

The Development of Motivation and Engagement Scale for College Students

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The purpose of the study is to develop items for the Motivation and Engagement Scale for college students based on Andrew Martin's model (2007). The Motivation and Engagement Wheel categorized 11 factors into four factors which are Adaptive Behavioral, Maladaptive Behavioral, Adaptive Cognitive, and Maladaptive Cognitive. Each factor has its own subfactors. These subfactors are 11 in total namely: (1) Persistence, (2) Planning, (3) Study Management, (4) Anxiety, (5) Failure Avoidance, (6) Uncertain Control, (7) Self-Handicapping, (8) Disengagement, (9) Self efficacy, (10) Mastery Orientation, and (11) Valuing of School. The scale was pretested to 300 college students from different universities in Manila. The scale's reliability using Cronbach's alpha are: .87 for the whole scale, .74 for Persistence, .84 for Planning, .74 for Study Management, .88 for Anxiety, .69 for Failure Avoidance, .89 for Uncertain control, .90 for Self-Handicapping, .88 for Disengagement, .86 for Self-Efficacy, .78 for Mastery Orientation and .84 for Valuing of School which indicate a moderate to high internal consistency. Convergent validity was also attained where the eleven factors were all significantly correlated. Construct Validity using the Confirmatory Factor Analysis (CFA) was conducted and showed that the data fit the hypothesized measurement model. The items also indicate good fit in 12 fit indices measured.

Keywords: *Motivation, Engagement*

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otivation and engagement are crucial in the learning process. Motivation and engagement can be respectively conceptualized as individuals' energy and drive to achieve to their potential and the behaviors that follow from this energy and drive (Martin, 2008). Motivation has been shown consistently to strengthen the ability of students to concentrate on school work and consequently with achievement, while its absence is associated with disengagement from learning behaviors and failure in school.

According to the psychological perspective of student engagement, motivation and engagement are closely intertwined. The former comprises private, psychological and unobservable factors, and the latter comprises publicly observable behavior (Reeve, 2012). Martin (2007) argued that although ideas may differ as to which factors are deemed motivation factors as opposed to engagement factors, there appears to be broad agreement that motivation is a basis for subsequent engagement. For this reason, Martin (2012) suggested using the Motivation and Engagement Wheel as an integrative and parsimonious approach to conceptualizing student engagement. The wheel aims to bridge the gap between diverse theoretical perspectives about motivation and engagement, such as expectancy-value, attribution and goal orientation theory. It also provides practitioners (e. g., educators, counselors and psychologists) with a parsimonious framework that they can apply to their practice and clearly communicate to students.

Student performance is greatly influenced by their motivation and engagement in the learning process. There is a wide range of theories that focus on specific motivational constructs, such as, self-efficacy (Bandura, 1997), need for achievement and self-worth (Atkinson, 1964), attribution and control (Skinner, Wellborn, & Connell, 1990; Weiner, 1985), expectancies and values (Ryan & Deci, 2000; Wifield & Eccles, 2000) and achievement goals (Ames, 1992). Martin recognized this limitation and developed his model (2001, 2003). He argued that students exhibit many attitudes and behaviors toward learning and that simply assessing one of the motivational constructs does not necessarily reflect their overall style or level of motivation. He developed the Student Motivation and Engagement Wheel which incorporates the core themes of the major theories to capture the complexity of academic motivation more adequately. His model reflects the significant commonalities across various theories and models of motivation that include: (a) cognitive and behavioral components (Pintrich & DeGroot, 1990), (b) strategies and behaviors driven by individuals' characteristics orientations and cognitions (Buss & Cantor, 1989), (c) approaches to engagement emphasizing the effects of cognitive change on behavioral change (Beck, 1995), (d) categorization of engagement into cognitive, affective, and behavioral dimensions (Miller et al., 1996; Miserandino, 1996) and (e) assessments of differential effects and strength of distinct aspects of motivation and engagement, such as, self-efficacy reflecting highly adaptive motivation (Bandura, 1997) anxiety impeding students' engagement (Sarason & Sarason, 1990) and self-handicapping reflecting maladaptive engagement (Martin, Marsh, & Debus, 2001). The wheel is conceptualized into two levels: The integrative higher-order level comprising four factors (Adaptive cognitive dimensions, Adaptive behavioral dimensions, Maladaptive behavioral dimensions, Impeding/maladaptive cognitive dimensions); and the lower-order comprising 11 factors (self-efficacy, valuing, mastery orientation, planning, study management, persistence, anxiety, failure avoidance, uncertain control, self-handicapping, and disengagement).

