

## Developing Mathematics Motivation Scale for the United Arab Emirates

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The objective of this study was to develop a valid and reliable mathematics motivation scale (MMS) for UAE students in grades 4 through 12 based on the self-determination theory. A total of 1,481 students (713 boys and 768 girls) from the UAE participated in this study. The process of developing the MMS involved: a) Development of an initial item pool, b) investigating the item-type of motivation membership, c) examining the appropriateness of the administration instructions and the items phrasing, d) and exploring various types of validity and reliability of the MMS. The results indicate that the MMS has acceptable levels of content validity and structure validity. The results also provided evidence that the MMS has acceptable levels of internal consistency and temporal stability.

Keywords: Motivation, Mathematics, Self-determination, Reliability, Validity, Intrinsic, Extrinsic, Amotivation.

### تطوير مقياس للدافعية في تعلم الرياضيات لدولة الإمارات العربية المتحدة

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المنطقة التعليمية لولاية وسكانسن - الولايات المتحدة الأمريكية  
 و عثمان السواعي وعبدالعزیز السرطاوي وإيمان الغزو وسناء طيبي  
 جامعة الإمارات العربية المتحدة، الإمارات العربية المتحدة

هدفت هذه الدراسة الى تطوير مقياس للدافعية في تعلم الرياضيات حسب نظرية التقرير الذاتي للطلبة في الإمارات العربية المتحدة. تكونت عينة الدراسة من ١٤٨١ طالبا وطالبة من الصف الرابع الابتدائي وحتى الصف الثاني عشر، وتضمنت عملية تطوير المقياس ما يلي: تطوير عينة من الفقرات، التحقق من انتماء الفقرات لنمط الدافعية التي استهدفت قياسه، التحقق من ملاءمة تعليمات التطبيق وصياغة الفقرات، وكذلك التحقق من اشكال مختلفة من الصدق والثبات للمقياس. أشارت النتائج الى تمتع المقياس بدلالات عالية من صدق المحتوى والبناء. كما عبرت معاملات الاتساق الداخلي ومعاملات استقرار الدرجات عن تمتع المقياس بدرجة مقبولة من الثبات.

الكلمات المفتاحية: الدافعية، رياضيات، تقرير الذات، الثبات، الصدق، الدافعية الداخلية والخارجية، واللدافعية.

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Motivation is considered a critical factor in understanding human behavior and has been extensively investigated. Mayer, Faber, and Xu (2007) documented that thousands of motivation studies were conducted in western cultures. Unfortunately, there is a lack of research regarding motivation in the Arab world in general and more specifically in the United Arab Emirates (UAE). The purpose of this study was to develop a valid and reliable scale that measures students' motivation in mathematics in the UAE.

Psychologists, educators, and researchers have utilized numerous theoretical approaches to improve understanding of academic motivation; the self-determination theory (SDT) is one of these approaches. The SDT generated ample studies that demonstrate the association between self-determined motivation and different educational outcomes (Deci et al., 1991; Vallereand et al., 1992; Ryan & Deci, 2000; Vansteenkiste, Lens, & Deci, 2006; Ahmed & Bruinsma, 2006; Um, Corter, & Tatsuoka, 2005; Lepper, Corpus, & Iyengar, 2005; Shih, 2008).

The SDT postulates that motivation is not a unitary phenomenon (Ryan & Deci, 2000). Motivation varies in quantity (level or amount) and quality (type or kind) among people (Vansteenkiste et al., 2006). The SDT researchers postulate that there are three distinct types of motivation: Intrinsic, extrinsic, and amotivation (Deci et al., 1991; Vallereand et al., 1992; Ryan & Deci, 2000; Vansteenkiste et al., 2006).

### **Intrinsic motivation**

Intrinsic motivation involves exhibiting behavior willingly without internal or external pressure or seeking separable consequences (Vallerand et al., 1992). The behavior is exhibited for itself and the reward or satisfaction derives from the behavior itself.

### **Extrinsic motivation**

Extrinsic motivation involves exhibiting behavior because of internal or external pressure seeking separable consequences from the behavior. The behavior is not performed for its own sake but rather as a means to an end. Furthermore, the researchers have confirmed

three types of extrinsic motivation: Identified regulation, introjected regulation, and external regulation (Vansteenkiste et al., 2006). These types of motivation vary in their degree in relation to self-determination or autonomy (Vansteenkiste et al., 2006).

