DEVELOPMENT AND VALIDATION OF THE UNIVERSITY OF MINDANAO NEEDS ASSESSMENT SCALE (UMNAS) FOR COLLEGE STUDENTS

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Abstract - Since the inception of Self-Determination Theory (Deci & Ryan, 2000), there had been less, if not very few, measures of psychological needs developed in the school setting. Seeing the value of this construct, the current research describes how needs exist among University students. This initial exploration, using a mixed-method of research, somehow led to the discovery of six-dimensional college needs theory. Aside from reports of excellent reliability and validity, this research enumerates evidence of standardization proving the utility of the scale to diagnose student's needs. Evidence is also provided for concurrent validity of the scale, when compared to other instruments having similar constructs.

Keywords - Needs assessment scale, Validation, Development, College students

I. INTRODUCTION

Need, as a construct, has its long history in the field of personality psychology. At its conceptual age, traditional need experts believed that valid assessment and analysis of individual needs is the doorway to the eclectic understanding of human psyche and it was also considered a fundamental determinant of human behavior (Latham & Pinder, 2005). One definition of need is that "it is a construct representing a force in the brain that organizes the perception, understanding, and behavior in such a way as to change an unsatisfying situation and increase one's satisfaction" (Engler, 2014). Needs construct likewise have shown to have considerable link with intrapsychic domain of personality framework (Cervera and Munarriz, 2013).

Deci and Ryan (1991) eloquently provided one of the most ground-breaking need constructs used in the school setting. They vie that psychological needs are organismic necessities for health which contain different subsets of needs that are essential for psychological growth, integrity and wellness. Despite meager reports, some related validation studies however have proven the use of needs construct in physical exercise (Vlapoulus & Michailidou, 2006), school counseling (Hyun, Quinn, Madon, & Lustig, 2006), and clinical practice using psychotherapy (Kormas, Karamali & Anagnostopoulos, 2014). Furthermore, needs studies worldwide have recognized that there are certain physiological and psychological needs that should be met especially in school. In fact, in relation to this, researchers posited that need constructs are useful when utilized to predict important outcomes, including college adjustment, well-being, personality development and scholastic achievement (Baard, Deci & Ryan, 1998; Burns et al., 2006). After the efforts of researchers abroad in developing an instrument for need assessment, there are still some issues that should be dealt with for its standardization, same is true in the Philippines. Despite the value of needs assessment in the academic sector, it can be gleaned that there is a limited research about this topic in the Philippine context. As what Segui (2004) observes, there is a dearth in literature about needs studies done in the Philippine context, most especially instrument that has utility in the school setting, although the study of Cagas and Hassandra (2014) confirmed the presence of the three-factor constructs of students' needs involving competence, autonomy and relatedness of Deci and Ryan (1991). But, the said research recommended further validation studies to understand the holistic nature of needs through the lens of the college students.

II. RESEARCH METHODS

2.1. Design

This current research employed a mixed-method research design but largely based on quantitative design. Identifying the factors to determine the structure of the instrument was dependent on the available theories, studies and existing tools measuring needs. Qualitative investigation was also conducted to verify the presence of the identified need factors. The attainment of construct validity for each dimension was carried out through exploratory and confirmatory factor analyses. The reliability of the instrument was established using internal consistency analysis and test-retest. This design is particularly based on the mixed methods of research propagated by Creswell (2009).

2.2. Participants

In the two phases of research, the participants involved were the undergraduate students in the Region XI particularly at the Southern part of Mindanao, Philippines. Phase 1 of this research was focused on identification of need items which later subjected to validity and reliability using college samples. In the Phase 2 of the study, the validated

instrument was normed using quota sampling technique. As a result, a total of 84 students enrolled in the different majors across year levels took the test-retest to ensure that the items of the test contain adequate or acceptable stability. To improve the utility of the validated instrument, the researcher selected 12 participants from the test-retest sample and conducted a qualitative item analysis using the item analysis guide suggested by Cohen & Swedlik (2009). Using a purposive sampling technique, a total of 32 selected students from the different college programs served as the participants for the concurrent validity procedures.