Martin (2007) argued that the eleven subfactors provide an adequate basis that are required to assess the complexity of motivation and engagement in educational practice, he also claimed that the second-order conceptualization with four dimensions of motivation and engagement aims at enhancing parsimony, providing a unifying approach to educational and psychological theory and increasing the

prospects of understanding the basic structure of students' motivation and engagement from an applied perspective. Martin proposed that the four second-order groups include adaptive cognitions (self-efficacy, value on school and mastery orientation), adaptive behaviors (planning, study management and persistence), impeding cognitions (anxiety, failure avoidance and uncertain control) and maladaptive behaviors (self-handicapping and disengagement). The factor analysis of responses of 12,237 high school students from 38 Australian high schools provided empirical support for this two level model (Martin, 2007) suggesting a clear picture of how and why students think and behave in particular ways towards school and learning.

A study by Lu et al. (2013) explored the motivation and engagement of undergraduate Chinese students. They found that students' academic engagement significantly facilitated their development of intellectual skills. Moreover, in a 2015 study in China conducted with a sample of 1,131 Chinese students from 10 full-time universities in Beijing, it shows that the Motivation and Engagement Scale for university/college students is a promising and valid instrument for assessing student engagement in Chinese universities. The study explored the issue of Chinese undergraduate student engagement through the use of the Motivation and Engagement Scale for University/College Students (MES-UC). In Martin's (2007, 2012a) Motivation and Engagement Wheel, the ideal engaged student is expected to score high on the six adaptive factors and low on the five maladaptive factors. The MES profile for the Chinese undergraduate students revealed in the 2015 Chinese study was generally consistent with this expectation, seemingly echoing the finding of Lu et al. (2013) that a 'lack of engagement' hardly exists for Chinese undergraduates. The details of the MES profile showed that although Chinese undergraduates achieved higher scores for the six adaptive factors, their performance on the maladaptive motivation and engagement factors was not as low as expected. Moreover, the study's results revealed some characteristics and individual differences in students' motivation and engagement, and should help develop an understanding of the quality of teaching of learning in Chinese higher education institutions (Yin, 2015). The results of the said study showed that both first-order models (i. e., the 4- and 11-factor models) fit the data well, and that nine of the eleven first-order factors had acceptable reliabilities. These results supported the psychometric qualities of the MES-UC, indicating that it could be useful to incorporate the MES-UC into research related to student engagement in higher education.

Engagement is a complex and multifaceted construct comprising three dimensions, including behavioral, emotional and cognitive engagement (Fredricks, Blumenfeld, & Paris, 2004; Hagel, Carr, & Delvin, 2012). Behavioral engagement focuses on the extent to which students become involved in academic, social and extracurricular activities. Emotional engagement refers to students' affective responses to their teachers, classmates, academics and institutions. Cognitive engagement relates to students' mental investment, which incorporates thoughtfulness and a willingness to exert the effort necessary to comprehend complex ideas and master difficult skills. In this sense, engagement can be seen as an overarching meta-construct that attempts to integrate the diverse lines of research that help explain student success (Kahu, 2013).