External regulation involves exhibiting behavior to obtain a reward or avoid punishment. The behavior is instrumental to obtain separable consequences from the behavior itself. External variables regulate the behavior; the reasons for exhibiting the behavior has not been internalized at all; and the locus of causality is externally perceived (Vansteenkiste et al., 2006).

Introjected regulation involves exhibiting behavior in response to internal pressure related to self-aggrandizement or avoidance of guilt or shame (Cokley, 2000; Cokley, Bernard, Cunningham, & Motoike, 2001). The reasons for exhibiting the behavior have been partially internalized and the locus of causality is externally perceived (Ryan & Deci, 2000).

Identified regulation involves exhibiting behavior for the value of the behavior itself. The student identifies with the reasons for exhibiting the behavior as his or her own and exhibits the behavior volitionally (Deci et al., 1991). The reasons for exhibiting the behavior have been internalized; and the locus of causality is internally perceived (Ryan & Deci, 2000).

### **Amotivation**

Amotivation refers to the absence of the intent to engage in an activity as a result of perception of incompetence and loss of control (Ryan & Deci, 2000). Amotivated students do not perceive contingencies between their behaviors and the outcomes. Amotivated students are autonomy is as follows:

Intrinsic→identified regulation→ introjected regulation→ amotivation (Vallerand et al., 1992; Cokley, 2000; Cokley et al., 2001; → The motivational continuum of the SDT from the most to least self-determination or external Fairchild et al., 2005; Ryan & Deci, 2000; Vansteenkiste et al., 2006). neither extrinsically nor intrinsically motivated.

**Table 1**  
**Sample Distribution (N = 1481)**

Gender			Grade									Total
			4	5	6	7	8	9	10	11	12	
Male	District	Al-Ain	43	62	16	22	19	25	24	24	19	254
		Dubai	39	44	22	24	23	25	21	25	21	244
		Fujarah	21	23	24	28	29	29	20	22	19	215
		Total	103	129	62	74	71	79	65	71	59	713
Female	District	Al-Ain	49	100	23	19	21	25	20	25	22	304
		Dubai	46	46	29	24	25	23	27	20	18	258
		Fujarah	22	22	21	25	22	26	27	22	19	206
		Total	117	168	73	68	68	74	74	67	59	768
Total												1481

The purpose of this study was to develop a valid and reliable scale that measures students' motivation in mathematics in the UAE based on the self-determination theory.

## METHOD

### Participants

A total of 1481 students (713 boys and 768 girls) from UAE participated in this study. The sample was selected using the following cluster-sampling method: first, three school districts were selected randomly from the UAE's 10 school districts. The three districts selected were Al Ain (304 girls & 254 boys), Dubai (258 girls & 244 boys), and Fujarah (206 girls & 215 boys). Second, schools from each district were selected randomly. Third, some classes were selected randomly from each school, and finally, the students from the selected classes who volunteered to participate in the study were included in the sample. Table 1 shows the distribution of participants according to school district, grade, and gender.

### Instrument

The objective of this study was to develop a scale that measures motivation in mathematics based specifically on the theoretical framework of the self-determination theory. The process of developing the MMS involved: a) Developing an initial item pool, b) investigating the item-type of motivation membership, c) examining the appropriateness of the administration instructions and the items phrasing, and d) exploring various types of validity and reliability of the MMS.

**Initial item pool development:** An initial item pool was developed based on the self-determination continuum and by reviewing a number of published studies in measuring

academic motivation in various cultures (Valierand et al., 1992; Cokley, 2000; Cokley et al., 2001; Fairchild et al., 2005; Karsenti & Thibert, 1996; Barkoukis et al., 2008). Sixty items were developed as an initial item pool. The items were designed to measure specific reasons why the students study mathematics that reflect the various types of motivation: Intrinsic motivation (IM), identified regulation (IR), introjected regulation (INR), external regulation (ER), and amotivation (AM). The initial item pool was reexamined to guarantee content representation of the self-determination continuum. Based on this review, 10 items were eliminated because of redundancy and language ambiguity.

