

Psychometric Analysis of the Professional Identity Questionnaires in Croatian Nursing Student Context

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Abstract

Introduction: The identification of nursing students with their profession, as well as gained professional competencies, are the crucial factors of the quality of their future work activities and the level of safety of the patient they are taking care of. Therefore, it is of utter importance to estimate the nursing students' professional identity during their education. **Objectives:** The purpose of this study was to translate Professional Identity Five-Factor Scale and Identity questionnaire, to test their psychometric properties in Croatian practice and to identify more suitable instrument of measuring the level of nursing students' professional identity in Croatian context. **Methods:** Quantitative, cross-sectional two-phase study was performed. In the first phase translated questionnaires were administered to a sample of 432 nursing students. Based on the confirmatory factor analysis (CFA), which revealed poor model fit, the principal component analysis was conducted. In the second phase, CFA was used to test the Croatian version of the instruments' factor structure on a sample of 222 students with different study orientations. **Results:** The CFA results, conducted in first phase, do not support the original version of the factor structures of the Professional Identity Five-Factor Scale and Identity models. The exploratory approach showed that the translated Professional Identity Five-Factor Scale had three factors with good psychometric properties explaining 49.35% of the variance. Translated Identity questionnaire had a two-factor structure (63.46% explained variance) with good reliability properties. In the second phase, on another heterogeneous sample of students, the described factor structure was found to have a good model fit obtained by CFA. **Conclusions:** According to the findings, Professional Identity Five-Factor is more appropriate for evaluating professional identity of nursing students, and Identity is probably better suited to measure professional identity among working professionals.

Keywords

nursing students, professional identity, questionnaires, Croatia, validation study.

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Introduction

As a form of social identity, professional identity (PI) is a basis of professional functioning and a focal point of many disciplines in research. It includes professional, educational, and social skills, attitudes, values, and beliefs which individuals share in interaction with other members of a certain group, and at the same time it differs them from other professional groups (Maginnis, 2018). PI development begins with education and preparation of students for their future occupation (Kruse et al., 2020; Maginnis, 2018; Tan et al., 2017). Therefore, the basis of PI of nursing students is education, through which the students get introduced to true values of nursing and the very meaning of belonging to their own

profession (Maginnis, 2018). Unfortunately, the opinion of nursing being exclusively connected to the occupation of doctors' profession is still persisting in the part of the

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public opinion, as well as the opinion that the nursing profession is “less important” (Milutinović et al., 2018). Nevertheless, nursing is formed out of autonomous competences and human-altruistic regime of values, recognition and consistency (Guo et al., 2018).

The early identification of nursing students with their profession, as well as gained professional competencies, are the crucial factors of the quality of their future work activities (Matthews et al., 2019) and the level of safety of the patient they are taking care of (Heldal et al., 2019). Therefore, it is of utter importance to estimate the nursing students’ PI during their education and later professional activity (Maginnis, 2018; Volpe et al., 2019). Thus stated, it is evident that there is a significant lack of valid instruments of evaluation of nursing students’ PI in related literature in Croatian language.

The goal of this study is to help prevail thus mentioned gap and to identify the valid instruments of evaluation of nursing students’ PI in Croatian context through the parallel translation and psychometric analysis of two surveys.

Background

Through the long course of years, PI is a focus of investigation of social and developmental psychologists (Cheek & Cheek, 2018). Although there is still no globally accepted definition of PI it is known that PI encompasses behaviors, knowledge and skills, values, beliefs and ethics, context and socialization, and group and personal identity (Fitzgerald, 2020). It includes the best practice, the creation of ideals and professional values (Nocerino et al., 2020). PI is a concept relates to many aspects of a profession and requirements for success within profession (Eason et al., 2018). Also, PI concept increasingly attracting attention in the workplace because it provides a better understanding of employees and their attitudes and provides insight into work-related outcomes (Hassan & Elhosanx, 2017).

In their theory of social identity, Tajfel describe PI through the personal awareness of the individual to attachment to a certain group, as well as the importance of that group for the individual (Tajfel, 1982). Since the PI is a form of social identity and it is designed based on the social interactions, personal growth and maturation (Cheek & Cheek, 2018), many authors begin with the theory of social identity in describing PI (Fitzgerald, 2020; Iwasaki et al., 2018; Maginnis, 2018; Mousazadeh et al., 2019; Tan et al., 2017), which is also the focal point of this research.

The basic element of becoming a nurse is the identification with the profession (Maginnis, 2018) which helps defining professional boundaries in health multidisciplinary environment (Brown et al., 2000) and it also has the effect on nurses’ behavior and work (Nocerino et al., 2020). Thus, the professionals’ tendencies of understanding the specificities in nurses’ PI are very significant (Matthews et al., 2019). The nurses with developed PI are self-confident in

decisions and in performing assignments (Rasmussen et al., 2018) they are personally, socially, and professionally fulfilled (Guo et al., 2018) which highly contributes to quality of their performance (Sabanciogullari & Dogan, 2015a). The increase of the PI level of nursing students and nurses has a positive impact on adapting and implication of knowledge in practice (Kabeel & Mosa Eisa, 2017), while the low level of PI has the loss of self-confidence and attachment to profession (Mousazadeh et al., 2019), as well as the higher level of stress and thoughts of abandoning their own profession (Rasmussen et al., 2018) as a consequence.