Students must be involved in useful and productive activities determined by educators and guided by governmental policy or societal expectations. Results of empirical studies have repeatedly shown that students' engagement in educationally purposeful activities is positively related to their grades, critical thinking skills and persistence between the first and second year of college (Carini, Kuh, & Klein, 2006; Kuh et al., 2008). So, to help shape policy and practice, student engagement research must explore how engagement varies across student group demographics and how it changes over time.

Psychological theories and research on motivation and learning suggest that motivation does not only refer to student attributes such as attitudes and effort. Instead, differences in motivation may arise from different sets of experiences. This study, therefore, aims to identify these experiences and tell whether such (e. g. learning environment and influences) will help students in their motivation and engagement aspects in learning and schooling. This can be proved through the data gathered such as the College Grade Point Average (CGPA). The study is to prove whether factors of engagement and motivation can predict the students' attainment of good grades and affect the students' motivation and engagement in achieving quality performances in school.

The present study developed new items for the Motivation and Engagement Scale for college students using Andrew Martin's model. This study seeks to examine a multidimensional model of student motivation and engagement using the same lower order constructs from Martin's model, and data derived from an additional source which is the individual respondents' CGPA for the measure of their achievement on the previous semester they took. Educational researchers have demonstrated the need to conduct research that examines the same constructs using data derived from additional 'objective' sources such as achievement measures. Importantly, Martin (2003) has previously shown among high school students, using a subset of the Wheel's scales and items, that key dimensions are significantly related to grade point average. With an increase in the range of associated data, the researchers may fully and confidently understand individual's motivation.

Method

Participants

The Motivation and Engagement Scale was administered for pre-testing to 300 college students from different universities and colleges in the National Capital Region. The participants were 152 male and 148 female whose ages range from 16 to 28 years old.

Instrument

The Motivation and Engagement Scale of the present study used the conceptual definitions of the different factors and constructs anchored on the Motivation and Engagement Wheel by Martin (2007). This scale is an instrument that measures college students' motivation and engagement. The scale developed consisting of 55 items.

The developed items were distributed to 11 factors, namely: (1) Valuing of School, (2) Mastery Orientation, (3) Self-efficacy, (4) Disengagement, (5) Self-handicapping, (6) Uncertain Control, (7) Failure Avoidance, (8) Anxiety, (9) Study Management, (10) Planning, (11) Persistence, as indicated in the Motivation and Engagement Wheel by Martin (2007). Items were distributed to the specific factors. Each of the 11 factors comprises five items, hence it is a 55-item instrument. For each item, the students rate themselves on a scale either 1 (Never), 2 (Seldom), 3 (Sometimes), 4 (Often), and 5 (Always). The items constructed were reviewed by an expert in the field of Educational Psychology. After which, the researchers revised the poorly constructed-items based on the revision suggestion to develop appropriate items for the scale. After the scale was completed, it was pre-tested to establish its validity and reliability.

Procedure

The respondents who answered the Scale are college students from different universities in the National Capital Region. First, the respondents were informed that they will be given a questionnaire on motivation and engagement adapted from Martin's model of Motivation and Engagement. Then, the scale was distributed to each of the respondents. The instruction in answering the scale was indicated and it was also explained to them verbally before answering. The instruction included that answers will be written on the answer sheet and the respondents are prohibited to write anything on the questionnaires. Students who have questions for clarifications must raise their hand and one member from the group of researchers will answer the inquiry. The participants answered the scale for 45 minutes. When everybody completed answering the scale, the purpose of the pretesting was reiterated to them.

Data Analysis

After the pretesting, the responses of the participants on the scale were tabulated using a spreadsheet. The data collected were used to determine the validity and reliability analysis for the motivation and engagement scale. For the descriptive statistics, the means, standard deviation, kurtosis, skewness, class interval was obtained. To test the reliability of the scale, the researchers established the internal consistency of the items using the Cronbach's alpha. To test the validity of the scale, the researchers utilized four validity measure: (1) Content validity in which items were examined and revised with the help of an expert; (2) Convergent validity in which the three eleven-factor of the scale were correlated to each other. (3) To establish the Construct validity, the researchers have used Confirmatory Factor Analysis with RMS, RMSEA, McDonald, Population Gamma Index, CFI and GFI as the fit indices to determine if the scale were able to attain its goodness of it. (4) Predictive Validity was used to where the motivation and engagement factors were used to predict CGPA.