**Item-type of motivation membership (Experts rating):** Further investigation of the items content validity was examined by 10 experts who hold PhDs in education. Based on the experts' responses, 6 items were eliminated and two items rephrased, either because two or more experts indicated that the items were ambiguous or the same item was classified in more than one type of motivation. All the experts agreed that the 44 items were written in clear and precise language as well as being classified in the same type of motivation that it was suppose to reflect.

**Administration instructions and the items phrasing appropriateness:** Five elementary teachers, 5 middle school teachers, and 5 high school teachers rated the appropriateness of the administration instructions and the phrasing of the 44 items for the students in the targeted grades. The analysis of the teachers' responses revealed that the phrasing of the items and the administration instructions were written clearly and the students in elementary school (4th grade and above), middle school and in high school would be able to read and understand the items and the instructions independently.

In conclusion, based on the initial item pool development, item-type of motivation membership, and the appropriateness of the administration instructions and the items phrasing, the MMS contained the various types of motivation (intrinsic motivation, identified regulation, introjected regulation, external regulation, & amotivation).

These types of motivation were reflected in the 44 items that represent reasons why students study mathematics. These items or reasons were rated on a 4-point scale (1 does not describe me at all, 2 describes me a little, 3 greatly describes me, and 4 describes me completely).

### Procedure

Written directions with examples were presented to the participants which explained how to complete the MMS\*. Mathematics teachers also presented this information verbally to the participants, and emphasized that the information collected would remain confidential. Mathematics scores (current and previous years) were obtained from schools official records.

## RESULTS AND DISCUSSION

### Evidence of factor structure

Exploratory factor analysis (EFA) was used to examine the factor structure of the MMS. The extraction method (maximum-likelihood), eigenvalues greater than 1, and the scree test and oblique rotation (direct oblimin,  $\delta = 0$ ) (Costello & Osborne, 2005; Ford, MacCallum & Tait, 1986) were performed on the participants' raw scores on all (44) items of the MMS. Kaiser-Meyer-Olkin measure of sampling adequacy ( $KMO = 0.953$ ) and the determinant correlation matrix (determinant =  $3.50E-009$ ) indicated that the sample size and the correlation matrix were suitable for factor analysis (Field, 2005).

The results of the EFA revealed six eigenvalues greater than one; however, the scree test presented in figure 1 indicated four underlying factors. The 4 factors accounted for 48.24% of the total variance: 24.10%, 15.03, 5.81%, and 3.30%, respectively, as shown in Table 1. The scree test was chosen to determine the number of factors in this study because it is a more accurate method than eigen-

values greater than one criterion (Russell, 2002; Costello & Osborne, 2005).

With regard to the item loadings, the items with a loading greater than 0.30 on a factor were considered significant and used in defining that factor (Costello & Osborne, 2005). Any item which loaded significantly in more than one factor was assigned to the factor in which it loaded more strongly if the difference between the two loadings was greater than 0.10 (Guilford, 1954). However, if the difference between the two loadings was 0.10 or less the item was eliminated.

Table 3 shows the rotated factor pattern coefficients matrix. These results indicate that 19 items were loaded significantly in factor 1. Fifteen of these items reflect the intrinsic motivation. Items IM9 and IM 27, which reflect intrinsic motivation, loaded significantly in factor 1 and factor 3 and the difference between the two loadings was less than 0.10. In addition, items IR4 and IR11, which reflect external motivation identification regulation, loaded significantly in factor 1. The results also indicate that 9 items were loaded significantly in factor 2, and all of these items reflect the amotivation. Furthermore, the results indicate that 8 items were loaded significantly in factor 3. Six of these items reflect the introjected regulation, and items IR17 and IR23, which reflect identification regulation. Finally, the results indicate that 8 items were loaded significantly in factor 4, and all of these items reflect the external regulation.

These results confirmed four of the five factors (intrinsic motivation, amotivation, introjected regulation & external regulation) of the MMS. However, the fifth factor, identified regulation motivation, did not emerge as a factor in the MMS. This may be due to the social contexts in the UAE's cultural and educational system.