In health system of Republic of Croatia, as well as in other countries, the nurses are exposed to professional and personal challenges and difficulties on daily basis, and by adopting the positive PI they deal with them more effectively (Sabanciogullari & Dogan, 2015b). Croatian nursing, legislative, legal, and professional institutions (Croatian Council of Nursing, 2007; Croatian Parliament, 2003; Croatian Parliament, 2019) regulate the determinants by which the nurses must be responsible, conscientious, devoted and professional, while they are also under the obligation of continuous formal and informal education. These factors and the importance of PI in work indicate the need of constant evaluation of PI level in nursing students and nurses through the valid instruments. Through examination of relevant literature despite the existence of numerous instruments we noticed the lack of such instruments in Croatian language, as well as the fact that there is no such global instrument, while the existing instruments have different reliabilities, depending on different subjects of examination (Volpe et al., 2019). Therefore existing instruments need to be adapted and validated for wider use (Tan et al., 2017). As mentioned earlier, there is still no globally accepted definition of PI, accordingly, different researchers have focused on different aspects of PI, and that is, they have developed different measurement tools with different factor structures. For example, Hao et al. (2014) developed Professional Identity Scale for Nursing Students, which measures five aspects of PI: social modeling, independence career choice, social comparison and self-reflection, benefits of retention and risk of turnover, and professional self-image. Further, the Nurse Self Concept Questionnaire (Cowin, 2001) measures six aspects of PI: general nursing, nursing care, staff relations, communication, knowledge, and leadership.

In this study, two instruments were selected after a detailed content analysis of a total of eight questionnaires measuring the level of PI and after reviewing previous results for their psychometric properties. We chose a more general instrument, Identity questionnaire (ID) (Brown et al., 1986), which can be applied to both students and professionals and Professional Identity Five-Factor Scale (PIFFS) (Tan et al., 2017) which is more appropriate for monitoring the development of students’ PI during formal education.

Therefore, the goal of this study is twofold: (1) to translate two instruments on PI, PIFFS, and ID in Croatian and to test their psychometric properties and (2) to identify more suitable instrument of measuring the level of nursing students' PI in Croatian context. The identification of valid instrument will enable the future assessments of the nursing students' PI in Croatian context and encourage the global intercultural parallel studies which are important for equal and uniformed advancement of the nursing profession (Lovrić et al., 2016; Žvanut et al., 2018).

Methods

Design of the Study

This research can be described as quantitative, cross-sectional study and included two phases. In the first phase of the study, the instruments were translated and used on a sample of Croatian nursing students. Based on the obtained results, confirmatory factor analysis (CFA) was conducted to check the latent structure of the Croatian version in comparison with the original questionnaires. Since the factor/latency structure differed from the original one, we proposed a new factor structure, so in the second phase of the study we tested the stability of this new/Croatian factor structure on different samples of students, as well as other aspects of validity.

Setting

The study was carried out in two phases, at four institutions of high education in the Republic of Croatia. The data were collected in the first phase from October to November 2018. Questionnaires with a detailed explanation of the study were distributed only to nursing students by teachers after the end of their lectures. The students filled the questionnaire forms in the pen and paper method. After the first phase of research, data were processed. In the second phase from January to April 2019, link on research, with the description of research aim, was distributed via official university forum groups and official e-mail addresses to heterogeneous group of students (different study programs; five of students were nursing students who have not been participating in the first phase). All participation was voluntary and anonymously.

Instruments

In both phases of research, two instruments for measuring PI were applied. The first instrument was a PIFFS, chosen accordingly to the goal of this research and constructed for the measuring of students' PI with different study specializations (Tan et al., 2017). It consists of 25 items by forming five factors: The knowledge of professional practice (six items), professional experience (six items), role model in profession

(five items), self-efficiency (six items), and affinity to certain profession (two items). All the answers are formed on the scale of 5°, where 1 stands for definitely not correct and 5 for definitely correct. In original study which included 1295 students of different studies, the reliability of the original instrument of the five subscales was $\alpha = 0.65-0.85$ (Tan et al., 2017).

The second instrument was ID by the author Rupert Brown, chosen for its vast possibilities of implementing on different groups of examinees and developed in 1983. It is primarily based on a theory of social identity, and it originated from the model of original scale of ethnic identity by Driedger in 1976, in order to evaluate the level of group identification (Brown et al., 1986; Driedger, 1976). It is appropriate for a global implementation on students of different orientations, as well as on employed professionals (Adams et al., 2006). It consists of 10 items which constitute three different factors: awareness of group affiliation (five items), assessment of self-respect (three items) and influence (two items). The scale of measurement was first applied on 137 examinees and then revised. The revised scale was then applied on 177 factory workers and its reliability was $\alpha = 0.71$ (Brown et al., 1986). The answers are offered in the scale of 1–5 (never, rarely, sometimes, often, and very often). Out of 10 items, the first five refer to affirmative, and the other five to denial items. The scores for 6–10 five items are reversed and give a possible range of 10–50 for the whole scale.

Through examination of relevant literature and through correspondence with the authors of instruments, we have concluded that no single instrument was neither translated nor tested in the context of Croatia.

In both phases, some general information about the participants was collected before the PI scales: socio-demographic variables (year of study, gender, age, previous schooling) and level of study satisfaction (a five-point item; 1: very dissatisfied, 5: very satisfied).

In the second phase, in addition to the same instruments used in the first phase and in order to test different aspects of the validity of the PI instruments, some additional measures are taken: average grades during studies (for all participants in the second phase) and the Croatian version of IPIP Big-Five Factor Markers (Mlačić & Goldberg, 2007). The questionnaire is intended for personality assessment and contains 50 items and five factors, each of which contains 10 items: extraversion, agreeableness, conscientiousness, emotional instability, and intellect (Mlačić & Goldberg, 2007). Due to the amount of time required to complete the questionnaires, the IPIP instrument was not mandatory to complete, so only 112 (50.5%) students completed it to the end.