Results

The reliability of the scale was assessed using the Cronbach's alpha. The coefficient alpha determined the internal consistency of the 55 items as a whole and for each factor (5 items each). The construct validity of the scale was first assessed using convergent validity by intercorrelating the eleven proposed factor. All the factors have been correlated with the CGPA to determine the predictive validity. The factor structure of the scale was also tested by comparing the four-factor model with a one-factor model.

Table 1
Descriptive Statistics

Domain	Total #	M	SD	Kurtosis	Skewness	CI+	CI-	Cronbach's Alpha
Persistence	5	4.13	0.63	-0.92	-0.33	4.25	4.06	.74
Planning	5	4.15	0.67	0.06	-0.84	4.23	4.15	.84
Study	5	4.10	0.62	0.06	-0.70	4.17	4.03	.74
Management								
Anxiety	5	3.25	1.00	-0.51	-0.50	3.36	3.13	.88
Failure	5	3.14	0.89	-0.70	-0.44	3.24	3.04	.69
Avoidance								
Uncertain control	5	2.94	0.96	-0.86	-0.20	3.04	2.83	.89
Self-handicapping	5	2.42	1.05	-0.60	0.55	2.54	2.30	.90
Disengagement	5	2.34	1.04	-0.56	0.56	2.46	2.22	.88
Self-efficacy	5	4.05	0.73	-0.51	-0.40	4.13	3.97	.86
Mastery	5	3.90	0.67	-0.20	-0.34	3.96	3.82	.78
Orientation								
Valuing of School	5	4.46	0.58	1.52	-1.20	4.53	4.40	.84

The descriptive statistics of the 11 subfactors of the Motivation and Engagement was determined. The mean values are within a moderate range (a total of 5-point scale). Standard deviations of the scores were minimal except for Self-handicapping which is 1.05 indicating wide dispersion of the scores.

The overall internal consistency of the scale using the Cronbach's alpha is .87 indicating high internal consistency of the items. With regard to the factors, all of the items have high internal consistency value. An item lower than .6 has low internal consistency.

Table 2
Intercorrelation of Subfactors for Motivation and Engagement

Variables	PR	PL	SM	A	FA	UC	SH	D	SE	MO	VS
Persistence	---										
Planning	.51*	---									
Study Management	.50*	.69*	---								
Anxiety	-.02	-.12*	-.11	---							
Failure Avoidance	-.01	-.20*	-.13*	.53*	---						
Uncertain control	-.10	-.29*	.20*	.61*	.49*	---					
Self-handicapping	-.06	-.28*	-.16*	.31*	.37*	.63*	---				
Disengagement	-.05	-.28*	-.15*	.44*	.40*	.63*	.74*	---			
Self-efficacy	.23*	.51*	.49*	.14*	-.04	-.31*	-.27*	-.29*	---		
Mastery Orientation	.55*	.62*	.53*	-.07	-.10	-.19*	-.11	-.12*	.62*	---	
Valuing of School	.15*	.37*	.31*	-.09	-.09	-.36*	-.40*	-.33*	.49*	.45*	---

