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Development and psychometric properties of professional belonging scale for nursing students

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ABSTRACT

The aim of this study was to develop and psychometrically test a scale of professional belonging in Iran. This study was carried out using exploratory mixed method on 150 nursing students. After using grounded theory, the process of professional belongings was explained and a 61-item question bank was formed and then the psychometric characteristics of the designed tools were examined. Following different quantitative and qualitative face and content validity, in construct validity, three methods of convergent, divergent and exploratory factor analysis were examined. By explaining a variance of 56.14%, the assessment tool of professional belonging was formulated with 47 items and the 5 factors of personal views, professional acceptance, educational context, interpersonal communications and perceived consequence in the Likert scale. In convergent and divergent validity, the correlation between belonging scale and depression questionnaire were ($r=0.1$), lower than that between belonging scale and self-efficacy questionnaire ($r=0.6$). The reliability was also examined using two methods of internal consistency using Cronbach alpha(0.97) and tool stability($r=0.76$). The Nursing Students Belonging Scale can be used as a criterion for measuring the nursing students' professional belonging and improving clinical environments.

Keywords: Instrument development, Nursing students, Professional belonging, Psychometric Properties.

Abbreviations: BPSA: Bayesian post stratification, CVD: cardiovascular disease, OCP: oral contraceptive pills, PBRs: population base random sample, LRA: logistic regression analysis, MLRA: multiple logistic regression analysis

INTRODUCTION

Sense of belonging is an important dimension of socialization in the workplace(McKenna & Newton, 2008). Belonging is also an important phenomenon for nursing students and instructors. It is a personal experience in response to the degree of feeling safe, accepted, valued, and respected in relation to others. In addition, the sense of belonging can result in behavioral, physical, psychological, and emotional outcomes(Murray & Main, 2004). Sense of belonging from the perspective of Iranian nurses and nursing students is acceptance of the profession; this factor can influence the process of socialization and being a nurse(Zarshenas et al., 2014). When the students felt they were accepted in a group, they felt comfortable in the social environment that eventually resulted in self-actualization and satisfaction(Carlson, Pilhammar, & Wann-Hansson, 2010). Individuals with the sense of belonging could cooperate with their colleagues properly and manage their problems. The researchers showed a positive correlation between an increase in the sense of

belonging and motivation, attention to others, and positive interpersonal behaviors(Andrew, Robb, Ferguson, & Brown, 2011). Jones and Lathlean (2009) assessed the nursing students' experience of belonging and mentioned that facilitation of the students' progress was the main goal of clinical education, which was affected by organizational, underlying, interpersonal, and personal factors. In fact, students' progress in reaching efficiency could be achieved after meeting the needs of the previous stages, i.e. security, belonging, and concept of health(Kim & Park, 2011). Nikbakht et al. (2005) evaluated the nurses' experience of professionalization on entrance to the clinical stage. According to the results, the sense of belonging was one of the main themes of the study and an essential factor in nurses' professionalization(Nikbakht Nasrabadi, Parsa Yekta, Seif, & Rasoolzadeh, 2006). A large number of studies have indicated that experience of belonging is an important measurable construct for perception of clinical environment dimensions, which directs positive learning experiences among nursing students(Del Prato,

Bankert, Grust, & Joseph, 2011). All instrumentation specialists have approved that questionnaire content have to be extracted directly from its references. This has to be considered in determining of questionnaire items, sentences, and literature (Sedgwick, Yonge, & Yonge, 2008). In fact, values and meanings reflecting a construct might be different from one culture to another. Maneesriwangul (2004) believed that in instrumentation studies, mere translation of the questionnaire was not enough and cultural differences had to be observed (McGaskey, 2011). The content of an instrument should be appropriate to the culture of the countries in which it will be used (Sedgwick et al., 2008). The goal of this study was to develop and examine the psychometric properties of professional belonging scale in Iranian nursing students.

Methods

This study was carried out in a two-stage process using exploratory mixed method. After the research ethics committee approved and obtained all the participants' written informed consent, this study started using an instrument development design that is particularly useful when the researcher needs to develop and test an instrument.

