Construction and Factorial Validation of a Short Version of the Academic Motivation Scale

Citation

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Abstract

Academic motivation is important to students' mental health and performance. One established measure is the Academic Motivation Scale (AMS), comprising 28 items. AMS assesses intrinsic motivation, extrinsic motivation, and amotivation, which are further categorised into seven subscales. One weakness of AMS is its length. This study constructed and validated a short version of the 14-item Academic Motivation Scale (SAMS). Data from two UK university student samples were analysed to construct and validate the factorial structure. SAMS yielded adequate internal consistency, and very strong correlations with the original version of AMS in both samples. Confirmatory factor analysis on SAMS replicated the seven-factor model identified in the original AMS. SAMS can be a reliable and valid alternative to the original AMS.

Keywords: academic motivation, Academic Motivation Scale, short assessment instrument, scale construction, factorial validation

Introduction

Academic motivation - the cause of behaviours pertinent to academic performance and achievement (Usher & Morris, 2012) - is one of the most studied constructs in educational psychology (Stover, de la Iglesia, Boubeta & Liporace, 2012). Academic motivation is regarded one of the most important psychological dimensions in learning and development (Roeser & Eccles, 1998; Scheel, Madabhushi, & Backhaus, 2009). While achievement motivation (i.e., need for achievement) relates to personality traits, mainly focusing on intrinsic motivation for achievement[1] (Atkinson, 1974; McClelland, 1961), academic motivation is a more temporal psychological tendency, thus can be enhanced (e.g., Perry, Turner & Meyer, 2006; Stipek, 2002). Academic motivation generally focuses on motivation for students' learning and development, divided into intrinsic motivation, extrinsic motivation, and amotivation. The pronounced impacts of academic motivation on numerous academic outcomes have been reported. For example, high academic motivation was related to higher levels of learning effort, perceived academic support received, self-regulation, self-efficacy, confidence in academic success, and academic achievement (Alfaro & Umaña-Taylor, 2015; Gil, Bernaras, Elizalde & Arrieta, 2009; Kirkagac & Oz, 2017; Moen & Doyle, 1978; Montalvo & Torres, 2004; Pintrich, 2000; Sivrikaya, 2019; Struthers, Perry, & Menec, 2000): academic motivation accounted for 10% of variance in academic achievement in university students (Kirkagac & Oz, 2017). On the other hand, low academic motivation was associated with low achievement, higher dropout, and more difficulties in progressing one's studies (Allen, Robbins, Casillas & Oh, 2008; Campbell, 1973; Gnambs & Hanfstingl, 2016). Academic motivation was also important to students' mental health: academic motivation was a significant negative predictor for suicidal risks (i.e., depressive symptoms and suicidal

[1] The approach-avoidance model of achievement motivation is described in relation to one's intrinsic motivation: high intrinsic motivation leads to approaching a task, whereas low intrinsic motivation leads to avoidance of a task (Atkinson, 1974; McClelland, 1961).

behaviours), explaining 8% of these variables, in 658 American university students (Lee, Chang, Lucas & Hirsch, 2019). Academic motivation was also significantly related to positive attitudes towards learning, which included less anxiety and more openness (Tasgin & Coskun, 2018), and negatively related to academic procrastination (Malkoc & Mutlu, 2018) and career stress in university students (Turan, 2019). The importance and relevancy of academic motivation are not limited to students. Academic motivation in teachers and prospective teachers was related to diverse positive outcomes including academic self-efficacy of teachers and positive attitudes towards teaching (Bedel, 2016; Titrek, Cetin, Kaymak & Kasikci, 2018). Academic motivation is essential for teachers as well.

One of the most established theories for academic motivation is the self-determination theory (SDT; Kotera, Adhikari & Van Gordon, 2018a), contending that human beings' inherent tendency is to self-actualise in the social community (Deci & Ryan, 1985). SDT categorises motivation into three general types: i) intrinsic motivation (i.e., where students study because learning itself is inherently satisfying, so is a reward), ii) extrinsic motivation (i.e., where students study in order to attain a good grade or employment, therefore learning is a means to an end), and iii) amotivation (i.e. where students lack the intention to engage in academic work or engage passively; AM) (Ryan, 2012).