Translation Procedure

The PI instruments were translated in Croatian language by two independent experts in translation whose basic language

is Croatian. The experts have fulfilled the terms of competencies for the translation, as well as the professional knowledge in the field of nursing (Petersen et al., 2019). The final Croatian translation resulted in the settlement of both the experts, after which the instruments were lectured by the professor of Croatian linguistics. Back-translation of the instruments to English language was done by the English professor in the Medical school, who has not anticipated in previous translations. After that, the authors of this article verified the synonymy of the back-translation version and original instruments. All the translators and the Croatian language lector conciliated with the final versions of both instruments (Lovrić et al., 2016). Before applying the instruments, four persons (two students of pre-graduate nursing faculty and two nurses with professional experience of over 15 years) reviewed and positively evaluated the comprehensibility of the final versions of the instruments. These four individuals were familiar with the theoretical meaning of the construct of PI and all four agreed that both translated instruments were content and face valid, meaning that the content of the items in the questionnaires represented well the construct of PI.

Sample

In the first phase, 432 nursing students participated in the study. In the second phase, 222 students from different study fields participated.

Data Analysis

Statistical analysis was performed in three steps. Based on the obtained results in first phase, CFA analysis was conducted for each of the instruments in order to test if our data fit to the originally postulated models. CFA was made in M plus 6 program (Muthén & Muthén, 2011). Quality of the model fit was assessed by comparative fit index (CFI), Tucker–Lewis index (TLI), a root-mean-square error of approximation (RMSEA), and standardized root-mean-square residual (SRMR). Values of CFI and TLI greater than 0.90, and RMSEA and SRMR smaller than 0.10 indicate a good model fit, and values of CFI and TLI greater than 0.95, RMSEA and SRMR less than 0.06, indicate a very good model fit (Hu & Bentler, 1999).

Since all CFA resulted with poor model fits (due to various reasons which will be shown in the further work), the second step was to calculate principal component analysis (PCA) for each of the instruments (also on the first sample of participants). PCA in program Statistica 13 with varimax rotation method was performed (Oblimin with Kaiser Normalization.). Bartlett's Test of Sphericity between the items and Kayser–Meyer–Olkin test for sampling adequacy was used. The cut-off value for displaying factor loadings was set to 0.4. Reliability of instruments (internal consistency type) was assessed by Cronbach's alpha coefficient and

Item-total correlations. In second phase, in order to establish whether the latent factor structure of PIFFS and ID questionnaires (which was revealed with previously conducted PCA in phase first) is stable on different Croatian sample, we conducted CFA on results obtained in second phase for both instruments.

In addition, the calculation of Pearson correlation coefficients was used to test different aspects of validity: convergent validity (correlation between PIFFS and ID scores); criterion validity (correlation between PIFFS/ID and study satisfaction and average grades [collected only in the second phase]); discriminant validity (correlation PIFFS/ID and Big-Five personality traits, collected in the second phase). To test for concurrent validity, we test for differences between high/low scoring students on measures of PI in their satisfaction with their studies and average grades (collected only in the second phase) via analysis of variance.

Since the aim of this study was, among other things, to test the latent/factor structure of the applied questionnaires, a detailed description of the Croatian versions of the PI questionnaires is described in the Results section.

Ethical Considerations

The written consent of the author for the use and adaptation of the questionnaire was obtained prior to the start of the study. Before taking surveys, all the participants were informed about the purpose and other details of research, after which they confirmed voluntary and anonymous participation in the research with their signature. Participants had the right to withdraw from the research without any consequences. During the research, the anonymity of the participants and confidentiality of the information were fully guaranteed. This research was approved by responsible Ethical committees of high education institutions involved (2181-223-07-18-0017; 2198-1-79-33/18/02; 2158-61-07-18-55, No number—21.03.2018).

Results

There were 654 (100%) participants in total in both phases, out of which 554 (84.7%) were female students and 100 (15.3%) male students. In first phase, of all nursing students at four Universities ($n = 536$), 80.6% engaged in this study ($n = 432$). The average age was 21.65 (SD = 4.62) years. Second phase included 222 (33.9%) students of different study orientations, few of them were nursing students. The sample consisted of 179 (80.6%) female and 43 (19.4%) males, with average age of 22.15 (SD = 2.04). Two samples (samples from the first and the second phase) were equal regarding to gender structure ($\chi^2 = 0.037$, $df = 1$, $p > .05$) and age ($t = 1.83$, $df = 644$, $p > .05$; $M1 = 21.65$; $M2 = 22.15$).

Phase 1—CFA of PIFFS and ID

First CFA included data obtained for PIFFS. As it was described in Methods section, three factors with six items, and one with five items was tested. Results of CFA obtained in M plus 6 were: $\chi^2 = 807.349$, $df = 223$; CFI = 0.850, TLI = 0.830, RMSEA = 0.078 (0.072–0.084), and SRMR = 0.067. The last two mentioned indicators (RMSEA and SRMR) are pointing to a good model fit, but the CFI and TLI indicate a poor model fit. Furthermore, correlations between factors were .556, .698, .777, .723, .571, and .786. Additionally, to get a better insight, analyses of reliability (internal consistency) were calculated for each factor as Tan proposed. Cronbach alpha for the first factor (α_1) was 0.883 (average interitem correlation ($rii_1 = .563$), for the second $\alpha_2 = 0.686$ ($rii_2 = .271$), the third $\alpha_3 = 0.747$ ($rii_3 = .377$), and the fourth $\alpha_4 = .422$ ($rii_4 = .124$). Considering all aforementioned parameters, firstly low levels of CFI and TLI, four of six correlations between factors who are equal or greater than 0.70, and one factor with an inadequate level of reliability, we can conclude that this four-factor model should be rejected.