In sum, Table 1 shows the total number of participants across the two phases of research. A combined total of 2,609 college students enrolled in the second semester of school year 2014-15 participated in the current study, 33.7 percent (n=881) of them covered the college student samples while the 66.2% (n=1,728) were the college students of the normative sample of the different colleges and branches of the University of Mindanao. However, this research only provides the results of the development and validity of the construct. Norming of the instrument is separately reported (Elnar, 2018).

Table1: The Participants Across the Two Major Phases of the Study

Phase	Frequency	Percentage
Phase 1	881	33.7
Phase 2	1728	66.2
Overall	2,609	100.0

2.2. Development Process and Instruments

The identification of the 11 dimensions of the UMNAS was initially formulated and supported through literature review and focused group discussion. The presence of these needs was further validated by a sample of college students who provided ratings (first part) as well as their ideas and reactions to the questions of the opinion questionnaire (second part).

The collated data were processed and analyzed subsequently after conducting a thematic analysis of the data of the qualitative responses. This resulted to the pool of items of the UMNAS. The items were later subjected to content validity by six experts (i.e. psychologists, counselors, school heads) in order to come up with the final items for the pilot test.

The scale with initial need items was later piloted which underwent two reliability procedures: the first part was to test the internal consistency of test items and the second part was to measure the relationship between scores from one test given at two different test administrations commonly known as test-retest at 10-day interval. These two-step reliability measures determined the reliability of the 97 retained items which were later utilized for construct validity.

The construct validation procedures were conducted at two separate representative samples: the concurrent validity was established by correlating the scales of UMNAS with other existing scores of need measures such as the Basic Psychological Needs Scale (BPNS) and Edward's Personal Preference Schedule (EPPS), while the factor analyses were performed to examine the construct's internal validity using Exploratory Factor Analysis (EFA). The instrument was further examined through Confirmatory Factor Analysis (CFA). The citedfactor analyses tested how the identified items reflect the constructs of UMNAS (EFA) and to ensure how well the model fit the data (CFA). To improve the final need items, series of qualitative interviews among the selected test-takers and test administrators was conducted.

2.3. Statistical Analysis

The development of test items was carried out through item analysis. Item analysis is a set of methods used to evaluate test items. A logical validity of items was determined using the formula of Lawshe (1975) for content validation ratio (CVR):

$$CVR = \frac{ne-(N-2)}{N/2}$$

where N is total number of panelists, and ne is the number of panel indicating the item as "essential".

To test if the items interrelate and represent similar content, an internal consistency coefficient was examined using Cronbach Alpha (α) to the overall test scales. The researcher have used the formula developed by Cronbach (1951) which was elaborated by Kaiser and Michael in 1975 (Cohen, Swerdlik & Sturman, 2013). The formula for getting the coefficient alpha was:

$$r_\alpha = \left(\frac{k}{k-1}\right)\left(1-\frac{\Sigma\sigma^2}{\sigma^2}\right)$$

where r_α is the coefficient alpha, k is the number of items, Σ is the sum of variances of each item, and σ^2 is the variance of the total test scores.

To test the stability of the items, a test-retest reliability was conducted by comparing the items of the two test administrations using Pearson r. The formula used for test-retest was:

$$r = \frac{\Sigma_{xy}}{\sqrt{(\Sigma x^2)(\Sigma y^2)}}$$

where Σ_{xy} is the sum of the product of

the paired x and y scores, Σx^2 is the sum of the squared x scores, and Σy^2 is the sum of the squared of y scores.

An exploratory principal component factor analysis was performed on the University of Mindanao Needs Assessment Scale (UMNAS) that determined the number of factors scale and which items were loaded on each factor. Factor analysis is a mathematical attempt to simplify sets of data (Kline, 2010).

EFA data was beforehand subjected to two sets of analysis: (1) Kaiser-Meyelin- Olkin (KMO) and Bartlett's Test for sampling adequacy, and (2) Scree Plot for interpretability and theoretical coherence which gives accurate decision guide whether to exclude a particular subscale or not. To further determine the fitness of hypothesized factors (subscales), CFA fit indices were examined such as chi-square (χ^2) goodness-of-fit statistic, root mean square error of approximation (RMSEA), Tucker-lewis Index (TLI), Adjusted Goodness of Fit Index (AGFI), and Comparative Fit Index (CFI). Purposely, the goodness-of-fit statistics evaluate the model and determine how well competing models fit the data. For example, χ^2 goodness-of-fit statistic requires an χ^2 value that is less than twice the model's degrees of freedom indicated an acceptable overall model fit (Hu & Bentler, 1995).