Zero order correlations were conducted among the 11 factors of motivation and engagement. Convergence was expected among the subfactors of adaptive behavioral, among the subfactors of adaptive cognitive, among the subfactors of maladaptive behavioral, and among the subfactors of maladaptive cognitive. This was fully supported in the results of the correlations where the coefficient values are all significant and the directions are all positive. Divergence was expected between the subfactors of maladaptive behavioral and cognitive with the subfactors of adaptive behavioural and cognitive. This was partly proven in the results of the correlations. When the subfactor planning was correlated with the subfactors of maladaptive cognitive and behavioral, the divergence was proven because all the correlation values are significant with negative directions. In the study management, however, its correlations between the maladaptive cognitive and maladaptive behavioral prove the divergence except between study management and anxiety with an insignificant value; and between study management and uncertain control with a positive direction. In the correlations between uncertain control and the subfactors of adaptive cognitive, the divergence was also proven because of the significant values attained with negative directions. When self-handicapping was correlated between the subfactors of adaptive cognitive, it was proven that there is divergence except with the subfactor mastery orientation because of the insignificant value obtained. Disengagement, when correlated to the subfactors of adaptive cognitive, with all the significant values attained with negative directions, the divergence was proven. However, in the correlations between persistence and the subfactors maladaptive cognitive and behavioral, as well as failure avoidance between the subfactors of adaptive cognitive, there was no any correlation that can prove divergence because all the values obtained were not significant with negative directions.

The factor structure of the Motivation and Engagement was tested using the Confirmatory Factor Analysis (CFA). The four-factor structure was compared to a one-factor structure. This was done to determine which factor structure best fits the data. The four-factor structure was composed of (1) Adaptive Behavioral, (2) Maladaptive Cognitive, (3) Maladaptive Behavioral, and (4) Adaptive Cognitive. In the one-factor model, all indicators were combined in one latent variable.

The four-factor model of the Motivation and Engagement turned out to have the best fit compared to the one-factor model. The fit indices of the four-factor model for the AIC=0.878, SBC=1.225, BCCVI=0.886, RMS=0.075, and RMSEA=0.122 had attained lower values than the one-factor model.

The four-factor model was further supported with adequate fit indices for GFI=0.888, AGFI=0.806, IMCS=1608.041, IMdf=55.0, BNFI=0.872, BNF=0.843, BCFI=0.892, JMPBFI=0.602, Bollen's Rho=0.814, Bollen's delta=0.892, and PGI=0.907.

The subfactors under the latent factors: Adaptive Behavioral, Adaptive Cognitive, Maladaptive Behavioral and Maladaptive Cognitive are all significant. The relationship of these four latent factors are also significant.

Table 3

Fit Indices of the Different Measurement Model for Motivation and Engagement

	Four Factor Model	One Factor Model
Joreskog GFI	0.888	0.609
Joreskog AGFI	0.806	0.413
Akaike Information Criterion (AIC)	0.878	2.882
Schwarz's Bayesian Criterion (SBC)	1.225	3.154
Browne-Cudeck Cross validation Index (BCCVI)	0.886	2.888
Independence Model Chi-Square (IMCS)	1608.041	1608.041
Independence Model df (IMdf)	55.000	55.000
Bentler-bonett Normed Fit Index (BNFI)	0.872	0.493
Bentler-bonett Normed Fit (BNF)	0.843	0.377
Bentler Comparative Fit Index (BCFI)	0.892	0.502
James-Mulaik-Brett Parsimonious Fit Index (JMPBFI)	0.602	0.393
Bollen's Rho	0.814	0.364
Bollen's Delta	0.892	0.505
RMS	0.075	0.180
Population Gamma Index (PGI)	0.907	0.619
RMSEA	0.122	0.277

