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THE ACADEMIC MOTIVATION SCALE (AMS): FACTORIAL STRUCTURE, INVARIANCE, AND VALIDITY IN THE ITALIAN CONTEXT

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The main purpose of this study was to validate an Italian version of the Academic Motivation Scale (AMS). A sample of 618 high school students completed the Italian translation of the AMS, also indicating their intentions to persist in versus drop out of school and their performance in a series of exams. Results of a confirmatory factor analysis confirmed the five-factor structure of the AMS and showed factorial invariance across gender and types of schools. The Italian version of the AMS had satisfactory levels of internal consistency and the correlations among the AMS subscales were consistent with the simplex pattern hypothesized by the Self-Determination Theory (SDT). In addition, the relationships between the AMS scores and the two measured motivational consequences were confirmed. In sum, the present findings provide adequate support for the factorial validity and reliability of the AMS and support its use in educational research on motivation.

INTRODUCTION

Self-Determination Theory (SDT) claims that individuals have a psychological need for autonomy (i.e., the perception of being the source of one's own behavior; Deci & Ryan, 2002) and that there are different styles of regulation for student academic motivation which reflect differences in their relative levels of autonomy. These types of regulation can be placed along a self-determination continuum ranging from amotivation to extrinsic motivation to intrinsic motivation (Deci & Ryan, 2000) where it is possible to identify six states which differ from the theoretical, functional, and experiential point of view.

Amotivation is considered the lowest level of autonomy on the continuum of motivational styles. Individuals who are amotivated lack an intention to act (Ryan & Deci, 2000): they are neither intrinsically nor extrinsically motivated and they believe their actions are the result of something that is beyond their control (Vallerand et al., 1992). Following amotivation, *externally regulated* motivation is the second least self-determined behavior which is performed to satisfy an external demand or obtain an externally imposed reward contingency (Deci & Ryan, 1985). Moving upward along the continuum, *introjected regulation* behaviors are controlled by internal

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reward/punishment contingencies, such as ego enhancement, guilt, or anxiety (Deci & Ryan, 2000).

Further along the continuum, *identified regulation* is a more autonomous, or self-determined form of extrinsic motivation, and entails the person attributing personal importance to the behavior. The most autonomous form of extrinsic motivation is *integrated regulation*, which occurs when identified regulations have been assimilated to the self (Deci, Vallerand, Pelletier, & Ryan, 1991). This form of extrinsic motivation is different from intrinsic motivation, because it is still instrumental rather than pursued for pleasure or personal satisfaction (Deci & Ryan, 2000, p. 237). At the top of the continuum is *intrinsic motivation* which is the most self-determined form of behavior. This type of regulation refers to "doing an activity for its inherent satisfactions rather than for some separable consequence" (Deci & Ryan, 2000, p. 3).

One of the most frequently used scales to measure the regulation of motivation according to self-determination theory is the Academic Motivation Scale (AMS; Vallerand et al., 1992, 1993). This scale was validated with various populations including English- and French-speaking students, from high school to university levels, and it was also tested for factorial invariance across gender and across time (Grouzet, Otis, & Pelletier, 2006). Although the original version of the AMS (Vallerand et al., 1992, 1993) consisted of seven subscales, four of which reflecting different types of extrinsic motivation and three distinguishing between forms of intrinsic motivation, more recent studies (e.g., Grouzet et al., 2006; Otis, Grouzet, & Pelletier, 2005; Ratelle, Guay, Larose, & Senecal, 2004) considered only one dimension of intrinsic motivation (intrinsic motivation to know) and therefore assessed five subscales instead of seven. Each subscale consisted of four items, and each item was a possible response to the questions "Why do you go to high school?" The subscales reflected Amotivation (e.g., Honestly, I don't know; I really feel that I am wasting my time in school), External Regulation (e.g., In order to obtain a more prestigious job later on), Introjected Regulation (e.g., Because of the fact that when I succeed in school I feel important), Identified Regulation (e.g., Because I think that a high-school education will help me better prepare for the career I have chosen), and Intrinsic Regulation (e.g., Because I experience pleasure and satisfaction while learning new things).