III. RESULTS AND DISCUSSION

3.1. Results of Four-Phase Item Development

Table 2 shows the number of items per subscale of the instrument that underwent four phases of item development. Item reduction was used in order to tap the most coherent, valid and accurate items for each dimension of the UMNAS.

Table 2: Number of Items in the Initial Subscales of UMNAS in Four-phase Item Development

Subscale	No. of Items			
	Phase 1	Phase 2	Phase 3	Phase 4
1. Academic Empowerment	18	14	14	0
2. Career Exploration	16	10	10	8
3. Social-Interpersonal Relationship	24	14	15	11
4. Psychological-Emotional	33	12	15	18
5. Physical-Aesthetic	21	12	12	11
6. Family Relationship	10	9	14	8
7. Heterosexual	15	11	0	0
8. Spiritual-Moral	22	20	20	12
9. Economic Stability	12	10	10	5
10. School Environment	12	12	14	12
11. Autonomy/Freedom	11	10	10	9
12. Skills & Competence	10	10	10	15
13. Validity Scale	0	0	0	5
Total Items	204	144	144	114

After further review of each identified item, the researcher developed an opinionnaire and administered it to the college students (Phase 3). During Phase 4 of the item development, the validated items which were content analyzed after Phase 3, were further examined by six experts using Lawshe's (1975) Content Validity Ratio (CVR). Significant remarks (recommendations) by the content validators were considered and items with low CVR were revised while those items having very low CVR value (i.e. -0.2) were discarded from a dimension where it supposed to belong.

3.2. Reliability of the UMNAS

The overall internal consistency of the item is shown in Table 3 which demonstrates an alpha value of .931. The overall reliability result appeared an excellent value when compared with the acceptable value of .7.

It was also gleaned from this method that none among the try-out items (114) were candidates for deletion. It also manifested that if one or any of the item was deleted, the overall Cronbach alpha did not increase or vary. The coefficient stability of all items (10-day interval) having range values of .509-.626 for test-retest showed significant correlation.

Table 3: Internal Consistency of UMNAS

	N	%	Cronbach Alpha	No. of Items
Valid Cases	200	100	.931	114
Excluded[a]	0	0		
Total	200	100.0		

The instrument's Cronbach alpha of .931 further means to have an excellent value (Karasar, 2011). Salvia and Ysseldyke (2004) explains that those items below the excellent value of .90 are suggested to be used only for screening decisions while those items exceeded or equal to .90 can be used for important decisions. In addition, the reliability of the items of the UMNAS was further confirmed through deletion of one of its items. Results showed that overall alpha did not reduce or vary during repeated calculation. However, when items were clustered, five dimensions produced low alpha that reduced into acceptable range values (.73-.83) instead of excellent interpretation of alpha value. This means that when items were consumed into one dimension (subscale), it indirectly reduced its stability as pointed out by Salvia and Ysseldyke (2004). The established reliability of UMNAS is likewise in coherent to the findings of Burns et al. (2006) on the psychometric soundness of Five Basic Needs (FBN): the test was highly reliable based on estimated internal consistency and test-retest. FBN and UMNAS have almost similar theoretical background, number of items and research protocols (process).

3.3. Construct Validity of the UMNAS

When the researcher tested the instruments' homogeneity using inter-correlational analysis, it was found out that the instrument could homogenously define college needs as the samples' scores contained a robust relationship at .01 confidence level (Table 4). Other validation research suggests that any inter-correlation at the narrowest degree of error led to the assumption of high or excellent degree of reliability which is next to the 99% percent accuracy requirement of any pharmacological studies.

Table 4: Inter-correlations of Subscales and the UMNAS' Total Score

Subscale	FA	CE	SM	SE	AI	PA
Family Attachment	-					
Career Exploration	.499**	-				
Self-Management	.548**	.673**	-			
Spiritual Enrichment	.649**	.538**	.714**	-		
Affective Integration	.690**	.637**	.697**	.774**	-	
Personal Autonomy	.695**	.548**	.639**	.706**	.841**	-
UMNAS Total	.858**	.751**	.810**	.851**	.902**	.873**

**** Correlation is significant at the 0.01 level (2-tailed)**

Homogeneity findings concur with the point of Furr and Bacharach (2014) in which testing the capability of a certain instrument to measure a single construct should attain high construct validity using inter-correlation analysis.