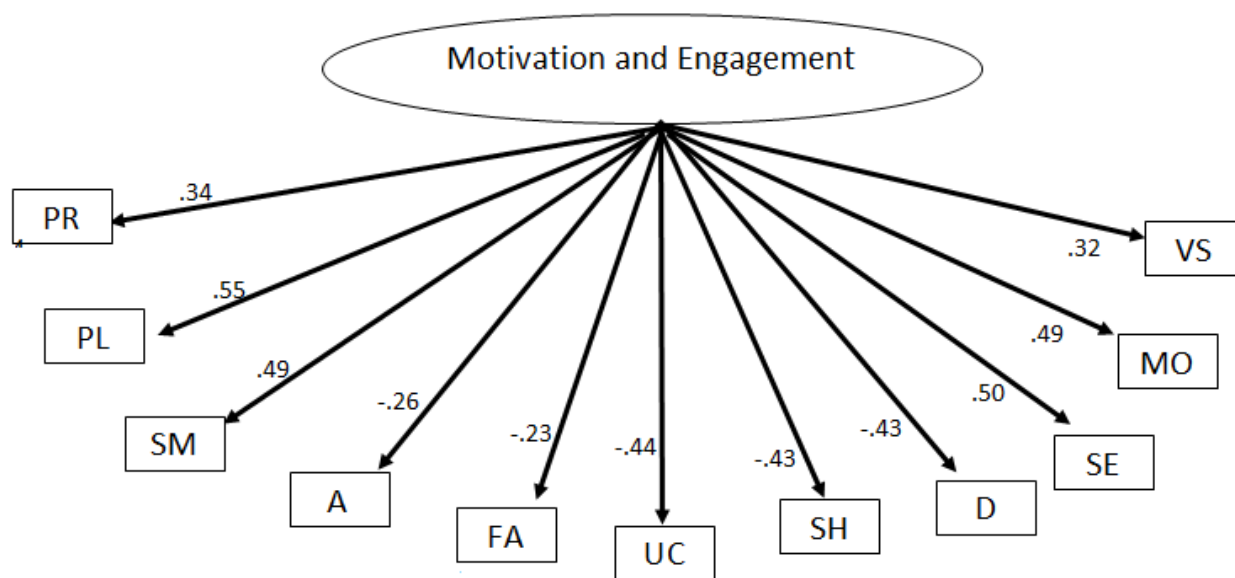


Figure 1. Four-Factor Model of Motivation and Engagement

Table 4
Predictive Validity

N=300	Beta	Std. Err. Of Beta	B	Std. Err. of B	T(288)	p-level
Intercept			2.50	0.38	6.63	0.00
Persistence	0.53	0.07	-0.05	0.06	-0.73	0.46
Planning	0.19	0.09	0.16	0.07	2.19	0.03
Study Management	-0.00	0.08	-0.00	0.07	-0.08	1.00
Anxiety	-0.23	0.08	-0.13	0.04	-3.03	0.00
Failure Avoidance	-0.07	0.07	-0.04	0.04	-0.93	0.35
Uncertain control	0.10	0.09	0.05	0.05	1.08	0.28
Self-handicapping	0.20	0.09	-0.10	0.05	-2.26	0.02
Disengagement	0.21	0.08	0.11	0.05	2.41	0.02
Self-efficacy	-0.10	0.08	-0.07	0.06	-1.20	0.23
Mastery Orientation	0.28	0.09	0.24	0.07	3.20	0.00
Valuing of School	-0.08	0.07	-0.07	0.06	-1.10	0.27

Predictive validity was determined by calculating the contribution of the factors of the motivation and engagement items on the College Grade Point Average (CGPA). Each beta has a corresponding p-value. If p-value is less than .05, the

predictor is significant. The factors Planning, Anxiety, Self-Handicapping, Disengagement, and Mastery Orientation significantly predict CGPA.

Discussion

The main purpose of the study is to develop items that would measure the motivation and engagement of college students where the items are based on the factors of motivation and engagement wheel proposed by Martin (2007). It includes determining the role of motivation and engagement scale administered by the researchers for college students to the attainment of the learners' good grades and exemplary student performance at school. The four factors namely Adaptive Cognitive, Adaptive Behavioral, Maladaptive Cognitive and Maladaptive Cognitive were proven where the items constructed proved to adequately measure the motivation and engagement of college students.

