

Turkish psychometric properties of the Innovative Behavior Inventory and Innovation Support Inventory: A model analysis on nurses

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Abstract

Aim: To adapt the Innovative Behavior Inventory and Innovation Support Inventory into Turkish and to test the relationship between nurses' innovative behaviors, innovation outputs, and innovation support.

Methods: The sample of this methodological, correlational study included 360 nurses working at two hospitals in Istanbul, a province in northwestern Turkey. The study data were collected using the Nurse Information Questionnaire, Innovative Behavior Inventory, and Innovation Support Inventory. For psychometric analysis, language and content validity, confirmatory factor analysis, and reliability analysis was performed. The model was examined with structural equation modeling.

Results: The original structure of the inventories was preserved in the Turkish versions. There were positive and significant correlations between innovation support, innovative behavior, and innovation output subdimensions.

Conclusion: The Turkish versions of the inventories were determined to have acceptable and good psychometric properties. The innovative behaviors of the nurses were found to have a significantly high impact on innovation outputs. It was also found that managerial support has a proximal effect on the nurses' innovative behaviors. The results of this study indicate that to achieve innovative outputs, nurses' innovative behaviors should be increased and that managerial support regarding this issue is important and has priority.

KEYWORDS

innovation outputs, innovation support, innovative behavior, inventory, nurse, scale

1 | INTRODUCTION

To ensure sustainable success and the provision of more appropriate, more effective, and cheaper treatment and care in health services, innovation is needed.¹ The International Council of Nurses (ICN)² drew attention to the importance of innovation in nursing in the

International Nurses Day theme, and described innovation in health services as the process through which better health promotion, disease prevention, and better quality patient care could be achieved through the implementation of new and good ideas. Nursing innovation can also be defined as the development of new nursing practices to replace traditional nursing practices and the improvement of current nursing practices.³

Nursing innovation is considered as a motivational and cognitive process³ and is composed of three dimensions: creation of

This study will be presented as a oral presentation at the 7th International Nursing Management Conference, 25-27 October 2018, Bodrum, Muğla, Turkey.

knowledge, innovative behavior, and diffusion of innovation.⁴ Weng et al⁵ suggested that the effectiveness of medical treatment, quality of care, and efficiency of work could be improved by developing nurses' innovative behaviors. However, in a study in which nurses' innovative behaviors were addressed as a subdimension of nursing innovation, innovative behaviors were found not to have a significant effect on the quality of medical care and patient experience.⁵ Therefore, in recent years, an increasing number of studies have been focused on nurses' innovative behaviors and the factors influencing these behaviors.^{6–11}

Nursing innovation is a concept which has attracted nurses' attention in recent years in Turkey. The number of nurses who have developed new products¹² or useful models that can be used in nursing care, and who have taken out patents for these products and models has increased. A new association has been established to develop innovative nursing and to provide counseling for nurses on issues such as the development of innovative ideas and products, patents and useful models.¹³ Innovation is among the themes of organized scientific meetings. In two studies conducted with nursing students, their individual innovation levels were determined as high in one study¹⁴ and low in another study.¹⁵ In contrast, in a study conducted with nurses, their innovative behaviors were determined as high.¹⁶ The use of new products and methods in nursing to ensure the quality of nursing care, inclusion of innovation as a criterion in the assessment of academicians' and nurses' performance, nurses' tendency to seek new working areas, and entrepreneurship in nursing may have played a role in these developments. Within this context, more current, valid, and reliable measurement tools may be needed to assess nurses' innovative behaviors and factors affecting these behaviors.

In the present study, the Innovative Behavior Inventory (IBI) and the Innovation Support Inventory (ISI) developed by Lukes and Stephan¹⁷ were adapted into Turkish to determine employees' innovative behaviors and the factors supporting innovation.

The IBI was preferred because it was developed based on other innovative behavior scales after those scales were reviewed and new elements were created to improve the points considered that those scales lacked, and because it deals with innovative behaviors multidimensionally and includes the outcomes of innovation. The reason why the ISI was preferred is that it questions not only whether innovation is supported by the organization and managers but also whether there is cultural support. However, in the present study, the model developed by the authors, who also developed inventories was tested. According to this model, innovation support positively affects innovative behavior. The direction of this relationship is from cultural support to organizational and managerial support, and managerial innovation support had a proximal contextual effect on innovative behavior. However, innovative behavior positively affects innovation outcomes.¹⁷

1.1 | Innovative behavior

Innovative behavior is defined as the creation, development, and realization of new ideas utilized within a working group or

organization.¹⁸ Lukes and Stephan¹⁷ identified six dimensions of innovative behavior by reviewing the literature on innovative behaviors and by examining the scales that measure innovative behaviors. The first dimension of innovative behavior which makes up the behavioral aspect of creativity is idea generation. In contrast, it is stated that individuals who do not generate ideas but search for new ideas in their environment may also perform innovative activities (idea search). It is stated that the employees in an organization are rarely able to put new ideas into practice on their own, and often have to obtain their managers' permission to do so. To realize successful innovation by putting new ideas into practice, it is necessary to receive feedback from employees' colleagues and managers about the new idea (idea communication). Once the new idea is approved, the implementation process is initiated by allocating resources such as time, money, and people (implementation starting activities). Then, other people are involved in the implementation process (involving others) and obstacles faced in this process are overcome (overcoming obstacles). The aforementioned six dimensions of the innovative behavior are aimed at achieving innovative outputs. When a product or method is developed in an organization by implementing new ideas, or when new ideas are used in the organization by modifying the existing products or methods, innovation outputs are obtained.¹⁷ This process applies to all employees working in any organization carrying on a business in the production or service sector. In several studies conducted using different scales, nurses' mean innovative behaviors scores were found to be higher.^{5,19,20}