Internal consistency for the five subscales assessed during the development of the AMS ranged from .60 to .86 (Vallerand et al., 1992, 1993), and from .76 to .86 in a study with a large English-speaking sample (Fairchild, Horst, Finney, & Baron, 2005). Construct validity was investigated through the examination of the scale simplex structure, which should represent the self-determination theory continuum (e.g., Ryan & Connell, 1989). Specifically, according to Vallerand et al. (1993), adjacent subscales should have stronger positive correlations than subscales farther apart (e.g., External Regulation should be more positively correlated with Introjected Regulation than with Identified Regulation), and scales farthest apart should have the strongest negative relationships (e.g., the Amotivation subscale should have the strongest negative correlations with Intrinsic Motivation). Considering the five-factor AMS, some support for the simplex structure was found in Vallerand et al. (1993), in Cokley (2000), and in Fairchild et al. (2005).

Support for the construct validity of the scale was also found through the examination of correlations between the AMS subscales and various motivational consequences such as cognitive consequences (concentration while studying), affective consequences (psychological well-being in the classroom), behavioral consequences (behavioral intentions of continuing schooling), and school performance (self-reported grades) (Vallerand et al., 1993). Moreover, Fairchild and colleagues (2005) investigated the relationships between AMS scores and the scores from other

motivation and goal-orientation measures, and found some evidence for convergent and discriminant validity. Finally, from a measurement point of view, results from a recent study (Grouzet et al, 2006) showed good longitudinal cross-gender factorial invariance in the AMS.

On the whole, these results suggested that the AMS constituted a valid and useful scale to measure academic motivation according to the multidimensional perspective of SDT. The AMS was never validated with Italian-speaking students, although Deponte and Kodilja (2006) proposed an AMS adaptation to measure motivation toward field training in undergraduate students. Furthermore, Dazzi and Pedrabissi (2006) proposed an alternative measure for the evaluation of academic motivation consistent with the Self-Determination Theory framework. Moreover, the AMS was never tested for factorial invariance across gender and school type in a European context. In the present study the psychometric properties of an Italian version of the AMS were evaluated in a sample of high school students. More specifically, the purpose of this study was four-fold: 1) to evaluate the five-factor model of academic motivation and to estimate the internal consistency of the scores; 2) to test for factorial invariance across gender and types of schools (in Italy, there are several types of high schools which differ by academic content and orientation; in particular, we considered general high schools — "Licei", International Standard Classification of Education, level 3A; UNESCO, 1997 —, a class of general high school oriented toward the study of the arts and sciences, and vocational high schools — "Istituti Professionali", ISCED, level 3B; UNESCO, 1997 —, oriented toward more practical subjects thus enabling students to start searching for a job as soon as they have completed their secondary education); 3) to evaluate the correlations among the AMS subscales to assess the simplex pattern hypothesized by Vallerand et al. (1993); specifically, adjacent subscales should have stronger positive correlations than subscales that are farther apart, and the scales that are the farthest apart should have the strongest negative relationships; 4) finally, we also investigated the relationships between the AMS scores and two of the motivational consequences assessed by Vallerand et al. (1993); more specifically, a sizeable positive relationship ($r > .30$) between AMS scores and (a) behavioral intentions of continuing schooling, and (b) school performance (self-reported grades) was expected.

Participants

The participants in this study came from one general high school (ISCED, level 3A; UNESCO, 1997) and one vocational high school (ISCED, level 3B; UNESCO, 1997) located in Grosseto, Tuscany. After listwise deletion of missing data, data from 603 students in grades 9-13 were accepted for analysis. Sixty-seven percent of the participants came from general high school, 46% were males, with a mean age of 16.30 ($SD = 2.10$) while females' mean age was 16.40 ($SD = 2.30$).

MEASURES

Academic Motivation Scale (AMS)

The AMS (Vallerand et al., 1992, 1993) consisted of five subscales assessing amotivation, external regulation, introjected regulation, identified regulation, and intrinsic motivation. Each scale included four items which were possible responses to the question "Why do you go to

high school?" Response choices for each item were rated on a 5-point Likert scale from 0 (*does not correspond at all*) to 7 (*corresponds exactly*). The items can be found in Vallerand et al. (1992). The AMS was translated from English into Italian by the authors and then back-translated by a graduate student fluent in English and Italian. Independent judges then considered the equivalence of the original and the back-translated versions of the scales and measures. After discussing instances of nonequivalence, the final editing was completed.