The attempt of calculation of CFA for results obtained on Brown's ID was not successful. Namely, the instrument implied the existence of three latent factors (the first with five, the second with three, and the third with two items). Testing of the described model resulted with an error regarding to extremely high correlation between two postulated factors, which means that this latent structure of the instrument certainly did not obtain our results. The Cronbach alphas of factors namely were $\alpha_1 = 0.881$ ($rii_1 = .614$), $\alpha_2 = 0.577$ ($rii_2 = .582$), and $\alpha_3 = 0.671$ ($rii_3 = .504$). Low levels of reliability of factors, but high interitem correlations, and high Cronbach alpha based on all items with moderate interitem correlation ($\alpha = 0.823$; $rii = .344$) indicated also that latent structure of the instrument is not three dimensional.

Based on the results of the above-described results of CFA, the second step was to calculate PCA for each instrument, with the intention of finding the latent structure of instruments, which better fits to our data. In addition to poor model fit, there was another argument for doing PCA that was theoretically based. Since we know that education, especially the practical aspect of education, shapes the PI (Tan et al., 2017), it is possible that the social factors and the functioning of the education system in Croatia are different in some aspects, which could be related to the differences in the structure of PI.

Phase 1—PCA of PIFFS and ID

Prerequisites for factor analysis were met (KMO = 0.883), Bartlett's test of sphericity is significant $p < .001$ with $\chi^2(253) = 3757.9$.

Latent (factor) structure of PIFFS and ID. PCA on PIFFS revealed three latent factors which together explain 49.35%

of the variance. The first factor (knowledge factor—KF) explained 34.05% and contained seven items (six of them correspond to the first factor as Tan defined). The second factor (experience factor—EF) also corresponds to the second Tan's PIFFS factor, it contains six items, and it explained an 8.85% of the variance. The third revealed factor contained eight items, it represents merge combination of the third and the fourth Tan's PIFFS factors, and it explained only 6.45% of the variance. The third factor is called perception of the role model and professional future (PRPF). Items 15 and 19, due to the low factor loadings score, were omitted from the analysis. The results are shown in Table 1.

Correlation between the first and the second factors was $r = .429$, between the first and the third $r = .409$, and between the second and the third was .337.

PCA on ID instrument revealed two latent factors which together explain 63.46% of variance. The first factor called Belonging to the profession which includes items describing a sense of connection to the profession included first five items (like the first factor in original ID) and explained 42.09% of variance. The second factor called not belonging to the profession which includes items describing negative feelings towards the profession included other five items, it explained 21.37% of variance. Correlation between them was .17. Results of factor loading are present in Table 2.

Internal consistency reliability of PIFFS and ID. PIFFS reliability parameters (Cronbach alpha) for the first factor were 0.841, average item total r was .488. Cronbach alpha for the second factor was 0.686 with average correlation between items was 0.271. Cronbach alpha, factor of reliability for the third factor was 0.824 with average interitem correlation of .375.

Both factors of ID questionnaire had a good level of reliability. Cronbach alpha for the first factor was $\alpha_1 = 0.881$ ($rii_1 = .613$), and for the second $\alpha_2 = 0.774$ ($rii_2 = .431$).

Next, the third step was to establish if the latent factor structure of PIFFS and ID revealed by PCA is stable across different samples, that is, are they indeed useful for application in future research in Croatia. In order to check this assumption, we conducted another research where these two scales were applied to sample 2. Results are presented below.

Phase 2—CFA on a Modified Version of PIFFS and ID on Different Sample

On the results of second sample, we conducted CFA to test our factor structures revealed with PCA (for two instruments that had good psychometric characteristics—PIFFS and ID) to the data of the new sample.

Results of CFA for PIFFS were: $\chi^2 = 364,311$, $df = 186$; $p < .05$; CFI = 0.899, RMSEA = 0.066 (0.056–0.076) and

Table 1. Construct Validity of the Translated Version of Professional Identity Five-Factor Scale in Croatian Language (n = 432).