Phase 1: Item generation

In the first stage, a form of grounded theory was used with attention to its advantage such as deriving the elements of a grounded theory of the participants' descriptions of day to day experiences, so that researchers can have some confidence in the relevance to their experiences. In this phase, sampling was recruited from different level of students, nurses and faculty member with maximum variation (Different educational levels, Different Experiences, Various work roles (Staff, Metron and Supervisor). Data were collected until saturation was achieved. Quotations from participants linked directly to elements in grounded theory for writing items (Wolf, 2007). Data in the qualitative phase of the study was collected by conducting 21 semi-structured in-depth interview and 3 group interviews with 27 nursing students. Data entry and line by line coding was done simultaneously to identify basic concepts. Basic codes were in the form of words or phrases either directly extracted from the data or similar statements told by the participants with exactly the same meaning as the given phrase or concept. Constant comparisons were made during the codifying process and similar codes were classified in one class, so that a total of 2000 codes across 19 basic classes were extracted. Further comparisons of the codes and classes, and integrating and linking them, ended up with a total of 5 classes referred to as personal views, professional acceptance, educational context, interpersonal communications, and perceived consequence. Then, based on this phase, conceptualization was done and content domain of the questionnaire was identified and

suitable items were formed. Considering the theoretical definition and attributes of the concept derived from the first step, an item pool was generated; each item was rated on a five-point likert scale ranging from one to five. After the initial items of "professional belongings" of the questionnaire were extracted and according to the inductive-deductive approach, a literature review was done and finally we formed 61 item pool;

Phase 2: psychometric properties

Through different methods of reliability and validity, the psychometric characteristics of the designed questionnaire were examined. Validity was assessed by qualitative and quantitative face and content validity and also construct validity.

Face validity

Qualitative and quantitative face validity was done. In the qualitative face validity, the questionnaire was assessed for grammatical, syntactic and appropriateness to flow logically by experts in psychometrics and nursing. It was also assessed by participants on the basic criteria of comprehension, ambiguity and clarity. In the quantitative face validity, the impact item was calculated. The percentage of nursing students who scored 4 or 5 in item importance (frequency) and the mean importance score of item (importance) were calculated using the following formula: Item Impact Score = frequency × Importance. If the item impact was equal to or greater than 1.5, it was maintained in the instrument; otherwise, it was eliminated.

Content validity

In the content validity examined at the level of individual items, we expressed the extent to which each item measured the target or content domain which is supposed to measure. In the content validity ratio, a panel of experts (12 members) in instrumentation and nursing from universities across the country (such as Tehran, Shahid Beheshti, Behzisti sciences, Tarbiat modares, Artesh, Shiraz, Zanjan, Arak, Oromie, Tabriz, Ghazvin, Shahrod and Birjand) were asked to assess the items about the essentials of each item using a three point rating scale (1. not necessary 2. useful but not essential 3. essential). According to Law she, the minimum score for each item must be 0.59 ($p=0.05$). In the content validity index, the experts rated the relevance of each item on a 4-point scale. (very relevant to not relevant). If 80% of the experts agreed that an item was valid, we incorporated it into the instrument (Beck, 2009). and it was determined by the proportion of experts rating the item as more than or equal to 3. Content validity index was calculated both for Item level (I-CVI) and scale level (S-CVI). If the I-CVI was higher than 79 percent, the item was considered appropriate. If it was between 70 and 79 percent, it needed revision. Also, if it was less than 70 percent, it was eliminated. In S-CVI, both of the methods of universal (SCVI-U) and average (SCVI-Ave) were assessed. Since this index

does not consider the possibility of inflated values because of the chance agreement, modified kappa statistics, which is a consensus index of inter-rater agreement, was also calculated.