The instrument is reliable where the items are internally consistent based on high values of the Cronbach's alpha. Nunnally (1978) has indicated 0.7 to be an acceptable reliability coefficient. The high internal consistency in the study with the Cronbach's alpha of .87 among the items indicates that there are similarities how the respondents answer each items within each factors. This evidence of internal consistency implies that there is congruency among each item for a given factor. This congruence served as a basis for considering the reliability of the items. The study obtained values of Cronbach's alpha of the 11 subfactors having 7 of which has good internal consistency namely Self-efficacy (.86), Valuing School (.84), Planning (.84), Anxiety (.88), Uncertain Control (.89), Self-handicapping (.90), and Disengagement (.88) while the other 3 subfactors of which were regarded as acceptable internal consistency: Mastery Orientation (.78), Study Management (.74), and Persistence (.74). The remaining subfactor of Failure Avoidance (.69) is marginal. In the previous study of Martin (2007), the obtained values of Cronbach's Alpha of each subfactor from the scale is to be generally concluded lower than our present study on Motivation and Engagement. For the Adaptive Cognitive, the value of Self-efficacy was .77, Mastery Orientation was .76 and Valuing of school was .81 which were all lower than the values obtained from the present study. The values of Cronbach's alpha of the two subfactors namely Disengagement and Self-handicapping was both .81 which are lower than our study. However, for the Adaptive Behavioral, two subfactors from Martin's study in 2007 obtained higher value of Cronbach's alpha: Persistence was .80 and Study Management was .82. Lastly, for Maladaptive Cognitive, only the subfactor Failure Avoidance from Martin's study obtained a higher value of Cronbach's alpha of .79 while the remaining subfactors Anxiety and Uncertain Control obtained .78 and .77, respectively, which are lower than the values obtained in the present study. Comparing the present study to Martin's in 2008, the previous study obtained values of Cronbach's alpha having 7 subfactors: Self-efficacy, Mastery Orientation, Planning, Persistence, Anxiety, Failure Avoidance and Uncertain Control which has acceptable internal consistency while four subfactors: Valuing of School, Study Management, Self-handicapping and Disengagement has good internal consistency. Martin's Cronbach's alpha results show higher internal consistency in two subfactors of Adaptive Behavioral namely Persistence and Study Management because of the difference in

terms of behavior between the Australian students and Filipino students. The year level also accounts for the given dissimilarity. Marvin's study used samples of students from the high school level—junior, middle and senior—while the present study had college students as participants. This was explained in the study by Martin (2009) revealing that high school students were generally more motivated and engaged than university students. There are also changes that can be drawn in terms of a range of institutional practices and student behavior related to learning and development, such as the time spent on tasks, teaching practices, student-faculty interactions and institutional requirements or services. Moreover, the subfactor Failure Avoidance from Maladaptive Cognitive also shows higher consistency compared to the results from the present study because as proven by the study of Martin (2010), the university students tended to score lower in terms of adaptive behavior and maladaptive motivation justifying the results given that the previous study—which made use of high school students who attained higher internal consistency in the subfactors Persistence, Study Management and Failure Avoidance from the factors Adaptive Behavioral and Maladaptive Cognition. Engagement varies across student group demographics and changes over time.

The items were regarded to be valid attaining convergence among the Adaptive Cognitive subfactors, among the Adaptive Behavioral, among Maladaptive Cognitive and among Maladaptive Behavioral. The convergence was proven by the results of the correlations where the coefficient values are all significant and the directions are all positive. Researchers also found that the subfactor persistence is not significantly related to most of the factors. In the other hand, divergence was only partly proven in the results of the correlations when the subfactors of maladaptive behavioral and cognitive; and the subfactors of adaptive behavioral and cognitive were correlated to one another. In the previous study, Martin (2008) found that all adaptive dimensions were significantly positively correlated and correlated markedly negatively with maladaptive dimensions and slightly negatively or at near-zero with impeding dimensions. Maladaptive dimensions were significantly positively correlated as were impeding dimensions.