1.2 | Innovation support and innovative behavior

In order for ideas developed by nurses about innovative products and methods in hospitals to be transformed into innovations with new products or services that create added value,⁴ nurses' innovative behaviors should be supported by organizations and managers.⁷ According to Lukes and Stephan,¹⁷ the major contextual influences affecting employees' innovative behaviors are defined under three headings: managerial support, characteristics of organizations they work in, and national culture. Engle et al²¹ state that particularly middle-level managers play an important role in facilitating the implementation of innovation. Nurses, who indicated that their managers were supportive were found to display more innovative behaviors.²² It has been found that in public health nurses, empowerment and individual innovative behaviors have little influence on job productivity.²³ In their meta-analysis study, Rosing et al²⁴ determined significant correlations between managerial support and employees' innovative behaviors.

Organizations implementing new ideas that create values for the organization are defined as innovative organizations.²⁵ It is stated that employees should be provided with a working environment in which they can freely express their new and creative ideas and implement them.²⁶ Xerri⁹ found that when the perceived organizational support was a variable, the effect of the leader-member relationship on nurses' innovative behaviors was indirect.

Lukes and Stephan¹⁷ studied the effect of cultural support on organizational support and the effect of organizational support including managerial support on employees' innovative behavior, and found that managerial support had the most proximal contextual effect on innovative behavior and that managerial support mediated the effect of organizational support and national cultural support. Sönmez and Yıldırım¹⁶ found that a proinnovation climate and supervisor supportiveness in the organization had a positive effect on the innovative behaviors displayed by nurses and that the autonomy of nurses had a full mediator role to increase the effect determined in this relationship.

2 | METHODS

2.1 | Design and aim of the study

This methodological, correlational study was aimed at adapting the IBI and ISI into Turkish and at testing the relationship between nurses' innovative behaviors, innovation outputs, and innovation support.

2.2 | Participants and procedure

The study population included nurses working in a training and research hospital and a private university hospital in Istanbul ($n = 900$). The IBI and ISI together included 35 items. As the size of the sampling in adaptation studies is recommended to be tenfold the number of the items in the scale,²⁷ the number of the participants in the study sample was predetermined to be 350 nurses. Thus, the sample of the study included 360 nurses, who worked in the aforementioned two hospitals for at least 6 months and agreed to participate in the study ($n = 360$). In the test-retest phase of the scale, the same scale was administered to 35 nurses twice at a 2- to 3-week interval. Data from the study were collected between March and May 2018.

2.3 | Instruments

2.3.1 | Nurse Information Questionnaire

The questionnaire included nine items questioning the participating nurses' age, sex, educational status, institution, position, length of service at the hospital, length of service as a nurse in the profession, the unit worked in, and type of work.

2.3.2 | Innovative Behavior Inventory

The inventory was developed by Lukes and Stephan¹⁷ by reviewing other innovative behavior scales. While reviewing other scales, they either removed or modified some of the items in those scales. The IBI includes six subdimensions and 23 items rated on a 5-point Likert scale. The IBI's six dimensions are as follows: idea generation, idea search, idea communication, implementation starting activities, involving others, and overcoming obstacles (20 items). The innovation output dimension consisting of three items was evaluated

separately. The Cronbach's α values of the subscales of the IBI ranged from 0.60 to 0.88. In the present study, the mean score for the six subscales of the IBI was regarded as the mean score for the overall IBI.

2.3.3 | Innovation Support Inventory

The ISI, developed by the same authors, included three subdimensions, namely managerial support, organizational support, and cultural support, and 12 items. The items of the inventory were rated on a 5-point Likert scale. Cronbach's α values of the subscales of the ISI ranged between 0.77 and 0.82.

2.4 | Statistical analysis

The descriptive analysis and reliability analysis were performed using SPSS v23 (IBM Corp., Armonk, NY), and for the confirmatory factor analysis (CFA) and structural equation modeling (SEM), the AMOS v22 (IBM Corp.) package program was used. The content validity of the inventory was assessed with the content validity index (CVI). While the relationship between test and retest measurements was assessed using the paired sample t test, the reliability was tested with the Cronbach's α coefficient. The CFA was used to assess construct validity. For the descriptive statistics, mean, standard deviation, median, numbers, and percentages were used.

2.5 | Ethical considerations

Before the study was conducted, the necessary permissions were obtained from the Ethics Committee of Social and Human Sciences (Decision Date: 5 February 2018, No.: 02) and from the hospital administrations where the study was to be conducted. After the informed consent form was obtained from them, the researchers collected the survey forms given to them in sealed envelopes.