Professional Identity Five-Factor Scale (PIFFS)	Croatian translation	Factors ^a
Construct items	Konstrukt čestice	1. KF ^b 2. EF ^b 3. PRPF ^b
1. I know the nature of the work I will do in my future profession	Poznajem prirodu posla kojim ću se baviti u svojoj budućoj profesiji	0.697
2. In most work environments, professionals with different backgrounds work together. I know of the different types of professionals I will be collaborating with	Na većini radnih mjesta zajedno rade stručnjaci različitih profila. Upoznat/a sam s različitim tipovima stručnjaka s kojima ću surađivati	0.811
3. I have a good idea about the roles and responsibilities of my future job	Imam dobru predodžbu o ulogama i odgovornostima mog budućeg posla	0.866
4. I know what kind of applications, tools, and equipment I will handle in my future occupation	Znam koje ću postupke primjenjivati i koju opremu koristiti u mom budućem zanimanju	0.823
5. I am aware of the impact of the decisions I make as a professional in nursing	Svjestan/na sam važnosti odluka koje ću donositi kao medicinska sestra	0.695
6. I have a good idea about the rules and regulations in the industry	Dobro poznajem pravila i propise profesije	0.520
7. I work part-time in (or am running) a business related to what I am studying	Privremeno radim u organizaciji povezanoj s onim što studiram ili vodim istu	0.719
8. I am part of an interest group (inside or outside of the polytechnic) related to my profession	Ja sam dio interesne grupe vezane uz sestrinstvo	0.564
9. I know personally some people who work in my future profession	Osobno poznajem neke ljude koji rade u sestrinstvu	0.401
10. I follow developments in my future industry in newspapers and on television	Pratim zbivanja u sestrinstvu u novinama i na televiziji	0.397
11. Before I entered the polytechnic, I already had some prior work experience related to in the profession of my choice	Prije upisa studija već sam imao/la neka prethodna iskustva vezana uz odabranu profesiju	0.726
12. I have interacted with professionals in the industry outside of polytechnic or through events organized in the polytechnic	Surađivala sam sa sestrama izvan studija ili putem događanja organiziranih u sklopu studija	0.651
13. When working on problems in class, I imagine myself to be in the shoes of a professional in my future work environment	Kad tijekom nastave rješavam problemske zadatke zamišljam se na svom budućem radnom mjestu	-0.567
14. I concentrate in my studies on what I believe I would need to know and be able to do when I enter my future occupation	U učenju se koncentriram na stvari za koje vjerujem da trebam znati i trebam moći napraviti kad se zaposlim	-0.432
15. I believe I can already think and reason like a professional in a company or organization ^c	Vjerujem da već mogu razmišljati i rasuđivati kao profesionalac na radnom mjestu	
16. I admire most those teachers who are professionals in the area that I would like to enter	Najviše se divim nastavnicima koji su profesionalci u struci kojom se želim baviti	-0.755
17. I admire professionals who are already working in my future work environment	Najviše se divim profesionalcima koji već rade u mojoj budućoj profesiji	-0.815
18. I am sure I will have no problems dressing and behaving professionally in my industry	Sigurno neću imati poteškoća s profesionalnim odijevanjem i ponašanjem u svojoj profesiji	-0.526
19. I feel poorly prepared for a real job (Reversed) ^c	Osjećam se loše pripremljen/na za pravi posao	
20. I believe that I will easily get along with my future colleagues, get their cooperation, and have informal conversations with them	Vjerujem da ću lako surađivati sa svojim budućim kolegama, dobiti njihovu suradnju i voditi neformalne razgovore s njima	-0.406
21. I'm confident that I can do an excellent job in the future	Siguran/a sam da mogu odlično raditi svoj posao u budućnosti	-0.429
22. I have no doubt that I will master all the skills necessary to succeed in my future work	Ne sumnjam da ću svladati sve potrebne vještine za uspjeh na budućem poslu	-0.430
23. I am not sure about the kind of challenges faced by the professional in the nursing	Ne znam s kakvim se izazovima suočava stručnjak u sestrinstvu	0.526

Eigenvalues, cumulative eigenvalues, and total variance (%) by factors 7.15, 1.87, 1.3

Total percentile and cumulative addition 34.05%, 8.92%, 6.45%

(continued)

Table 1. Continued.

Professional Identity Five-Factor Scale (PIFFS)	Croatian translation	Factors ^a
<i>Total percentage of the factor model 49.35%</i>		

^aFactor names in Croatian are: 1. "Znanje", 2. "Iskustvo", 3. "Precepcija uzora i profesionalne budućnosti."

^bKF = knowledge factor; EF = experience factor; PRPF = perception of the role model and professional future.

^cThe items were excluded from the final factor analysis (please refer to section Results).

SRMR = 0.062. These parameters are indicating a good model fit. Internal consistency reliability was 0.842, 0.791, and 0.844, respectively.

As for ID, the following parameters were obtained: $\chi^2 = 142.57$, $df = 34$; $p < .05$; CFI = 0.909, RMSEA = 0.124 (0.104–0.145) and SRMR = 0.072. All parameters, except RMSEA indicated a good model fit. Reliability of subscales on this sample was 0.90 and 0.75.

Sensitivity and Different Aspects of Validity—Results From Phase 1 and Phase 2

In Table 3, the basic descriptive parameters for PIFFS and ID instruments in two samples are presented.

From the range of responses and the coefficient of variation, it could be concluded that both instruments had good sensitivity, that is, individuals with high and low expression of various aspects of PI could be adequately distinguished on these instruments. Participants tended to give above average responses on all factors of both instruments, with the exception of the experience factor (PIFFS) where they gave slightly below average responses, probably due to the lack of practical experience during this period of training for future professionals.

The correlation between the scores of the two instruments (correlation between the higher order factors of PIFFS and ID) is .57 (Phase 1) and .54 (Phase 2), respectively, indicating adequate construct validity, that is, a specific type of construct validity called convergent validity. More specifically, the instruments measure the same construct, but based on the magnitude of the correlations, they could be said to measure some different aspects of the construct of PI. Another type of construct validity, discriminant validity, was assessed by calculating the correlation of PIFFS/ID with Big-Five personality traits from the second phase of research ($n = 112$). The correlations between the five personality factors and the subscales of PI range from .06 to .38, with most being very low cca 0.19. These low correlations also indicate good construct discriminant validity of the Croatian versions of PIFFS and ID, meaning that PI is a different construct than personality.