The identified regulation motivation reflects the highest level of autonomy or self-determination among the external motivation types. Past research confirmed that autonomy and supportive contexts enhance autonomous motivation while controlling contexts diminish autonomous motivation (Ryan & Deci, 2000). More specifically the social contexts of the culture, home, school, and classroom environment impact the degree in which students internalize the external regulation of the beha-

avior (Deci, Ryan, & Williams, 1996; Ryan & Deci, 2000). The social contexts have a critical impact on the level of internalization of extrinsically motivated behaviors because they are not inherently interesting.

Autonomy and supportive contexts such as providing the students with the freedom to choose, encouraging individuality, respecting students' opinions, and fostering responsibility and independence would maintain intrinsic motivation and facilitate internalization of the extrinsic motivation (Ryan & Deci, 2000; Hoang, 2007; Edmunds, Ntoumanis, & Duda, 2008; Um et al., 2005; Urda & Schoenfelder, 2006; Wong, Wiest, & Cusick, 2002).

Controlling contexts that pressure students to think, feel, and/or behave in a specific manner limit the internalization of regulation. The overall internalization of regulation among students in controlling contexts is less than the students in autonomy and supportive contexts (Ryan & Deci, 2000). More importantly the internalization that occurs in controlling contexts tends to be only introjected (Ryan & Deci, 2000). These findings support the factorial validity of the MMS in measuring the four types of motivation (intrinsic motivation, introjected regulation, external regulation & amotivation) and support Ryan and Deci's (2000) claim with regards to the identification regulation subscale. However, this claim requires further investigation in the UAE.

Most motivation theories like the self-determination theory, is rooted in Western culture. The social contexts of the culture, home, school, and classroom environment in the Arab world are different from Western cultures. These variables are critical in the process of internalization of external regulation of the behavior. Western culture is individually- oriented while Arab culture is socially- oriented. Social norms and values in the Arab culture have a significant influence on the individual's behavior (Abu Hilal & Al Khati, 2011). These norms and values also play a major role in determining whether context is autonomous supportive or controlling. The role of culture in academic motivation is very important. However, the role of culture is beyond the scope of this study. A further investigation of the role of culture in academic motivation is highly recommended.

### **Evidence of construct validity**

**Simplex Pattern:** The simplex structure (Cokley et al., 2001; Fairchild et al., 2005) of the MMS was examined in relation to the self-determination continuum as an indicator for its construct validity. The motivational continuum of the self-determination from the most to least self-determination or autonomy is as follows: Intrinsic → introjected regulation, → external regulation → amotivation. These types of motivation vary in their degree in relation to self-determination or autonomy.

The hypothesis was that the strength of the relationships and directions among the four subscales (types of motivation) varies according to their degree and direction in relation to the continuum of self-determination. According to this hypothesis, the Intrinsic subscale represents the most self-determination or autonomy and the Amotivation subscale represents the polar opposite which is the least self-determination or autonomy. Therefore, the relationship between these two subscales is expected to be significantly negative. However, the relationship between the Intrinsic subscale and introjected regulation subscale are expected to be significantly positive. Likewise, the relationship between the external regulation subscale and amotivation subscales are expected to be significantly positive. Finally, the magnitude and the direction of the

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**Table 2**  
**Rotated Factor Pattern Coefficients Matrix**

Items	Factors			
	1	2	3	4
IM36	.725	-.032	.013	.021
IM37	.777	-.080	-.115	.045
IM28	.708	-.125	.064	-.054
IM21	.642	-.082	.156	-.038
IM1	.709	-.017	-.060	.000
IM3	.693	-.074	-.024	-.028
IM42	.683	.031	-.085	.098
IM10	.620	-.026	.122	-.084
IR11	.547	-.101	.217	-.004
IM2	.553	-.023	.160	.032
IM8	.557	-.067	.137	-.017
IR4	.554	-.057	.129	-.032
IM35	.661	.108	-.176	.134
IM9	.432	-.033	.382	-.082
IM16	.462	.022	.255	-.022
IM15	.425	.129	.068	.155
IM22	.447	.161	.013	.143
IM27	.355	.062	.247	.038
IM32	.371	.152	.179	-.048
AM41	-.008	.883	.048	-.106
AM39	-.112	.828	.064	-.083
AM34	.082	.762	-.029	.016
AM26	-.068	.736	-.012	.002
AM31	.004	.726	.031	.000
AM20	-.052	.689	-.027	.053
AM44	.068	.720	.008	-.023
AM7	-.059	.519	-.126	.064
AM14	.045	.469	-.033	.183
INR29	.194	-.049	.598	.074
INR12	-.005	.006	.683	-.018
INR24	.003	.010	.657	.015
INR18	.126	.000	.579	.047
IR17	.268	-.107	.454	.061
INR33	-.017	-.072	.474	.262
IR23	.074	.021	.410	.127
INR5	.115	-.021	.360	.040
ER13	.029	-.019	.084	.633
ER40	.037	.286	-.074	.507
ER6	.189	-.049	-.063	.621
ER30	.164	.005	.093	.544
ER38	.081	.281	-.034	.477
ER25	-.143	.029	.285	.442
ER19	-.200	.087	.194	.388
ER43	.255	.225	.101	.323
Variance explained	10.008	6.113	1.995	0.918
% Variance Explained	22.75	13.89	4.53	2.09