Construct validity

Construct validity was tested using factor analysis, convergent and divergent validity. Exploratory factor analysis was used with 150 students according to the number of items extracted in the first phase to reduce a set of data and group the inter-correlated variables together. In factor analysis, a principal component analysis (PCA) with Equamax rotation was used with the following criteria: eigenvalues higher than 1.0 and factor loading higher than 0.4. Before factor analysis, Kaiser-Meyer Olkin measures and Bartlett's test were calculated. In convergent and divergent validity the correlation between belonging scale and depression questionnaire were ($r=0.1$) lower than that between belonging scale and self efficiency questionnaire ($r=0/6$).

Reliability

Internal consistency was assessed using Cronbach's alpha, which provides information on the degree of interrelatedness of items. A minimum of 0.7 was considered sufficient. The stability of the scale was assessed by measuring the test-retest reliability. The respondents were sent the same instrument after approximately 2 weeks to complete it.

Results

In the first stage, item generation phase, using purposive sampling, the process of professional belonging was explained by conducting twenty-one semi-structured interviews and three group interviews with nursing students, nurses and faculty members. In this stage, content domain with 5 dimensions, including perceived consequences, perceived professional relationships, professional identity, established professional status and confusion role were identified. 61 items were generated from this stage, which were combined with items from the literature. In psychometric testing, quantitative face validity was performed. The impact score of each one was calculated. All of the items had scores higher than 1.5 (between 1.8 to 4.8). In qualitative face validity comprehension, ambiguity and clarity of the items were assessed; most of the items were generally easy to understand for nursing students and in some of the items a few words were changed to be better understood. In qualitative content validity, we requested the panel of 12 experts in nursing and instrument design to judge about the content of items, in accordance with the theoretical definitions of the construct underlying the study, its dimensions, and items of each dimension. In this stage, 56 items were revised, 4 were eliminated, 2 were separated, and 5 remained unchanged; finally, 59 items remained at this stage. In the next step, CVR was calculated with 11 experts on the necessity

of the items and according to the Lawshe table from 59 items. 5 items were eliminated. Then, the content validity index was calculated for each item (I-CVIs) to be rated in terms of clarity and its relevancy according to the construct itself and its dimensions on a 4-point ordinal scale from 1 to 4. At this stage, 1 item with a CVI score lower than 0.70 was eliminated. Two items with a CVI between 0.70 to 0/79 were modified according to the recommendation of the panel members and 8 items were merged to 4 items and again were returned to the experts and in this round all of the items were higher than 0.79. Then, modified Kappa was calculated for the proportion of chance agreement. Evaluation criteria for Kappa is the values about 0.74, between 0.60 and 0.74 and the ones between 0.40 and 0.59 are considered as excellent, good, and fair, respectively. In this stage, as in the previous stage the item with unacceptable score again received a low score (0.59) and was eliminated; finally, 50 items were entered into the next stage that was construct validity and it was assessed by factor analysis, divergent and convergent validity. The KMO of sampling adequacy value was 0.9 and Bartlett's test of Sphericity reached statistical significance ($p=0.001$), supporting the factor ability of the correlation. Principal component analysis with Equamax rotation by considering to Scree plot [Fig-1] were extracted as 47 items in 5 factors of personal view, professional acceptance, educational context, interpersonal communication and perceived consequences with eigenvalues higher than 1/0 and minimum factor loading of 0.4 that explained totally 56.14% of the total variance. [Table1,2] In convergent and divergent validity, self-efficiency and beck depression were used. With alpha 0.05, beta 0.2, these two questionnaires were submitted to 30 students and the results showed that the correlation between belonging scale and depression questionnaire were ($r=0.1$) lower than that between belonging scale and self-efficiency questionnaire ($r=0.61$). In reliability, two methods of stability and internal consistency were assessed. For stability, the scale was given twice to the same population (20 nursing students) and then we correlated the scores over time that showed 0.76 correlation coefficient after 2 weeks. For internal consistency, the correlation between subscales and the total questionnaire was assessed [Table3] shows the internal consistency for 5 domains and for the total questionnaire. The internal consistency of the whole scale was 0.97 and in 5 subscales it exceeded 0.8, showing an acceptance rate.