Further, intrinsic motivation and extrinsic motivation are categorised into six types, three types respectively (Vallerand Blais, Brière & Pelletier, 1989). Intrinsic motivation to know (IMK), is related to curiosity, exploration, intrinsic intellectuality, and autonomous learning. IMK, therefore, can be defined as the pleasure and satisfaction derived from learning, exploring, or attempting to acquire the new (e.g., a student reads a textbook for the pure pleasure of learning something new). Intrinsic motivation toward accomplishment (IMA), resonating with mastery motivation in educational research (Harter, 1981), includes individuals' engagement with their environment to feel efficacy and create unique

accomplishments (Deci & Ryan, 1991). Therefore, IMA pertains to the pleasure and satisfaction resulting from a student's attempts to accomplish or create something. For instance, a student with high IMA may work beyond what is asked, in order to feel pleasure and satisfaction during such attempts. Lastly, intrinsic motivation to experience stimulation (IMS) is activated when a student studies to experience stimulating sensations (e.g., cognitive stimulation, aesthetic experiences, and excitement). The dynamic sensation of flow and peak experience (Csikszentmihalyi, 2000) are examples of IMS. A student with high IMS may go to class to feel cognitive pleasure of active discussion with peers.

In contrast to these types of intrinsic motivation (which focus on the pleasure in the process of learning), extrinsic motivation targets the end product (Deci, 1975). The three types of extrinsic motivation can be ordered from a high to low level of self-determination - identified, introjected, and external regulation (Deci & Ryan, 1991). Identified regulation (IDR), the most self-determined type of extrinsic motivation, refers to extrinsic motives being internalised. A student with high IDR recognises the value of studying. The middle level of extrinsic motivation is introjected regulation (IJR), where a student has justified their academic work by themselves. IJR is not considered as intrinsic motivation, because it is still based on external experiences (instead of their authentic determination). An IJR-oriented student may study because they know that is what good students are supposed to do. Finally, external regulation (ER), the lowest type of extrinsic motivation, is observed when a behaviour is regulated by external instruments such as rewards and constraints. For example, a student with high ER may study because their parents tell them to do so. Table 1 summarises all types of academic motivation.

[Insert Table 1 about here]

While there have been several scales to measure academic motivation (e.g., Children's Academic Intrinsic Motivation Inventory [CAIMI, 122 items; Gottfried, 1986]; Motivated Strategies for Learning Questionnaire [MSLQ, 56 items; Pintrich & de Groot, 1990]; Achievement Emotions Questionnaire [AEQ, 222 items; Pekrun, Goetz, Frenzel, Barchfeld & Perry, 2011]), one of the most established scales is the Academic Motivation Scale (AMS; Vallerand et al., 1992). AMS addresses limitations that other scales suffer from: the validity and reliability of CAIMS are not reported; MSLQ is not based on SDT, thus does not explore intrinsic and extrinsic motivation; and AEQ does not directly assess motivation, as it assesses emotions related to motivation such as enjoyment, hope and pride. AMS directly assesses intrinsic and extrinsic motivation relating to SDT, and its validity and reliability are reported (Vallerand et al., 1992). AMS consists of 28 items, categorised into seven types of motivation, rated on a seven-point Likert scale (1= 'Does not correspond at all' to 7 = 'Corresponds exactly'). Table 2 summarises the items and subscales of AMS. AMS had satisfactory levels of internal consistency (mean $\alpha = .81$), and a confirmatory factor analysis confirmed the seven-factor structure of the AMS (Vallerand et al., 1992).

[Insert Table 2 about here]

Although AMS has demonstrated its high utility in assessing students' motivation, a shorter version has been sought to reduce time and effort to complete for students (Kotera, Conway & Van Gordon, 2019, Kotera, Conway & Van Gordon, 2018b; Kotera, Green & Van Gordon, 2018c). High response burden can lead to reduced response rates and fewer completions, hindering data quality (Diehr, Chen, Patrick, Feng & Yasui, 2005). Because the levels of intrinsic motivation and extrinsic motivation were different across disciplines (Maurer, Allen, Gatch, Shankar & Sturges, 2014), the initial model of the short version of the AMS (Short Academic Motivation Scale [SAMS]) was constructed first in UK university students

majoring in business. A second sample of UK university students majoring in healthcare was used to cross-validate SAMS.

It is acknowledged that there is an ongoing debate on whether motivation can be accurately measured with a self-report scale such as SAMS (Schultheiss & Brunstein, 2001), due to inherent social desirability bias (Latkin, Edwards, Davey-Rothwell & Tobin, 2017). This explains why implicit motive (based on the two-motive model, a similar motivation model to SDT [McClelland, Koestner & Weinberger, 1989][2]) research often employs methods other than self-report measures, such as thematic apperception tests (Schultheiss & Brunstein, 2001) and picture-story tests (Brunstein, Schultheiss & Grassman, 1998). However self-report measures have their own strengths, including high feasibility and practical usefulness (Harley, 2016) which are particularly helpful in today's fast-moving education settings (Schellings & Van Hout-Wolters, 2011).