When we split the participants into the groups with above and below average scores on two PI questionnaires (on total score), we find a difference in average satisfaction with studies (in both phases; both samples) and average grades

(second phase). More specifically, participants with above average scores on the PIFFS questionnaire were more satisfied with their studies. This result was repeated for both samples, obtaining the same trend of results on the ID questionnaire participants with above average levels of PI were significantly more satisfied with their studies compared to the group of students with below average levels of PI on the ID questionnaire. The results were obtained in two measurements. Also, in the sample of students from the second measurement phase, students who had above-average scores on PIFFS and/or ID had a significantly higher grade point average during their studies, that is, they were more successful students. The described results can be seen in Tables 4 and 5.

Correlations between satisfaction with studies and the subscales of ID and PIFFS ranged from .19 to .22 ($p < .05$) in first phase, which consisted only of nursing students, but correlations between these variables in second phase (heterogeneous sample) were significantly higher (ranging from .56 [ID] to .64 [PIFFS]). The correlations between average grades in second phase with the various subscales of PIFFS and ID range from .21 to .30 ($p < .05$).

These correlations, in combination with the results in Table 4, suggest that both PI questionnaires (PIFFS and ID) are good diagnostic instruments for satisfaction with studies, that is, they can be used for selection purposes to predict future satisfaction with studies and probably also satisfaction with future work. The better diagnostic/predictive validity is found for the heterogeneous sample of students. Similar results are obtained for average grades in second phase (Table 5).

Discussion

PI is a construct related to future job satisfaction and commitment, it builds up during professional education and therefore it is very important to promote its development during the study period. Since there was no psychometrically valid PI instrument in Croatian language, the purpose of this study was to translate two PI instruments into Croatian language and to test their psychometric properties.

Based on the theoretical background, we expected that the factor structure of the translated instruments in Croatian would have the same factor structure as instruments in English used in other countries. Contrary to our assumption,

Table 2. Construct Validity of the Translated Version of Identity Questionnaire in Croatian Language ($N = 432$).

Identity	Croatian translation	Factors ^a	
		1.BP ^b	2. NBP ^b
Construct items	Konstrukt čestice		
1. I am a person who considers the _____ group important.	Smatram da je sestrińska profesija važna.	0.620	
2. I am a person who identifies with the _____ group.	Identificiram se sa sestrińskom profesijom.	0.822	
3. I am a person who feels strong ties with the _____ group.	Osjećam jaku povezanost sa sestrińskom profesijom.	0.867	
4. I am a person who is glad to belong to the _____ group.	Drago mi je što pripadam sestrińskoj profesiji.	0.840	
5. I am a person who sees myself as belonging to the _____ group.	Vidim se kao pripadnik sestrińske profesije.	0.853	
6. I am a person who makes excuses for belonging to the _____ group.	Nalazim izgovore što pripadam sestrińskoj profesiji.	0.421	
7. I am a person who tries to hide belonging to the _____ group.	Pokušavam prikriti pripadnost sestrińskoj profesiji.	0.795	
8. I am a person who feels held back by the _____ group.	Osjećam da me sestrińska profesija sputava.	0.816	
9. I am a person who is annoyed to say I'm member of the _____ group.	Osjećam se uznemireno kad moram reći da sam član sestrińske profesije.	0.872	
10. I am a person who criticizes the _____ group.	Kritiziram sestrińsku profesiju.	0.677	
<i>Eigenvalues, cumulative eigenvalues, and total variance (%) by factors 4.20, 2.13</i>			
<i>Total percentile and cumulative addition 42.09%, 21.37%</i>			
<i>Total percentage of the factor model 63.46%</i>			

aFactor names in Croatian are: 1. "Pripadanje profesiji", 2. "Nepripadanje profesiji."

bBP = belonging to the profession; NBP = not belonging to the profession.

the results of the CFA in the first phase showed that the Croatian versions of the instruments PI have a significantly different factor structure. Applying the exploratory approach, it is revealed that PIFFS has three (vs. originally postulated

four used) factors with good psychometric characteristics. More specifically, the first (KF) and the second factor (EF) contained the same items as the original version. A difference appeared in the original factor "Professional self-efficacy," whose items in the Croatian version were distributed between the factors "Knowledge" (KF) and "Professional role model" (PRPF). These differences in the distribution of items among factors are probably related to the context of education in Croatia, which is more theory oriented, and to clinical education in group work of six or more students, which is not an "adequate" situation in which students can assess their self-efficacy (Gusar et al., 2020). This could point to still insufficient quantity of professional knowledge and experience which is related self-efficacy of our participants. Furthermore, factor 2 (EF) in the Croatian version of a survey was made by the items identical to the original survey (Tan et al., 2017), while the factor 3 (PRPF) in the Croatian version consists of eight items which in the original survey belong to factors 3 (Having the Professional Role Model) and 4 (Professional Self-efficiency) and with the eliminated items 15 and 19 which were not confirmed in the factors of the Croatia version of the survey. Those two items are also related to practical experience, which seems to be lacking in nursing in Croatia. Item 15 (I believe I can already think and reason like a professional in a work place) which belongs to factor 3 (Having the Professional as a Role Model) in the original survey has not proved to be significant to our participants, which could be consequence of the fact that our participants who are involved in the study are still acquiring their knowledge and skills which will ensure them of their future resonance. The assumption is that there are cultural differences as well as differences in the education system. It is possible that theory dominates in Croatia in relation to clinical practice, given the way in which clinical practice is organized (Gusar et al., 2020). Similar results that speak in favor of the fact that the insufficient professional knowledge and experience has a significant influence in forming the PI are published in the qualitative study conducted in 24 hospitals in Iran, within the nurses employed in ICU Ward (Mousazadeh et al., 2019). Further, the possible cause of such results is also the way of organization of half of the lessons for nursing student in the form of clinical training (according to Directive 2005/36/EC) in the group work of six or more students, which makes the development of mutual relationships and perception of mentors as professional role models more difficult (Browne et al., 2018; Gusar et al., 2020). Item 19 (I feel poorly prepared for a real job) which belongs to factor 4 (Professional Self-efficiency) in the original survey, is also not included in the Croatian version of the survey, possibly because of our participants' present and expressed awareness of still undergoing the phase of education which implies further preparation for the competent execution of the works and tasks in the nursing range (Simmonds et al., 2020). In summary, the structure of the Croatian