Intentions to Persist versus Drop Out

We assessed intentions to persist in, versus drop out of, school with the same three items used by Hardre and Reeve (2003), namely: "I sometimes consider dropping out of school," "I intend to drop out of school," and "I sometimes feel unsure about continuing my studies year after year." The first two items were also used in the Vallerand, Fortier, and Guay (1997) investigation and they correlated highly with one another, predicted actual drop out behavior one year later, and were sensitive to students' motivational states. We asked these items using a 7-point Likert scale ranging from 1 (*not at all*) to 7 (*very much so*). The three-item measure increased both the scope and reliability of our outcome measure ($\alpha = .84$).

School Performance and Demographic Variables

The measure of school performance in this study was the students' self-reported grades on their performance in three subjects: Italian, Second language, and Mathematics. Strong evidence exists that self-reported school grades are accurate reflections of the school grades actually obtained (Battin-Pearson et al., 2000; Herman, Dornbusch, Herron, & Herting, 1997).

Participants were asked to report on their age, gender, and grade level.

Procedure

Study participants completed the described measures in class at the end of the school year. Students were informed that we were interested in understanding the reasons why they went to school. The questionnaire was completed anonymously and no compensation was given for participation.

RESULTS

Factor Analyses of the Italian Version

We performed confirmatory factor analysis using AMOS 6.0 (Arbuckle, 2005). Confirmatory factor analysis (a) allows the researcher to see how well data fit a particular theoretical model (i.e., fitting data to a priori specified models), (b) forces researchers to be precise in defin-

ing constructs (Thompson, 1997), and (c) rewards parsimony (Thompson, 1997). In this case the theoretical model consisted of five correlated factors, constituting an oblique model.

Multiple indices of fit were assessed in support of the model. The χ^2/df ratio was included as an absolute fit index, with acceptable scores on the chi square, adjusted for degrees of freedom, defined as smaller than five (Wheaton, Muthèn, Alwin, & Summers, 1977). We considered two incremental fit indices, the Tucker-Lewis index (TLI; Bentler & Bonett, 1980) and the incremental fit index (IFI; Bollen, 1989), with values close to .95 being indicative of good fit (Hu & Bentler, 1999). We also included the comparative fit index (CFI; Bentler, 1990) with values greater than .90 considered a good fit (Byrne, 2001). Finally, we considered the root mean square error of approximation (RMSEA; Steiger, 1990). Values below .05 indicated good fit and values as high as .08 represented reasonable errors of approximation in the population (Browne & Cudeck, 1993). The model we tested had goodness-of-fit indexes as follows: $\chi^2 = 530.24$ ($df = 160$), $p = .01$, $\chi^2/df = 3.30$, TLI = .93, IFI = .94, CFI = .94, RMSEA = .06. The five correlated factor model seemed to fit the data reasonably well. See Table 1 for the standardized regression coefficients.

TABLE 1

Standardized regression weights, measurement errors, and correlations between factors from the CFA

Items	Factors	Standard Regresssion Weights	Standard Measururement Errors
Honestly, I don't know; I really feel that I am wasting my time in school.	Amotivation	.77	.41
I once had good reasons for going to school; however, now I wonder whether I should continue.	Amotivation	.60	.64
I can't see why I go to school and, frankly, I couldn't care less.	Amotivation	.90	.19
I don't know; I can't understand what I am doing in school.	Amotivation	.90	.19
Because I need at least a high-school degree in order to find a high-paying job later on.	External Regulation	.52	.73
In order to obtain a more prestigious job later on.	External Regulation	.79	.38
Because I want to have "the good life" later on.	External Regulation	.85	.28
In order to have a better salary later on.	External Regulation	.85	.28
To prove to myself that I am capable of completing my high-school degree.	Introjected Regulation	.75	.44
Because of the fact that when I succeed in school I feel important.	Introjected Regulation	.65	.58
To show myself that I am an intelligent person.	Introjected Regulation	.85	.28
Because I want to show myself that I can succeed in my studies.	Introjected Regulation	.88	.23
Because this will help me make a better choice regarding my career orientation.	Identified Regulation	.77	.41
Because eventually it will enable me to enter the job market in a field that I like.	Identified Regulation	.65	.58
Because I think that a high-school education will help me better prepare for the career I have chosen.	Identified Regulation	.72	.48
Because I believe that my high school education will improve my competence as a worker.	Identified Regulation	.72	.48
Because I experience pleasure and satisfaction while learning new things.	Intrinsic Regulation	.85	.28