Aside from homogeneity testing, this research also tested the concurrent validity of the scale with other instruments developed under similar needs construct. Hence, it was found that both of the instrument have considerable or high degree of concurrent validity in terms of r values with other instruments (BPNS: .87**; EPPS: .633**). This correlation from similar need instruments does not only verify the inherent capacity to measure college needs, but also revealed the UMNAS' true identity in measuring the need construct of the college students. Simply put, making UMNAS' subscales relative to western psychological construct (BPNS & EPPS) proved its usability among the Filipino subjects which correspond to the call of Enriquez (1992), the father of Sikolohiyang Pilipino (Filipino Psychology), in developing down-to-earth (culture-fair) measures that can quantity the true psychological construct of the Filipinos (Church & Katigbak, 2002).

3.4. Exploratory and Confirmatory Factor Analysis (EFA, CFA)

Before conducting the exploratory factor analysis, EFA data was screened using Kaiser-Meyer-Olkin (KMO=0.892) and Bartlett's test of sphericity to measure the sampling adequacy of the EFA sample (n=300) which is shown in Table 5. The table shows that the sample entered for data processing was adequate and surpassed the minimum criteria of .05 (Kaiser & Michael, 1975).

Table 5: Factorability of the EFA Data

Sampling Method	Approx. Chi-Square	df	KMO	Sig.
Kaiser-Meyer-Olkin Measure of Sampling Adequacy			.892	
Bartlett's Test of Sphericity	5016.665	1326		.000

Adequacy of sampling data further indicates a strong threshold to perform factor analysis and that had been said to be a correlation matrix was not an identity matrix (Cochran, 1970).

Through objective judgment, the scree plot's Eigenvalues was also examined that determined the number of factors (dimensions) of the UMNAS (Furr & Bacharach, 2014). The plot revealed that the instrument is multi-dimensional (Figure 1).

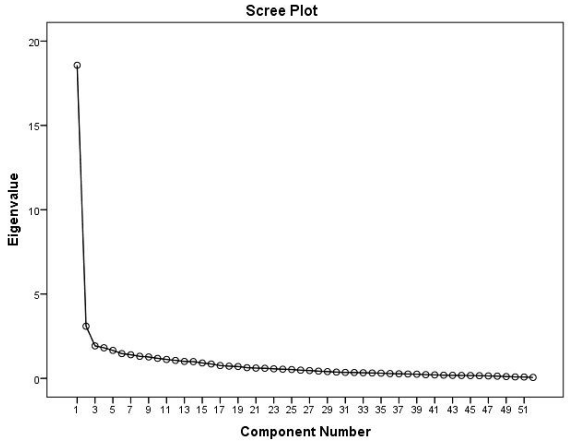


Fig.1. Scree Plot of EFA Data.

A multi-dimensional instrument having correlated factors is considered a higher-order factors which contains several attributes but each of the dimension is homogenous measuring a specific atttibute and yet correlated to the higher-order factor measuring only one construct (Furr & Bacharach, 2014).

Introspectively, the established initial validity and reliability provided an evidence of psychometric soundness of the instrument. As also suggested by other validation research, the instrument should undergo factorial analyses for the purpose of calibrating and finding the best items to measure the needs of college students.

After series of factor rotation, there were 13 components extracted, which explain a cumulative 74.107 percent of the total variations of the data. However, due to some item isolation issues in which other items loaded with other components, the researcher were able to come up with 28 items loading into a six-factor model, with the remaining items manually eliminated. Rozeboom (1992) posits that components must have robust factor indices greater than 0.60, must not load as a weaker index to other components, and that components must be comprised of at least three items.

The factor loadings of the 28 items clustered in the six factors or dimensions of the UMNAS. An item having the factor loadings of .30 or .40 indicate reasonable value, while a factor loading value of .70 or higher is considered very strong (Furr, 2011).