Table 3. Descriptive Parameters for PIFFS and ID Questionnaires ($n = 654$).

Scale/Factor	Sample	M	SD	Min–max	Coefficient of variation	Skewness	Kurtosis	Shapiro-Wilk W
<i>PIFFS</i>								
1.KF ^a	1 (N = 432)	4.19	0.59	1.57–5	14.17	−0.67 (0.12)	0.42 (0.23)	0.942 (<0.05)
	2 (N = 222)	3.98	0.71	1.14–5	17.82	−1.02 (0.16)	1.14 (0.33)	0.931 (<0.05)
2.EF ^a	1 (N = 432)	3.43	0.79	1–5	22.95	−0.20 (0.12)	−0.18 (0.23)	0.989 (<0.05)
	2 (N = 222)	3.16	0.99	1–5	31.26	−0.04 (0.16)	−0.66 (0.33)	0.982 (<0.05)
3.PRPF ^a	1 (N = 432)	4.15	0.60	1–5	14.45	−0.88 (0.12)	1.42 (0.23)	0.945 (<0.05)
	2 (N = 222)	4.05	0.69	1–5	17.17	−1.11 (0.16)	2.07(0.33)	0.928 (<0.05)
<i>ID</i>								
1.BP ^b	1 (N = 432)	4.46	0.66	1–5	14.77	−1.51 (0.12)	3.08 (0.23)	0.806 (<0.05)
	2 (N = 222)	3.50	0.64	1–4	18.26	−1.58 (0.16)	2.43 (0.33)	0.784 (<0.05)
2.NBP ^b	1 (N = 432)	4.15	0.77	1–5	18.50	−1.58 (0.12)	3.42 (0.23)	0.860 (<0.05)
	2 (N = 222)	4.35	0.60	2–5	13.70	−1.57 (0.16)	3.37 (0.33)	0.856 (<0.05)

aKF = knowledge factor; EF = experience factor; PRPF = perception of the role model and professional future.

bBP = belonging to the profession; NBP = not belonging to the profession.

version of the PIFFS still captures the construct PI that was originally captured by the PIFFS, with the exception that some items are distributed differently. The described results underline the importance of a detailed psychometric analysis of the PI assessment questionnaire, which Matthews et al., 2019 emphasized.

Further, for the heterogeneous sample, the same factor structure was confirmed and all three factors have a good level of reliability. Among nursing student's reliability of second factor called experience was slightly lower. This could be explained by the low experience of the nursing students during their study period. These results indicate the need for continuous assessment of PI, as the formation of a strong PI is important for nursing students due to its link to the development of a high-performing workforce (Browne et al., 2018), as well as the importance of improving the level of the practical aspect of teaching, especially in the education of nursing students in function of the development and promotion of PI.

ID scale revealed two-factor structure (vs. three factors in original form) with also very good psychometric properties. Factor 1 of the Croatian version consists of items 1 to 5, as in original version of the survey (Brown et al., 1986) and it forms the belonging to the profession factor. Walker et al., in their study also state the importance of belonging in the

development of PI (Walker et al., 2014). Differently to the original instrument in which the items 6 to 10 make two factors, these factors represent one single factor in the Croatian version, and it refers to nonbelonging to profession. The items in question are those which refer to aspects of the evaluation of self-respect and the influence of the profession. Since our participants are in the current progress of the educational process, it is possible that they identify their own professional self-respect with their own personal professional influence, and being students, they are still not in the position of completely developed feeling of self-respect (Duruk et al., 2017), nor the feeling of possibility of professional influence (Farčić et al., 2020). Such results may indicate the need to improve the practical part of education that would strengthen the mentioned aspects among nursing students. Similarly, to PIFFS, the Croatian version of ID still captures the construct PI, which was also confirmed by four persons involved in the content and comprehensibility analysis. Also, repeated CFA on a different heterogeneous sample (Yu et al., 2015) confirms stable newly revealed factor structure as well as good reliability. This result suggests the possibility of using the instruments in students of other orientations not only nursing students, and shows the comprehensiveness of the instruments.

Table 4. Differences Between Satisfaction with the Study at the Students with Above/Below Average Level of PI ($n = 654$).

	Phase 1 M (PIFFS) = 3.77 Phase 2 M (PIFFS) = 3.93		Phase 1 M (ID) = 3.93 Phase 2 M (ID) = 4.30		$F(df)$ PIFFS	$F(df)$ ID
	Below average PIFFS	Above average PIFFS	Below average ID	Above average ID		
Phase 1 Satisfaction with study	3.28	3.55	3.12	3.63	$F(1,411) = 8.77^*$	$F(1,411) = 33.05^*$
Phase 2 Satisfaction with study	3.83	4.57	3.71	4.62	$F(1,220) = 37.58^*$	$F(1,220) = 59.34^*$

* $p < .01$.