Most motivation theories like the self-determination theory, is rooted in Western culture. The social contexts of the culture, home, school, and classroom environment in the Arab World are different from Western cultures. These variables are critical in the process of internalization of external regulation of the behavior. Western culture is individually-oriented while Arab culture is social-

ly-oriented. Social norms and values in the Arab culture have a significant influence on the individual's behavior (Abu Hilal & Al Khatib, 2011). These norms and values also play a major role in determining whether context is autonomous supportive or controlling. The role of culture in academic motivation is very important. However, the role of culture is beyond the scope of this study. A further investigation of the role of culture in academic motivation is highly recommended.

Relationships among the subscales is expected to weaken according to self-determination continuum moving from the most self-determination or autonomy (intrinsic) toward the least self-determination or autonomy (amotivation).

The Pearson correlation coefficients among the MMS subscales were computed to examine the simplex pattern of the MSS. These results are presented in Table 3. The findings indicate that the correlation between the intrinsic motivation, on one hand, and the introjected regulation, external regulation, and amotivation, on the other, were ( $r = 0.52, p < 0.05$ ), ( $r = 0.31, p < 0.05$ ), and ( $r = -0.02, p > 0.05$ ), respectively. The correlation between the introjected regulation, on one hand, and the external regulation and amotivation, on the other, were ( $r = 0.39, p < 0.05$ ), ( $r = -0.07, p < 0.05$ ), respectively. Finally, the correlation between the external regulation and amotivation was ( $r = 0.47, p < 0.05$ ).

*These findings confirmed the following:*

First, the relationship between the Intrinsic subscale and introjected regulation subscale were significantly positive. Likewise, the relationship between the external regulation subscale and amotivation subscales were significantly positive as predicted. Second, the relationship between the intrinsic and introjected regulation, on one hand and the external regulation and amotivation subscales were positive and the strongest as expected.

Overall, the simplex pattern of the MSS is consistent with the self-determination continuum which provides evidence that the MMS has construct validity.

**Table 3**  
**Correlation Coefficients among the MMS Subscales**

Subscales	Intrinsic	Introjected Regulation	External Regulation
Intrinsic	1.00		
Introjected Regulation	0.52**	1.00	
External Regulation	0.31**	0.39**	1.00
Amotivation	-0.02	-0.07**	0.47**

\*\*  $p < 0.01$

**Relationship between MMS and achievement in mathematics:** It is logical to assume a relationship between motivation and achievement and that relation vary according to the type of motivation. The hypothesis was that achievement in mathematics should be positively and significantly correlated with the intrinsic motivation and introjected regulation. In contrast, achievement in mathematics should be negatively and significantly correlated with the external regulation and amotivation.

The results shown in Table 4 indicate that the correlation between the intrinsic motivation and introjected regulation, on one hand, and achievement in mathematics in previous year and current, on the other, were ( $r = 0.16, p < 0.05$ ), ( $r = 0.13, p < 0.05$ ), ( $r = 0.20, p < 0.05$ ), and ( $r = .20, p < 0.05$ ) respectively. The results also indicate that the correlation between the external regulation and amotivation, on one hand, and achievement in mathematics previous year and current, on the other, were ( $r = -0.13, p < 0.05$ ), ( $r = -0.12, p < 0.05$ ), ( $r = -0.28, p < 0.05$ ), and ( $r = -0.29, p < 0.05$ ) respectively. These findings confirm a significant relationship between the intrinsic motivation, introjected regulation, external regulation and amotivation, on one hand, and achievement in mathematics on the other. This relation was positive for the intrinsic motivation, introjected regulation and negative for external regulation and amotivation. These results also are consistent with the findings of Ahmed & Bruinsma (2006); Um et al. (2005); Lepper, Corpus, & Iyengar (2005). These results provide evidence that support the validity of the MMS.