Factorial validity was established where a four-factor structure was compared with a one-factor structure. The four-factor structure explained the most adequate solution to fit the data supporting the factors proposed by Martin (2007). Predictive validity was established by correlating student CGPA with the eleven factors in Motivation and Engagement Wheel by Martin (2007).

The present study's factor structure was tested using Confirmatory Factor Analysis (CFA). The four-factor structure obtained the best fit of data when compared to a one-factor structure proving that the four latent factors (Adaptive Behavioral, Adaptive Cognitive, Maladaptive Behavioral and Maladaptive Cognitive). The 11 latent subfactors (Self-efficacy, Mastery Orientation, Valuing of School, Persistence, Planning, Study Management, Disengagement, Self-handicapping, Uncertain Control, Failure Avoidance and Anxiety) has significant relationship among each other and subfactors. From this result, it is proven that it is the four-factor model which accounts for a type of model used that fit the data very well. However, when compared to the previous study by Martin (2008), the two models used—invariance across boys and girls; and invariance across junior, middle and senior high—also

yielded an excellent fit to the data. When successive elements of the factor structure were held invariant across year groupings, as well as invariant across boys and girls, the fit indices (Chi square, DF, CFI, NNFI, RMSEA) were quite comparable. This result indicates that there is relative invariance across all models suggesting that factor structure, factor loadings, uniqueness and factor correlations are much the same across the three year groupings and the gender groupings. Taken together, these data suggest in terms of underlying motivational factors and the composition of and relationships amongst these factors, junior, middle, and senior high school students, as well as, boys and girls, are not substantially different.

The present study has addressed the research gaps seen in the study of Martin (2008) where less than 5% of the data were missing in each sample leading to the implementation of the Expectation Maximization (EM) Algorithm, the most widely recommended approach to imputation for missing data. There were no any missing data based on the results gathered from the present study. Moreover, the items were proven having good and acceptable internal consistency and reliabilities fitting the respective factor and subfactor they belong to.

The present study had constructed items that measure and examine the same multidimensional model of students' motivation and engagement from the lower construct on Martin's model. All factors were given justification through the equally distributed good and acceptable items composed of 11 subfactors. Then, the researchers derived data on students' College Grade Point Average (CGPA) as a measure for their achievement based on previous semester. The gathering of the students' CGPA serves as the main data and basis of the researchers for the students' evidence of academic performance. The study wants to prove whether factors of motivation and engagement can predict the students' attainment of good grades and affect the students' motivation and engagement in achieving quality performances in school. Doing so, we will be able to identify the various needed adjustments to be done in terms of time spent on tasks, teaching practices, student-faculty interactions, institutional requirements or services and other purposive academic activities essential to students' learning and development.

The wheel was treated as a multidimensional construct which lead the researchers to an appropriate scale with good items for Filipino college students which will determine the students' level of motivation, engagement and performance at school. Viewing engagement as a complex and multifaceted construct comprising three dimensions, including behavioral, emotional and cognitive engagement, the scale itself was then characterized by its hierarchical dimensionality. The wheel aims to bridge the gap between diverse theoretical perspectives about motivation and engagement, such as expectancy-value, attribution and goal orientation theory. It also provides practitioners (e. g., educators, counselors and psychologists) with a parsimonious framework that they can apply to their practice and clearly communicate to students.

The contribution that this study is that the constructed scale is applicable to college or university students measuring their motivation and engagement. Since the results revealed some characteristics and individual differences in students' motivation and engagement, it addresses further understanding of motivation and engagement. From a sociocultural perspective, student motivation and engagement

are highly influenced by broader social and cultural contexts (Kahu, 2013; Martin, Yu, & Hau, 2014). From this perspective, students' motivation and engagement greatly emanate from the goals and norms presented in their broader social contexts. Moreover, motivation and engagement may be functions of practices in different educational contexts, even for students who share an ethnicity. Although some studies have considered the individual differences in student motivation and engagement, little consensus has been achieved. The possible differences caused by students' demographic and contextual backgrounds must be examined further.

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