Methods

Population

The first sample comprised 300 undergraduate business students (164 males, 134 females, and 2 transgenders; M_{age} = 20.78, SD_{age} = 4.60, RNG_{age} = 18-57 years old; 214 Britons, 59 other Europeans, 13 Asians, 11 Africans, one North American, South American, and Aseanian) at a university in the Midlands region of the UK. The second sample comprised 320 undergraduate healthcare students (278 females, and 42 males; M_{age} = 29.31, SD_{age} = 9.09, RNG_{age} = 18-58 years old; 286 Britons, 15 other Europeans, 12 Africans, 5 Asians, and 2 North Americans) at a university in the Midlands region of the UK.

[2] Difference between the two-motive model and SDT includes that the two-motive model considers power over others, while SDT considers autonomy, namely power over oneself (Schuler, Brandstatter & Sheldon, 2013). Implicit motives were stimulated by nonverbal signals and related to non-declarative behaviours, while explicit motives were aroused by verbal signals and related to declarative behaviours (Schultheiss, 2001, 2008).

Recruitment

Students were recruited through opportunity sampling with research flyers and announcement distributed by programme tutors.

Ethics

Ethical approval was granted by the university's research ethics committee. No participation incentive was awarded. Informed consent was obtained from all participants included in the study. The privacy rights of human subjects were observed: only anonymous data were collected.

Analyses

After data screening for outliers and the assumptions of parametric tests, correlation analysis was conducted to identify two items from each subscale., Additionally, i) the internal consistencies, ii) correlations between the same subscales, and iii) gender differences in each subscale in AMS and SAMS were compared in 300 business students. The seven-factor model, reported in AMS was tested using confirmatory factor analyses (CFAs), and cross-validation referring to the internal consistencies was conducted in 320 healthcare students.

Results

Construction of the SAMS with Business Students

None of the 28 items in the AMS was deemed to have severe non-normal distribution, assessed from the skewness (< 2) and kurtosis (< 7) values (Fabrigar, Wegener, MacCallum & Strahan, 1999). The initial version of SAMS was constructed with business students. First, two items from each of the same seven AMS subscales (total 14 items) were selected based on the strength of correlations with the intended subscale of the AMS, ensuring that the short

version would be correlated with the original version, and the chosen items would represent their intended subscale (Stöber & Joormann, 2001). In order to reduce the risk of suboptimal domain coverage (Thompson, 2007), the descriptions of the chosen items were reviewed to capture the meaning of the original subscale. The 14 selected items, and their correlations with subscales of SAMS are listed in Table 3.

[Insert Table 3 about here]

Each individual item in SAMS displayed a correlation with its relevant subscale between .74 and .88, indicating 'strong (≦ .60)' to 'very strong (≦ .80)' correlations (Evans, 1996).

Internal consistencies for the AMS subscales ranged between .77 and .86, and SAMS ranged between .63 and .85, demonstrating 'acceptable (≦ .60)' to 'high (≦ .80)' reliability (Griethuijsen et al., 2014; Raes, Pommier, Neff & Van Gucht, 2011) (Table 4).

[Insert Table 4 about here]

Correlations between the same subscales for the original AMS and SAMS were very strong (Evans, 1996): r =.93 for IMK, r = .91 for IMA, r = .89 for IMS, r = .88 for EID, r = .90 for EIJ, r = .89 for ER, and r = .94 for AM. Further, we compared the male-female gender differences between AMS and SAMS, through an analysis of variance (Vallerand et al., 1992). The significant differences were found in the same subscales: identified regulation (p = .01 for AMS, and p = .02 for SAMS) and amotivation (p < .00 for both AMS and SAMS). Female students scored higher in the identified regulation, and lower in amotivation than male students.

Replication and Factorial Validation with Healthcare Students

As reported with the original AMS, model fit for the seven-factor model was tested, using CFAs with RStudio version 1.1.463 (RStudio Team, 2015) with 320 healthcare students. The goodness of fit of the models was examined using the chi-squared to degrees of freedom ratio (χ^2/df), the comparative fit index (CFI), the Tucker-Lewis Index (TLI), the root mean square error of approximation (RMSEA), and the standardised root mean residual (SRMR). All the assessment values indicated an adequate to good fit: $\chi^2 = 165.196$ (df = 56, $p < .000$), $\chi^2/df = 2.94$ (i.e., < 5 indicating an acceptable fit; Watkins, 1989), CFI = .94, TLI = .901 (i.e., > .90 indicating an acceptable fit; Hu & Bentler, 2009), RMSEA = .078 (i.e., < .08 indicating an acceptable fit; Hu and Bentler, 1999), SRMR = .051 (i.e., < .06 indicating a good fit; Hu & Bentler, 2009). Figure 1 shows the factor structure (correlation matrices among the latent variables and factor loadings) of the seven-factor model in SAMS.

[Insert Figure 1 about here]

Further, cross-validation was conducted with the healthcare students. Though the internal consistencies of SAMS were lower than the original version of AMS (SAMS ranged from .61 to .85, whereas AMS ranged from .76 to .91), all the SAMS subscales had 'acceptable (≦ .60)' to 'high (≦ .80)' reliability (Griethuijsen et al., 2014; Raes et al., 2011) in this healthcare student sample too (Table 5).