It appears that correlations between achievement in mathematics and introjected regulation, on one hand, is stronger than the correlation between achievement in mathematics and intrinsic motivation on the other.

This may be due to the social contexts in the Arab culture. introjected regulation involves exhibiting behavior in response to internal pressure related to self-aggrandizement or avoidance of guilt or shame (Cokley, 2000; Cokley et al., 2001). motivation, introjected regulation, external regulation & amotivation. The results also provided evidence that the MMS has acceptable levels of internal consistency and temporal stability. In conclusion, the results indicate that the MMS has acceptable levels of content, structure and construct validity in measuring four types of motivation, namely intrinsic.

**Table 4**  
**Correlation Coefficients among the MMS Subscales and Mathematics Achievement (N=1346)**

Subscales	Math last year	Math current year
Intrinsic Motivation	0.16**	0.13**
Introjected Regulation	0.20**	0.20**
External Regulation	-0.13**	-0.12**
Amotivation	-0.28**	-0.29**

\*\*  $p < 0.01$

Pride, guilt or shame has a significant influence on the individual's behavior in the Arab culture, and its impact is more likely to be higher in the Arab culture than the Western cultures.

Overall, the pattern of the relationships between MMS subscales, on one hand, and the mathematics achievement on the other, provides evidence that the MMS has construct validity.

#### Evidence of internal consistency

Internal consistency was established by computing the Cronbach's alpha for each subscale. Cronbach's alpha ranged from 0.77 (introjected regulation) to 0.90 (intrinsic motivation) as illustrated in Table 5. Also, the internal consistency of each subscale was examined by computing inter item and total score correlation matrix for each subscale. The results are presented in Tables 6 to 9 in the Appendix. The results indicate significant relationships ( $p < 0.01$ ) among the items in each subscale and their subscale total score. Furthermore, the findings indicate that the relationship between the items and their subscale total score was higher than the relationships among the items. These results reflect acceptable levels of internal consistency.

### Evidence of reliability

Test-retest stability was examined by administering the MMS twice to 130 students. The interval between test-retest was 14 days. Test-retest reliability coefficients for the subscales ranged from 0.68 to 0.85. The results are presented in Table 5. These results indicate that the MMS has adequate levels of temporal stability.

### Implications and recommendations

The UAE has been in the process of reforming its education system and significant efforts have been made toward achieving this goal. Assessment is critical in ensuring the success of this reform. Assessment provides educators, parents, and students with information to make informed decisions. Social, psychological, and educational decisions based on reliable and valid data is the best approach to meet the students' needs.

The MMS provides educators in the UAE with significant information which furthers their understanding of students' performance, and assists them in developing intervention programs or strategies for students experiencing difficulties in mathematics. It also provides researchers with an instrument to use in studying motivation and relevant variables that impact students' achievement in the UAE. Furthermore, the results of this study highlights the need for further investigation of external identified regulation motivation and the impact of the social contexts on students' internalization of the external regulation of their behavior and its impact on achievement. Finally, the results of this study provide support to the applicability of the self-determination theory in the UAE. Further investigation of the validity of this theory in the Arabic culture is recommended.