(*table continues*)

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Table 1 (continued)

Items	Factors	Standard Regresssion Weights	Standard Measururement Errors
For the pleasure I experience when I discover new things never seen before.	Intrinsic Regulation	.85	.28
For the pleasure that I experience in broadening my knowledge about subjects which appeal to me.	Intrinsic Regulation	.75	.44
Because my studies allow me to continue to learn about many things that interest me.	Intrinsic Regulation	.71	.50

Factors	Factors	Correlations
Amotivation	External Regulation	−.003
Amotivation	Introjected Regulation	−.10*
Amotivation	Identified Regulation	−.39***
Amotivation	Intrinsic Regulation	−.36***
External Regulation	Introjected Regulation	.52***
External Regulation	Identified Regulation	.58***
External Regulation	Intrinsic Regulation	.12
Introjected Regulation	Identified Regulation	.55***
Introjected Regulation	Intrinsic Regulation	.55***
Identified Regulation	Intrinsic Regulation	.60***

Note. Standardized estimates for measurement errors are proportions of unexplained variance.
*** $p < .001$; * $p < .05$.

TABLE 2
Equivalence of the factor structure of the scales across different subgroups

Subgroup Comparison	Baseline Model	Nested Model (measurement weights and covariances)	$\Delta \chi^2/df$	Δ CFI
Men vs. Women				
χ^2/df	724.018 (320)	829.244 (350)	105.226 (30) $p < .01$	.009
CFI	.935	.926		
RMSEA	.046	.048		
General high school vs. Vocational high school				
χ^2/df	729.070 (320)	830.124 (350)	101.054 (30) $p < .01$	.001
CFI	.936	.925		
RMSEA	.046	.048		

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Scale means, standard deviations, and coefficient alphas for the sample are displayed in Table 3. Cronbach's coefficient ranged from .81 (Identified Regulation) to .87 (Intrinsic Regulation). Findings were consistent with those of Vallerand et al. (1992) and Fairchild et al. (2005). These results provided support for the internal consistency of scores from the AMS.

TABLE 3
Reliability, means, standard deviations, and correlations for the five AMS subscales

	Subscale	Amotivation	External Regulation	Introjected Regulation	Identified Regulation	Intrinsic Regulation
Alpha		.86	.83	.85	.81	.87
Mean		7.88	20.16	16.68	21.51	18.31
SD		4.88	5.49	5.89	4.82	5.35
	Amotivation	1.00				
	External Regulation	.004	1.00			
Correlation	Introjected Regulation	−.11*	.46***	1.00		
	Identified Regulation	−.36***	.50***	.49***	1.00	
	Intrinsic Regulation	−.39***	.11	.50***	.52***	1.00

*** $p < .001$; *$p < .05$.

Correlations among the AMS Subscales

To address the third purpose of the study, we investigated the correlations between the AMS subscales (Table 3). To support the simplex pattern, stronger relationships should be found between adjacent types of motivation than between types farther apart on the continuum. In addition, Amotivation and Intrinsic Motivation should display a negative correlation with one another as they anchor the opposite ends of the continuum. The correlations largely supported the simplex pattern, with only one deviation from the theorized relationships: External Regulation displayed a slightly stronger positive relationship with Identified Regulation than with Introjected Regulation. This deviation was also present in the subscales correlation matrices of preceding studies (e.g., Vallerand, 1993; Fairchild, 2005).

Relationship between AMS Scores and Motivational Consequences

Support for the simplex pattern allowed the computation of an overall Relative Autonomy Index (RAI) to reduce the number of variables needed to represent the different types of motivation (Grolnick & Ryan, 1987). To do so, a different weight was allocated to each subscale, with the autonomous subscales having positive weights and the nonself-determined subscales having negative weights. This study used the approach of Vallerand and Ratelle (2002), where a

