychology*, *54*(2), 315–323.

Rosário, P., Pereira, A., Núñez, J. C., Cunha, J., Fuentes, S., Polydoro, S., Gaeta, M., & Fernández, E. (2014). An explanatory model of the intention to continue studying among non-traditional university students. *Psicothema*, *26*(1), 84–90.

Rosseel, Y. (2012). lavaan: An R Package for structural equation modeling. *Journal of Statistical Software*, *48*(2), 1–36.

Rotter, J. (1966). Generalized experiences for internal versus external control of reinforcement. *Psychological Monographs, 80*(1), 1–28.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68–78.

Ryan, R. M., Kuhl, J., & Deci, E. L. (1997). Nature and autonomy: An organizational view of social and neurobiological aspects of self-regulation in behavior and development. *Development and Psychopathology, 9*(4), 701–728.

Schuetze, H. G. (2014). From adults to non-traditional students to lifelong learners in higher education: Changing contexts and perspectives. *Journal of Adult and Continuing Education*, *20*(2), 37–55.

Schuetze, H. G., & Slowey, M. (2002). Participation and exclusion: A comparative analysis of non-traditional students and lifelong learners in higher education. *Higher Education*, *44*(3–4), 309–327.

Scott, L. M., & Lewis, C. W. (2012). Nontraditional students: Assumptions, perceptions, and directions for a meaningful academic experience. *The International Journal of Interdisciplinary Social Sciences, 6*(4), 1–10.

Sheldon, K. M., & Krieger, L. S. (2004). Does legal education have undermining effects on law students? Evaluating changes in motivation, values, and well-being. *Behavioral Sciences & the Law*, *22*(2), 261–286.

Shillingford, S., & Karlin, N. J. (2013). The role of intrinsic motivation in the academic pursuits of nontraditional students. *New Horizons in Adult Education and Human Resource Development*, *25*(3), 91–102.

Slezáčková, A., & Bobková, A. (2015). Silné stránky charakteru a akademická motivace ve vztahu k optimálnímu prospívání českých vysokoškolských studentů [Character strengths and academic motivation with regard to ideal education of Czech university students]. *Annales psychologici, 1*(2), 24–39.

Souto-Otero, M., & Whitworth, A. (2017). Adult participation in higher education and the 'knowledge economy': A cross-national analysis of patterns of delayed participation in HE across 15 European countries. *British Journal of Sociology of Education, 38*(6), 763–781.

Stover, J. B., de la Iglesia, G., Boubeta, A. R., & Liporace, M. F. (2012). Academic Motivation Scale: Adaptation and psychometric analyses for high school and college students. *Psychology Research and Behavior Management*, *5*, 71–83.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics*. Needham Heights: Allyn & Bacon.

Thunborg, C., Bron, A., & Edström, E. (2012). Forming learning identities in higher education in Sweden. *Studies for the Learning Society*, *2*(2–3), 23–34.

Thunborg, C., Bron, A., & Edström, E. (2013). Motives, commitment and student identity in higher education – Experiences of non-traditional students in Sweden. *Studies in the Education of Adults*, *45*(2), 177–193.

Tilley, B. P. (2014). What makes a student non-traditional? A comparison of students over and under age 25 in online, accelerated psychology courses. *Psychology Learning & Teaching*, *13*(2), 95–106.

Twigg-Flesner, A. (2018). The end of lifelong learning – Where have all the mature undergraduate students gone? A literature review and practical recommendations from a case study in England. In J. Hoffman, P. Blessinger, & M. Makhanya (Eds.), *Perspectives on diverse student identities in higher education: International perspectives on equity and inclusion* (pp. 129–145). Bingley: Emerald Publishing Limited.

Utvær, B. K. S., & Haugan, G. (2016). The Academic Motivation Scale: Dimensionality, reliability, and construct validity among vocational students. *Nordic Journal of Vocational Education and Training*, *6*(2), 17–45.