**Table 5**  
**Cronbach's Coefficient  $\alpha$  and Test-Retest Reliability Coefficient for MMS (N= 1326)**

Subscales	Cronbach's Coefficient	Test-retest r
Intrinsic Motivation	0.90	0.85
Introjected Regulation	0.77	0.68
External Regulation	0.79	0.75
Amotivation	0.90	0.76

### REFERENCES

- Abu-Hilal, M., & Al Khatib, S. (2011). Structural relations among goal orientations, self-efficacy, metacognition and achievement: invariance across gender. *Journal of Educational and Psychological Studies*, 5 (1)1-14.
- Ahmed, W., & Bruinsma, M. (2006). A structural model of self-concept, autonomous motivation and academic performance in cross-cultural perspective. *Electronic Journal of Research in Educational Psychology*, 4, 551-576.
- Cokley, K. O. (2000). Examining the validity of the academic motivation scale by comparing scale construction to self-determination theory. *Psychological Reports*, 86, 560-564.
- 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.
- Costello, A. B., & Osborne, J. W. (2005). Best practice in exploratory factor analysis: Four recommendations for getting the most of your analysis. *Journal Practical Assessment, Research & Evaluation*, 10, 1-9.
- Deci, E. L., Ryan, R. M., & Williams, G. C. (1996). Need satisfaction and the self-regulation of learning. *Learning and Individual Differences*, 8 (3), 165-183.
- Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, M. R. (1991). Motivation and education: The self-determination perspective. *Educational Psychologist*, 26, 325-346.
- Edmunds, J., Ntoumanis, N., & Duda, J. L. (2008). Testing a self-determination theory-based teaching style intervention in the exercise domain. *European Journal of Social Psychology*, 38, 375-388. DOI: 10.1002/ejsp.463.
- Fairchild, A. J., Horst, S. J., & Finney, S. J. (2005). Evaluating existing and new evidence for the academic motivation scale. *Contemporary Education Psychology*, 30, 331-358.
- Field, A. P. (2005). *Discovering statistics using SPSS (2nd)*. London, England: Sage.



- Ford, J. K., MacCallum, R. C., & Tait, M. (1986). The application of exploratory factor analysis in applied psychology: A critical review and analysis. *Personnel Psychology, 39*, 291-314.
- Guilford, J. P. (1954). *Psychometric theory*. New York, NY: McGraw-Hill Book Company, INC.
- Hoang, T. N. (2007). The relations between parenting and adolescent motivation. *International Journal of Whole Schooling, 3*, 1-21.
- Karsenti, T., & Thibret, G. (1996). Amotivation scale for elementary children: Refining the extrinsic/intrinsic dichotomy. 2-9. <http://www.eric.ed.gov/PDFS/ED397139.pdf>.
- Lepper, M. R., Corpus, J. H., & Iyengar, S. S. (2005). Intrinsic and extrinsic motivational orientations in the classroom: Age differences and academic correlates. *Journal of Educational Psychology, 97*, 184-196.
- Mayer, J. D., Faber, M. A., & Xu, X. (2007). Seventy-five years of motivation measures (1930-2005): A descriptive analysis. *Motive and Emotion, 31*, 83-103.
- Russell, D. W. (2002). In search of underlying dimensions: The use of (and abuse) of factor analysis in personality and social psychology bulletin. *Personality and Social Psychology Bulletin, 28*, 1629-1646. DOI: 10.1177/01466702237645.
- Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic Motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*, 54-67.
- Shih, S. (2008). The relation of self-determination and achievement goals to Taiwanese eighth graders' behavioral and emotional engagement in schoolwork. *The Elementary School Journal, 108*, 313-334.
- Um, K.U., Corter, J., & Tatsuoka, K. (2005). Motivation autonomy support, and mathematics performance: a structural equation analysis. 1-16.
- [http://cms.tc.columbia.edu/i/a/1996\\_NCME2005-eunkeyoung.pdf](http://cms.tc.columbia.edu/i/a/1996_NCME2005-eunkeyoung.pdf)
- Urdu, T., & Schoenfelder, E. (2006). Classroom effects on student motivation: Goal structures, social relationships, and competence beliefs. *Journal of School Psychology, 44*, 331-349.
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The academic motivation scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement, 52*, 1003-1017.
- Vansteenkiste, M., Lens, W., & Deci, E. L. (2006). Intrinsic versus extrinsic goal contents in self-determination theory: Another look at the quality of academic motivation. *Educational Psychologist, 4*, 19-31.
- Wong, E. H., Wiest, D. J., & Cusick, L. B. (2002). Perceptions of autonomy support, parent attachment, competence and self-worth as predictors of motivational orientation and academic achievement: An examination of the sixth-and ninth-grade regular education student. *Adolescence, 37*, 255-266.