[Insert Table 5 about here]

As in business students, among healthcare students, correlations between the same subscales for the original AMS and SAMS were very strong (Evans, 1996): r =.94 for IMK, r = .93 for

IMA, r = .93 for IMS, r = .89 for EID, r = .94 for EIJ, r = .92 for ER, and r =.94 for AM. Table 6 summarised correlations between the same subscales for the original AMS and SAMS in both healthcare and business students.

[Insert Table 6 about here]

Discussion

The present study, aiming to develop a short version of the AMS (Vallerand et al., 1992), revealed that i) the short version of AMS (SAMS) had very strong correlations with the original AMS, ii) though slightly lower than the original AMS, the internal consistencies of SAMS were adequate to high, iii) the seven-factor model was replicated in SAMS using CFAs, and iv) very strong correlations between AMS and SAMS, and adequate to high internal consistencies of SAMS were found in both of the samples (business students and healthcare students). These key findings suggest that the short version of AMS (SAMS) can be an efficient and participant-friendly alternative for assessing academic motivation. Academic motivation is an important construct for students' functioning and academic success (Gil et al., 2004; Pintrich, 2000; Usher & Morris, 2012). High intrinsic motivation was associated with good mental health, low shame, and ethical judgement, while high extrinsic motivation was related to poor mental health, high shame (a significant predictor of poor mental health), and unethical judgement (Kotera et al., 2018a, 2019). Poor mental health of students has been increasingly highlighted in the UK (Brown, 2018) and other countries (e.g., Dahlin, Nilsson, Stotzer & Runeson, 2011; Ohnishi, Koyama, Senoo, Kawahara & Shimizu, 2016). Likewise, the criticality of ethical education in higher education has been noted (Ahmed, Chung & Eichenseher, 2003; Iorga, Ciuhodaru & Romedea, 2013). Academic motivation, therefore, will be of greater importance, indicating the high utility of SAMS in future research.

However, we should be aware that the participants of the present study were recruited from one university, hindering the generalisability of the findings. More comprehensive data collection is needed. Moreover, the internal consistencies for the introjected regulation in both of the samples were low. This was similar to the original AMS. While noting that a common cut-off Cronbach's alpha (e.g., $\alpha = .70$) is a rule of thumb (i.e., it is not based on empirical research or logical reasoning; Hoekstra, Vugteveen, Warrens & Kruyen, 2018), and Cronbach's guideline (1951) states that i) a high alpha value is desirable in an individual score, and ii) the more essential quality than alpha is the meaningfulness of the scores, a reconsideration of this subscale (and corresponding items) may be needed. Relatedly the lower internal consistencies of the subscales in SAMS than AMS may be due to reduced comprehensiveness, as seen in other shorter scales (e.g., Raes et al., 2011). Furthermore, as implied in studies about implicit motive (e.g., Schultheiss & Brunstein, 2001), future studies employing SAMS will still suffer from the social desirability biases for it being a self-report measure (Latkin et al., 2017). For example, students who know correlations between extrinsic motivation and unethical judgements (Kotera et al., 2018b) may purposefully mark low numbers for items corresponding to extrinsic motivation. Lastly, as this study focused on the psychological aspects of academic motivation, it did not consider many other socio-cultural factors that could affect academic motivation (e.g., family's socioeconomic status, family relationship, culture and ethnicity; Chen, Kong, Gao & Mo, 2018; Iski et al., 2018; Maehr, 1974), which have been poorly examined to date. For example, survey classifying students into broad groups to compare scores across these groups (e.g., Asian, Black, Hispanic, White) can promote an idea that these groups are monolithic, ignoring variances within the group (Urdan & Bruchmann, 2018). These socio-cultural factors need to be carefully examined in future motivation research (Urdan & Bruchmann, 2018). For example, in the UK, inclusivity of education has been progressed, however there are still challenges to be overcome such as

inclusivity for students with disabilities and female students pursuing a subject that is underrepresented by women (Equality and Human Rights Commission, 2018). Motivation research needs to be aware of such diversity, and the participant-friendly tools such as SAMS may be helpful.

The Academic Motivation Scale (AMS) is one of the most established measures to assess students' academic motivation. However, the original 28-item version requires a great amount of time and effort of students, which can reduce the quality of responses as answer fatigue occurs. As the mental health and wellbeing of university students have been a focus in many countries, the shorter form of AMS has been sought, in order to assess motivation, but without the same time requirements needed for the AMS. This study recruited UK business and healthcare students and reported promising results supporting the use of the short version of AMS (SAMS), comprising 14 items. SAMS can be used as an efficient and student-friendly measure to assess students' academic motivation.

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