During factor analysis, the initial 12 dimensions identified through content analysis collapsed into the six dimensions (subscales) of the UMNAS, as follows: The first factor (F1) has accumulated six final items (86, 46, 41, 56, 83, and 50). These combined items will measure the need for Family Attachment of the college students. The second factor (F2) reveals six final items (110, 112, 103, 78, 94, and 16). These statements concentrate on the students' need for Career Exploration. the third factor (F3), four items (12, 82, 81, and 71) were identified to measure the students' strategies in handling situations and self-awareness. Thus, the F3 was suitably named as Self-Management. The fourth factor (F4) showed in the table reveals another four items (3, 8, 106, 47). Thus, combining these four items in F4, the researcher named them as Spiritual Enrichment. The fifth factor (F5) combines four inter-related items (79, 98, 84, and 77). F5 is named as Affective Integration since these items speaks about students' emotional aspect. Finally, the last dimension identified by the principal component analysis (PCA) was the sixth factor (F6) and this factor was named by the researcher as Personal Autonomy. F6 is a cluster of four items (34, 67, 52, and 29). Together, these six factors (dimensions) formed the needs of the college students.

While EFA proved its multi-dimensional construct converged into one higher-order (single-factor) that can be usable tool to measure the needs of the college students, the calibrated instrument likewise supported the presence of needs among other set of clinical and non-clinical samples that focused on headache (Cramer et al., 2001), satisfaction (Johnston & Finney, 2010), supportive care (Lehmann et al., 2012), spirituality (Buck, McMillan, 2012), and family (Chien & Lee, 2005; Bilgin et al. 2013).

Using confirmatory factor analysis, a six- factor multidimensional model of UMNAS was also found. The model, at the same time, showed considerable fit as revealed by these fit indices': χ^2 - df (540.876; 307) , GFI (0.800) AGFI (0.889) TLI (0.874) RMSEA (0.072). The Chi-square ($\chi^{2)}$ estimate value of 540.876, which was found to be significant at p-value at 0.000 showed an associated probability of less than 0.05 (Cochran, 1970). The degree of freedom value of 307 revealed a good fit. The larger the value of df the higher the fit can be obtained. But, according to Hu and Bentler (1995), χ^2 can only offer dichotomous strategy implied by a statistical decision rule and cannot be used to quantify the degree of fit alone. Thus, the researcher opted to measure other model fit indices of the measured variables. Tucker-lewis Index (TLI) fit value is close to 1 (0.874) which indicates a very good fit while the Root Mean Error of Approximation (RMSEA) is 0.072. Similarly, Wood and his colleagues (2008) explain that an RMSEA of .06 is considered a good fit.

Both exploratory and confirmatory factor analyses provided a strong support to the existing need constructs identified by the literature and other contemporary context-specific need instruments focused on intrinsic motivation (Reeve & Sickenius, 1994) and exercise (Vlachopoulos & Michailidou,

2006), to name a few. However, the inherent constructs of the above-cited need instruments were built upon the basic psychological needs concept of Deci and Ryan (2000). This adds to the motivation of the researcher to validate those psychological need constructs among the undergraduate sample and postulated that the existence of these three constructs (competence, relatedness and autonomy) might be limited which calls for further validation, as dealt by this validation research. Through factor analyses, the developed dimensions of the UMNAS confirmed the presence of needs in variety of theoretical constructs and grounded theory of measurement which further redounds to the emergence of one-factor six-dimensional construct of college needs via factor analysis.

CONCLUSIONS

UMNAS is a college need model composed of six-factor multidimensional and yet correlated dimensions have considerable fit model which is also supported by the illustrated structural equation model. Results reveal that both internal consistency and test-retest proved the stability of all items and hence an indicative of high to excellent range of reliability. The same is true when it comes to construct validity wherein it showed to have homogenous construct based on concurrent and other validity indices (EFA, CFA). Based on the results and findings of the study, it is concluded that the formulated instrument has shown substantial evidence of reliability and validity capable of measuring the needs of the college students.

ACKNOWLEDGMENTS

The researcher wishes to give his wholehearted appreciation to the administrators, staff, faculty, and students of University of Mindanao (Main & Branches) and Ateneo de Davao University for unconditional assistance in the completion of this empirical research.

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