## APPENDIX

Table 6  
 Inter Item and Total Score Correlation Matrix of the Amotivation (AM)  
 Subscale (N= 1379)

Items	AM TOTAL	AM 7	AM 14	AM 20	AM 26	AM 31	AM 34	AM 39	AM 41	AM 44
AM										
TOTAL	1.00									
AM7	0.63	1.00								
AM14	0.62	0.33	1.00							
AM20	0.76	0.48	0.42	1.00						
AM26	0.76	0.44	0.38	0.55	1.00					
AM31	0.76	0.37	0.42	0.50	0.54	1.00				
AM34	0.79	0.41	0.42	0.53	0.55	0.60	1.00			
AM39	0.80	0.43	0.37	0.54	0.56	0.52	0.57	1.00		
AM41	0.82	0.43	0.39	0.56	0.56	0.57	0.63	0.67	1.00	
AM44	0.72	0.38	0.32	0.44	0.46	0.47	0.51	0.58	0.61	1.00

Table 7  
 Inter Item and Total Score Correlation Matrix of the External Regulation (ER)  
 subscale (N= 1404)

Items	ER TOTAL	ER 6	ER 13	ER 19	ER 25	ER 30	ER 38	ER 40	ER 43
ER									
TOTAL	1								
ER6	0.64	1							
ER13	0.68	0.47	1						
ER19	0.6	0.3	0.32	1					
ER25	0.58	0.26	0.33	0.21	1				
ER30	0.66	0.44	0.37	0.38	0.29	1			
ER38	0.69	0.3	0.33	0.37	0.3	0.34	1		
ER40	0.68	0.31	0.34	0.33	0.25	0.32	0.56	1	
ER43	0.55	0.19	0.28	0.14	0.31	0.22	0.28	0.32	1

Table 8  
 Inter Item and Total Score Correlation Matrix of the Introjected Regulation (INR)  
 subscale (N= 1433)

Items	INR TOTAL	INR 5	INR 12	INR 18	INR 24	INR 29	INR 33
INR							
TOTAL	1.00						
INR5	0.64	1.00					
INR12	0.69	0.31	1.00				
INR18	0.73	0.33	0.38	1.00			
INR24	0.69	0.28	0.44	0.39	1.00		
INR29	0.77	0.33	0.45	0.58	0.47	1.00	
INR33	0.62	0.25	0.36	0.33	0.32	0.37	1.00

Table 9

Inter Item and Total Score Correlation Matrix of the Intrinsic Motivation (IM) Subscale (N= 1360)

Items	IM Total	IM2	IM16	IM22	IM32	IM35	IM1	IM8	IM15	IM21	IM28	IM37	IM3	IM10	IM36
IM TO-TAL	1.00														
IM2	0.63	1.00													
IM16	0.63	0.37	1.00												
IM22	0.54	0.19	0.28	1.00											
IM32	0.51	0.23	0.33	0.26	1.00										
IM35	0.63	0.31	0.31	0.34	0.32	1.00									
IM1	0.69	0.52	0.40	0.25	0.24	0.41	1.00								
IM8	0.61	0.40	0.36	0.22	0.19	0.34	0.45	1.00							
IM15	0.54	0.26	0.33	0.32	0.24	0.27	0.30	0.28	1.00						
IM21	0.71	0.43	0.47	0.26	0.24	0.36	0.54	0.52	0.32	1.00					
IM28	0.73	0.45	0.42	0.27	0.28	0.37	0.51	0.46	0.30	0.54	1.00				
IM37	0.73	0.43	0.36	0.35	0.26	0.42	0.47	0.39	0.31	0.46	0.53	1.00			
IM3	0.69	0.45	0.35	0.30	0.21	0.35	0.47	0.37	0.32	0.46	0.48	0.52	1.00		
IM10	0.67	0.43	0.35	0.25	0.27	0.30	0.42	0.35	0.31	0.42	0.46	0.47	0.50	1.00	
IM36	0.75	0.44	0.41	0.34	0.34	0.45	0.43	0.37	0.31	0.47	0.52	0.56	0.51	0.55	1.00
IM42	0.67	0.32	0.33	0.31	0.26	0.41	0.40	0.32	0.33	0.44	0.43	0.48	0.42	0.43	0.54

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