Table 5. Differences Between Average Grades at the Students with Above/Below Average Level of PI Obtained in Second Phase ($n = 222$).

	Phase 2 M (PIFFS) = 3.93		Phase 2 M (ID) = 4.30		$F(df)$ PIFFS	$F(df)$ ID
	Below average PIFFS ($n = 103$)	Above average PIFFS ($n = 118$)	Below average ID ($n = 95$)	Above average ID ($n = 126$)		
Phase 2 Average grades	3.73	4.00	3.72	3.99	$F(1,219) = 16.10^*$	$F(1,219) = 15.45^*$

* $p < .01$.

Based on the results of the two PCAs described above, we can conclude that ID and PIFFS are potentially useful and psychometrically high-quality instruments for measuring PI in nursing and other students. Similar validation results of instruments in which the factor structure is different of original structure but it is stable were obtained on the Croatian sample during the validation of other instruments in nursing (Lovrić et al., 2016; Lovrić et al., 2020).

It should also be noted that a lower level of PI, as well as somewhat lower reliability, is obtained for student nurses on all subscales of the two instruments from PI compared to a heterogeneous sample. It is possible that these results are related to a specificity of the nursing profession, perhaps this can also be seen as a sign of an insufficient level of the practical aspect of their education in comparison with other types of study. Despite the differences between the nursing and heterogeneous samples described above, the same factor structures of PI instruments were found in both samples (but different from the original), which may suggest that cultural influence is stronger than specific curricula in the formation of PI. But all these statements are assumptions that need to be verified in further research.

With regard to other psychometric properties of these two Croatian versions of the instruments, we can conclude that the instruments are construct valid. More specifically, the instruments are intercorrelated to a moderate extent, indicating that they both measure the same construct (PI), but also some different aspects of this construct. Both instruments are related to satisfaction with studies and grade point average in the way that individuals with a more developed PI are also more satisfied and successful in their studies. These results are of practical importance in that they can be used for selection purposes, but also as markers of students' professional development, since it is known that PI is a construct that can be influenced and improved through educational programs and training.

The information that PI can be considered as an independent construct is obtained by correlating it with personality traits. All five personality traits were significantly correlated with all subscales of both instruments, but these correlations were very low.

In summary, our results show that in the Croatian context, PIFFS interrogates precise and specific aspects of the nursing

profession, such as knowledge about the future profession, the future work environment, specific work experiences and the existence of a professional role model, as well as the perception of a personal professional future, while ID measures the global sense of belonging and rejection of the profession and does not track the developmental aspects of the participants. Accordingly, PIFFS is better suited to measure the development of PI during study and is adequate for nursing but also for all other student populations, whereas ID is probably better suited to measure PI among working professionals.

Despite the fact that the factor structure of the instruments is stable across two samples, it would be very informative to try to verify these factor structures on larger samples. In future research, it would be interesting to examine which characteristics of study are related to PI measures.

Strengths and Limitations

The results of this study indicate the importance of not only translation but also psychometric validation of instruments. Despite multiple statistical analyses in our study it is necessary these instruments should be further evaluated. The obtained results are from a cross-sectional study. Longitudinal studies are needed to provide further insight into the development of PI during study and to determine the impact of some specific educational interventions (practical and theoretical) on PI development.

Implications for Practice

To our knowledge, this is the first Croatian study to offer an easy used and validated instrument for measuring nursing students' PI. The period of nursing study is essential to the formation of PI and this instrument will provide the possibility to monitor the development of the PI at different education stages. Since, during the study time, students acquire knowledge, skills, and learn from their mentors (role models), which is necessary to distinguish themselves from other professionals (Haghighat et al., 2019), this instrument will also provide an opportunity to gain insight into the real impact of the educational program on the development of PI, which has been confirmed as a basis for providing high quality and safety health care. Through education

process, students define who they are (will be) and promote their PI, which is essential for their later professional life, as it is known that higher PI is associated with higher job satisfaction (Hood et al., 2014; Sabanciogullari & Dogan, 2015b), professional independence (Severinsson & Sand, 2010), and consequently better health care.

Also, the identification of valid instrument will enable the global intercultural parallel studies which are important for equal and uniformed advancement of the nursing profession.

Conclusion

Although our results do not support the original factor structures for PIFFS and ID, the Croatian version of both instruments still capture the construct PI, which was originally captured by the PIFFS and ID scales. The items related to experiences from the practical part of the study are distributed differently in the Croatian version than in the original version, which is due to the specificity of the educational process for nurses in Croatia, which is probably not sufficiently practice oriented. The best model for PIFFS was a three-factor model and for ID the best model was a two-factor model. Both scales are reliable instruments with good construct, criterion, concurrent, and content validity. PIFFS is more suitable for assessing PI nursing students and other students during their study period in Croatian context, while ID is probably more suitable for working professionals.

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Declaration of Conflicting Interests

The authors declared no conflicts of interest with respect to the research, authorship, and/or publication of this article.


Ethical Approval


Before taking surveys, all the participants were orally and literally informed about the purpose and other details of research, after which they confirmed voluntary and anonymous participation in the research with their signature. Participants had the right to withdraw from the research without any consequences. During the research, the anonymity of the participants and confidentiality of the information were fully guaranteed. This research was approved by responsible Ethical committees of high education institutions involved (114-06/18-01/05, 2198-1-79-33/18/02; 602-04/18-08/07, 2158-61-07-18-55).

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