Vallerand, R. J., Blais, M. R., Brière, N. M., & Pelletier, L. G. (1989). Construction et validation de l'échelle de motivation en éducation (EME) [Construction and validation of the Motivation toward Education Scale]. *Canadian Journal of Behavioural Science / Revue canadienne des sciences du comportement, 21*(3), 323–349.

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Brière, N. M., Senécal, C., & Vallières, E. F. (1992). The Academic Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, *52*(4), 1003–1017.

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Brière, N. M., Senécal, C., & Vallières, E. F. (1993). On the assessment of intrinsic, extrinsic, and amotivation in education: Evidence on the concurrent and construct validity of the Academic Motivation Scale. *Educational and Psychological Measurement*, *53*(1), 159–172.

Vallerand, R. J., Pelletier, L. G., & Koestner, R. (2008). Reflections on self-determination theory. *Canadian Psychology, 49*(3), 257–262.

Vallerand, R. J., & Thill, E. E. (1993). Introduction au concept de motivation. In R. J. Vallerand & E. E. Thill (Eds.), *Introduction à la psychologie de la motivation* (pp. 411–414). Laval: Éditions études vivantes – Vigot.

van Rhijn, T. (2012). An investigation of mature students' motivation to attend university. *Proceedings of the Canadian Society for the Study of Higher Education (CSSHE) Annual Conference, 28 to 30 May 2012, Waterloo, Ontario*, p. 346. Retrieved from https://s3.amazonaws.com/academia.edu.documents/33431234/2012_CASAE_Proceedings.pdf?AWSAccessKeyId=AKIAIWOWYYGZ2Y53UL3A&Expires=1558347250&Signature=zhMVoLPs87iM%2B29IpQNoUK1%2BpII%3D&response-content-disposition=inline%3B%20filename%3DSocial_Networking_Sites_Online_Spaces_fo.pdf#page=346

Viau, R. (2001). La motivation: condition essentielle de réussite. In J. C. Ruano-Borbalan (Ed.), *Éduquer et former* (pp. 113–121). Paris: Éditions Sciences Humaines.

Zákon č. 117/1995 Sb., o státní sociální podpoře [Czech Act No. 117/1995 Sb., On state social support]. (1995). Praha: Tiskárna Ministerstva vnitra.

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Appendix A

Descriptive statistics for the Academic Motivation Scale (AMS): mean, standard deviation, kurtosis (K), and skewness (S), *N* = 1,885, 28 items

Factor	Item	Wording	M	SD	K	S
IMse	4	Pro ty intenzivní pocity, které zažívám, když komunikuji své vlastní myšlenky ostatním. (*For the intense feelings I experience when I am communicating my own ideas to others.*)	3.61	1.63	−.74	.11
IMse	11	Pro potěšení, které zažívám, když čtu myšlenky zajímavých autorů. (*For the pleasure that I experience when I read interesting authors.*)	4.15	1.62	−.62	−.22
IMse	18	Pro potěšení, které zažívám, když se cítím zcela ponořen/a do děl autorů. (*For the pleasure that I experience when I feel completely absorbed by what certain authors have written.*)	3.60	1.60	−.67	.08
IMse	25	Pro povznášející pocit, který prožívám, když si čtu o různých zajímavých věcech. (*For the 'high' feeling that I experience while reading about various interesting subjects.*)	4.43	1.59	−.39	−.46
IMa	6	Pro potěšení, které prožívám během překonávání sama sebe ve studiu. (*For the pleasure I experience while surpassing myself in my studies.*)	4.25	1.65	−.65	−.37
IMa	13	Pro potěšení, které zažívám, když překonávám své osobní úspěchy. (*For the pleasure that I experience while I am surpassing myself in one of my personal accomplishments.*)	4.70	1.55	−.18	−.61
IMa	20	Pro uspokojení, které cítím, když plním složité akademické úkoly. (*For the satisfaction I feel when I am in the process of accomplishing difficult academic activities.*)	3.52	1.63	−.84	.08
IMa	27	Protože vysoká škola mi umožňuje zažít osobní uspokojení v mém úsilí o podávání excelentního studijního výkonu. (*Because high school allows me to experience apersonal satisfaction in my quest for excellence in my studies.*)	3.81	1.64	−.78	−.13
IMk	2	Protože učení se nových věcí mě těší a uspokojuje. (*Because I experience pleasure and satisfaction while learning new things.*)	5.36	1.36	1.17	−1.05
IMk	9	Kvůli potěšení, které zažívám, když objevuji nepoznané věci. (*For the pleasure I experience when I discover new things never seen before.*)	4.97	1.51	.18	−.76
IMk	16	Pro potěšení, které zažívám, když si rozšiřuji znalosti o věcech, které mě baví. (*For the pleasure that I experience in broadening my knowledge about subjects which appeal to me.*)	5.48	1.35	1.76	−1.26