Discussion

The aim of this study was to develop a new instrument for the measurement of belonging to nursing students and also evaluate the psychometric properties of the questionnaire. This study used multi-method construction which combined qualitative and

quantitative methods. It covers a broad range of factors that contribute to nursing professional belonging. The item reduction process has a rigorous methodology with different methods of validity and reliability and was employed to develop this 47 item questionnaire. Qualitative research has been recognized as a strong foundation for constructing a questionnaire as an effective approach to represent the unique experience of the participants' perspectives (Beck, 2009). In another study, Levett Jones assessed BES-CPE psychometric properties developed by Sumer (1995) in clinical settings. In that study, 34 items, divided into 3 factors, namely dignity, relationship, and efficiency, were extracted (Del Prato et al., 2011). Our questionnaire is similar to Levett's questionnaire and the result of other studies (Shafakhah, Zarshenas, Sharif, & Sarvestani, 2015) with respect to the title of interpersonal relationships. However, precise examination reveals considerable differences among the items. In our society, interpersonal relationships involve a wide spectrum, i.e. family, colleagues, peers, patients, and even instructors. In Levett's questionnaire, on the other hand, free expression of grief to colleagues, invitation to lunch with colleagues, and colleagues' attention to one's absence were mentioned, which are different from belonging criteria in Iranian society. Moreover, due to the strong familial bases in Iran, the individuals' perception of the family affects their sense of belonging. Therefore, family's roles and perspectives regarding the individuals' profession, behavior, and relationships have an impact on their sense of belonging. The effects of peers (classmates or prospective colleagues) are also of great importance. Trust in nurses, respecting their professional perspective, etc. are among the major factors forming the items of interpersonal relationships in Iranian society, but they are not included in Levett's questionnaire. In that questionnaire, the effective factors in the increase of belonging mostly point to the role of colleagues, i.e. being accepted by colleagues, helping them, cooperating with them, and colleagues' supports. In our questionnaire, on the other hand, various dimensions, including personal viewpoint, educational background, and perceived outcomes were effective in professional belonging. Thus, our questionnaire had wider dimensions and was not limited to the role of colleagues. This might be attributed to the nature of nursing in Iran. Belonging scale was developed by Hegerty and Patusky for measurement of the sense of belonging among adults in 1995. That questionnaire had 27 items in two sections, namely psychology and antecedents, which determined 36.8% of the variance of all the items. This was lower compared to our investigation (56.14%). Yet, it has been reported that the extracted factors have to determine at least 50% of the variance (Hagerty & Patusky, 1995). Higher education scale is another instrument

developed based on Lute Jones' questionnaire entitled "assessment of the sense of belonging among students in higher education" which is made up of three parts: relationship with the student community, relationship with educational institutions and merging. Due to the small sample size (N = 57) in this study, it is likely that the participants are students more interested in this study. The study also had limitations in terms of geographical generalization (Metsälä, Heiskanen, & Kortelainen, 2012). Regarding the relationship with educational institutions and merging with the student community and educational institutions which is concerned with the sense of membership and belonging to the institution or company and participation in their usual activities, items are peculiar to the Applied Sciences and, practically, they are different from and non-comparable to our questionnaire which assesses professional belonging. Concerning the dimension of relationship with the student community, there are some cases which, to some extent, make a reference to our interpersonal communication questionnaire, for example, item 'One or more students of specialty training trust me' which is similar to item, 'My classmates trust me as a nurse' in our questionnaire. To cite another example, the items 'It is important for me that other students pay attention to me' or 'It is important for me to feel that I am accepted by the students' are expressed in the area of interpersonal relationships as 'My professional views are valuable for my friends / colleagues'. It is noteworthy that the correlation between the items in this area is between .37 to .84 whereas in our questionnaire, in the area of interpersonal communication the correlation was between .66 to .80. This indicates that there is a strong correlation between the items on the questionnaire. This study devised a questionnaire for nursing students with good psychometric properties, but development of a questionnaire to measure professional belonging in Iranian nursing students is still in its development stage. This study provides evidence for the soundness of the factor structure and acceptance reliability of the questionnaire in Iranian population. Further studies are required for applying the questionnaire in other nursing students in other educational areas in Iran.

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