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weight of +2 was awarded to the Intrinsic Motivation subscale because this construct represented the highest level of self-determination; a weight of +1 was assigned to the Identified Regulation subscale; a weight of –1 was allocated to the External Regulation subscale; and a weight of –2 was awarded to the Amotivation subscale, because it represented the lowest level of self-determination. According to Vallerand and Ratelle (2002) the Introjected Motivation subscale was not considered in computing the RAI. Multiplying the score for each subscale by its corresponding weight and adding all the products yielded an index for the individual's self-determined motivation. In this way the final RAI measure served as an indicator of a person's overall motivational orientation with positive scores representing more autonomous regulation and negative scores representing more controlling regulation. To investigate the hypothesized relationships between the AMS and the measured motivational consequences hypothesized by Vallerand et al. (1993) Pearson's correlations between RAI scores and criterion-related variables were computed. As hypothesized, both self-reported grades and intentions to persist in school were positively correlated with RAI, with $r = .40$ and $r = .58$, respectively.

DISCUSSION

The main goals for this study were to validate the factorial structure of the Italian translation of the AMS, test the factorial invariance for gender and types of schools, assess the simplex pattern between the subscales, and evaluate relationships with criterion-related variables.

First, the results of this study show that the five-factor structure that underlies the AMS was replicated in a high school student sample with the Italian translation. The fit indices show that the five-factor model is appropriate to explain Italian data. Additionally, all the AMS subscales show good internal consistency. According to previous studies (Cokley, Bernard, Cunningham, & Motoike, 2001; Fairchild et al., 2005; Vallerand et al., 1992, 1993), the Identified Regulation subscale is the least reliable of the subscales, although its alpha is good (.81).

Second, the test for factorial invariance reveals the presence of invariance across factor pattern coefficients and factor covariances for males and females and for general high schools and vocational high schools. This result confirms the factorial cross-gender invariance of the AMS (Grouzet et al., 2006) and provides some evidence for the applicability of the scale to different types of high schools.

Third, correlations between the five AMS subscales reveal a pattern consistent with the self-determination continuum where adjacent subscales have stronger positive correlations than subscales farther apart, and scales farthest apart have the strongest negative relationships.

Fourth and finally, correlations among the RAI and variables related to motivational consequences lead to a pattern of results consistent with predictions from Self-Determination Theory (Deci & Ryan, 2002). As Paunonen and Ashton (1998) suggested, showing the predictive utility of an imported measure is one of the best ways of demonstrating the cultural applicability of an imported scale.

The value of the AMS is that it allows the study of extrinsic and intrinsic motivation according to the multidimensional perspective of the SDT. Results of the present study provide support for the factor structure, the factor invariance, the reliability, and the predictive validity of the Italian version of the AMS. This translated version of the AMS appears to capture the original

constructs fairly well in the Italian context, and, therefore, researchers may find this measure useful in empirical models which incorporate both determinants and consequences of academic motivation.

Some limitations in the present study should be underlined, though. Primarily that the relationships between the AMS scores and motivational consequences were investigated in a cross-sectional design. A longitudinal design would allow one to study the long-term effects of self-determination. A second shortcoming is the exclusive use of self-report measures which could have introduced sources of potential bias into the results; therefore, it would be useful for future research to include more objective measures of academic performance and student behavior. Finally, for the purpose of this study, only motivational consequences were included. Future research in the Italian context may benefit from using the AMS in empirical models also integrating determinants of self-determination in a more complete model of student academic motivation.

NOTE

1. Although the fit of this multigroup model was acceptable (see Cheung and Rensvold, 2002), the chi square difference test between the constrained model and the unconstrained baseline model indicated that the factor loadings were not fully equivalent across the samples. Differences on various parameters were assessed based on the results of the Lagrange multiplier (LM) test, which suggests that cross-group equality constraints could be released to improve model fit. Examination of the univariate and multivariate LM tests for releasing constraints suggested that one of the 20 constraints could be released to improve model fit, both in the men vs. women and in the general high school vs. vocational high school multigroup models. In the first case, the nonequivalent item tapped in the External Motivation factor. The item stated "Because I need at least a high-school degree in order to find a high-paying job later on." There is a stronger relationship between this item and the Amotivation factor in general high school students compared with the vocational high school sample. The nonequivalent item in the analysis considering men vs. women stated "Because of the fact that when I succeed in school I feel important". This item tapped into the Introjected Regulation factor. There is a stronger relationship between this item and the External Regulation factor for male students than for females.

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