IMk	23	Protože díky studiu se můžu dále učit o mnoha věcech, které mě zajímají. (*Because my studies allow me to continue to learn about many things that interest me.*)	5.59	1.29	2.49	−1.39
EMidr	3	Protože se domnívám, že mě vysokoškolské vzdělání lépe připraví na povolání, které jsem si vybral/a. (*Because I think that a high-school education will help me better prepare for the career I have chosen.*)	5.84	1.45	2.22	−1.58
EMidr	10	Protože mi to umožní zaměstnat se v oboru, který se mi líbí. (*Because eventually it will enable me to enter the job market in a field that I like.*)	5.86	1.38	2.91	−1.67
EMidr	17	Protože mi to pomůže lépe se rozhodnout o mém profesním směřování. (*Because this will help me make a better choice regarding my career orientation.*)	5.28	1.41	1.18	−1.13
EMidr	24	Protože věřím, že pár let vzdělávání navíc zvýší mou pracovní kvalifikaci. (*Because I believe that a few additional years of education will improve my competence as a worker.*)	5.66	1.37	2.29	−1.47
EMintr	7	Abych si dokázal/a, že vysokou školu ukončím s titulem. (*To prove to myself that I am capable of completing my high-school degree.*)	4.49	1.83	−.82	−.48
EMintr	14	Protože díky vysokoškolským úspěchům se cítím důležitý/á. (*Because of the fact that when I succeed in school I feel important.*)	4.08	1.80	−.96	−.27
EMintr	21	Abych si dokázal/a, že jsem inteligentní. (*To show myself that I am an intelligent person.*)	4.09	1.84	−1.05	−.28
EMintr	28	Protože si chci dokázat, že budu ve studiu úspěšný/á. (*Because I want to show myself that I can succeed in my studies.*)	4.68	1.71	−.37	−.69
EMer	1	Protože jen s maturitním vysvědčením bych si nenašel/a dobře placenou práci. (*Because I need at least a high-school degree in order to find a high-paying job later on.*)	5.28	1.84	−.14	−1.00
EMer	8	Abych později získal/a lukrativnější práci. (*In order to obtain a more prestigious job later on.*)	5.53	1.50	1.63	−1.38
EMer	15	Protože chci mít pak dobrý život. (*Because I want to have 'the good life' later on.*)	5.66	1.42	1.72	−1.35
EMer	22	Abych měl/a pak lepší plat. (*In order to have a better salary later on.*)	5.18	1.60	.66	−1.08
AM	5	Ani nevím, myslím si, že ve škole jen ztrácím čas. (*Honestly, I don't know; I really feel that I am wasting my time in school.*)	2.08	1.43	2.29	1.64
AM	12	Kdysi jsem měl/a na to dobrý důvod, ale teď si už nejsem jistý/á, jestli bych v tom vůbec měl/a pokračovat. (*I once had good reasons for going to school; however, now I wonder whether I should continue.*)	2.55	1.74	.18	1.09
AM	19	Nevím a být upřímný/á, je mi to jedno. (*I can't see why I go to school and frankly, I couldn't care less.*)	2.22	1.53	.86	1.25
AM	26	Nevím, nechápu, co na vysoké škole dělám. (*I don't know; I can't understand what I am doing in school.*)	1.96	1.49	2.55	1.77

Appendix B

Polychoric correlations of all AMS items

Item	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20	#21	#22	#23	#24	#25	#26	#27	#28
#1	1																											
#2	.00	1																										
#3	.32	.30	1																									
#4	–.08	.34	.19	1																								
#5	.00	–.47	–.48	–.19	1																							
#6	–.10	.46	.14	.43	–.31	1																						
#7	.19	.12	.23	.19	–.12	.38	1																					
#8	.50	.05	.48	.02	–.19	.11	.45	1																				
#9	–.09	.68	.22	.41	–.40	.55	.21	.07	1																			
#10	.24	.23	.71	.10	–.48	.15	.20	.49	.26	1																		
#11	–.15	.49	.16	.45	–.27	.42	.13	–.05	.61	.18	1																	
#12	.01	–.36	–.41	–.18	.69	–.24	–.05	–.16	–.33	–.44	–.17	1																
#13	–.04	.44	.23	.41	–.34	.70	.39	.21	.57	.24	.43	–.28	1															
#14	.14	.20	.23	.28	–.20	.42	.54	.33	.28	.19	.22	–.10	.52	1														
#15	.45	.09	.48	.06	–.24	.10	.36	.64	.09	.50	–.02	–.20	.21	.38	1													
#16	–.04	.63	.28	.34	–.45	.48	.16	.08	.73	.32	.50	–.40	.56	.29	.21	1												
#17	.22	.24	.39	.22	–.26	.26	.24	.39	.28	.37	.21	–.21	.29	.30	.37	.36	1											
#18	–.15	.44	.09	.44	–.21	.43	.14	–.07	.52	.09	.78	–.14	.39	.26	–.04	.47	.25	1										
#19	–.03	–.43	–.40	–.12	.67	–.25	–.08	–.18	–.36	–.45	–.24	.63	–.30	–.14	–.26	–.44	–.23	–.19	1									
#20	–.07	.39	.15	.44	–.26	.55	.30	.09	.48	.12	.45	–.18	.53	.43	.10	.39	.23	.53	–.17	1								
#21	.12	.14	.14	.20	–.08	.32	.55	.29	.20	.11	.15	–.01	.34	.63	.31	.18	.22	.20	–.02	.42	1							
#22	.51	–.05	.35	–.01	–.07	.05	.38	.73	–.06	.32	–.14	–.05	.15	.35	.66	–.01	.33	–.15	–.08	.10	.40	1						
#23	–.04	.58	.33	.31	–.47	.42	.19	.12	.62	.35	.46	–.39	.45	.23	.22	.72	.35	.40	–.45	.36	.20	.07	1					
#24	.36	.17	.56	.06	–.35	.15	.34	.62	.18	.58	.08	–.27	.28	.31	.58	.27	.45	.04	–.32	.14	.23	.56	.37	1				
#25	–.12	.53	.18	.41	–.31	.48	.21	.00	.66	.17	.68	–.23	.48	.31	.07	.64	.26	.66	–.28	.53	.25	–.06	.60	.19	1			
#26	–.04	–.44	–.46	–.19	.77	–.26	–.09	–.23	–.37	–.48	–.23	.74	–.35	–.15	–.28	–.46	–.28	–.16	.75	–.22	–.02	–.13	–.46	–.39	–.26	1		
#27	.01	.35	.21	.40	–.25	.53	.37	.19	.42	.19	.39	–.20	.54	.51	.22	.37	.31	.46	–.18	.64	.46	.19	.35	.23	.49	–.23	1	
#28	.11	.22	.26	.26	–.26	.44	.67	.35	.28	.25	.20	–.14	.47	.60	.36	.28	.31	.25	–.17	.44	.65	.36	.32	.35	.33	–.19	.60	1