3 | RESULTS

3.1 | Characteristics of the participants

Of the participating nurses, whose mean age was 27.5 (5.8) (min-max: 20-48), 50% worked in a public hospital, 50% worked in a private hospital, 84.2% were female, 76.4 had a bachelor's degree, 55.8% worked in inpatient services, 89.7% were staff nurses, and 86.4% worked shifts. While their mean length of service at the hospital was 3.3 years (SD 4.2) (min-max: 10 months-27 years), their mean length of service as a nurse in the profession was 5.4 years (SD 6.4) (min-max: 10 months-30 years).

3.2 | Translation procedure

The inventories were adapted into Turkish in accordance with the guidelines of the International Society for Pharmacoeconomics and Outcomes Research (ISPOR).²⁸ The inventories were first translated

into Turkish by three bilingual experts independently. After the Turkish versions of the inventories were transformed into a single text by the researchers, they were translated back into English by a native speaker of English, who had a good command of both languages. Then the back-translated inventories were sent to Lukes, the developer of the original inventories, to confirm whether they were comprehensible. After the opinions of the author of the original inventories regarding the validity of the language were obtained, the necessary revisions were made.

The cognitive debriefing and content validity of the inventories were evaluated by five experts with a doctoral degree in nursing. Expert opinions were assessed with the CVI, and the CVI of the inventories was found to be 0.94 for the IBI and 0.97 for the ISI, which were above the assumed value of 0.80.^{29,30}

3.3 | Pilot study

To evaluate the comprehensibility of the inventories in Turkish, they were pilot-tested with 10 staff nurses. No changes were made because there were no incomprehensible items.

3.4 | Construct validity

To test the construct validity of the inventories, the CFA, used to test whether a previously defined construct was validated as a model, was performed. The regression weights (estimates) and significance values of the pathways in the model related to the IBI consisting of six subdimensions (innovation outputs excluded) and the ISI consisting of three subdimensions are presented in Tables 1 and 2. According to the analysis results, the regression weights (estimates) of the pathways in the models were considered significant.

To evaluate the analysis results of the IBI and ISI, the general model fit indices χ^2/df (CMIN/DF), the absolute fit index goodness of fit index (GFI), and the comparative fit indices, the comparative fit index (CFI), normed fit index (NFI), and root mean square error of approximation (RMSEA) were used. According to the results related to the IBI, the fitness values for χ^2/df ($383.312/155 = 2.473$) and GFI (0.904) were considered statistically good, and for CFI (0.936), RMSEA (0.064), and NFI (0.897) were considered acceptable. The results showed that the model was supported and the dimensions were confirmed.

The model was tested by creating the necessary covariances for the ISI. According to these results, the fitness values for χ^2/df ($158.889/49 = 3.243$) and GFI (0.929) were considered statistically good, and for CFI (0.957), RMSEA (0.079), and NFI (0.940) were considered acceptable. The results showed that the model was supported and the dimensions were confirmed.

3.5 | Reliability

For the stability analysis of the inventories, the test-retest analysis was performed. The inventories were administered to 35 nurses twice at a 2-week interval. The paired sample *t* test performed to determine the

difference between the two administrations demonstrated that the difference was not statistically significant ($p > 0.05$) (Table 3). There were positive, moderate to high correlations between the first and second administrations of the inventory in terms of the measurements for its subdimensions ($p < 0.001$). The internal consistency of the inventories was assessed with the Cronbach's α coefficient. The results showed that the items in the subdimensions of the inventory had internal consistency (Table 4).

3.6 | Relationship between innovative behavior, innovation outputs, and innovation support

The mean scores for the subscales of the IBI and for the innovation outputs were high. In the ISI, the highest mean score, which was slightly above the average was obtained from the managerial support subscale. Analysis of the correlation between the subdimensions of the inventories indicated that there was a moderate correlation between the IBI subdimensions and innovation outputs and a weak correlation between innovation support and other dimensions (Table 4).

Relationships in the model created¹⁷ while the inventories which were developed to assess the relationship between the six-dimensional IBI and the innovation output subdimension and to determine the relationship between innovation support and innovative behavior were tested. The model was tested by forming the necessary covariances. According to the results, the fitness value for the GFI (0.948) was considered statistically good, and for χ^2/df ($94.583/34 = 2.782$), CFI (0.959), RMSEA (0.070), and NFI (0.939) were considered acceptable. The results showed that the model was supported (Figure 1).

According to the SEM, it was found that the effect of innovative behavior on innovation output ($\beta = 0.67$) and the effect of managerial support on innovative behavior ($\beta = 0.31$) were statistically significant. In addition, the effect of cultural support on organizational support ($\beta = 0.49$) and the effect of organizational support on managerial support ($\beta = 0.64$) were also significant (Figure 1).

4 | DISCUSSION

4.1 | Adaptation of inventories into Turkish

The inventories were adapted into Turkish in accordance with the ISPOR guidelines.²⁸ Based on expert opinions, the content validity of the items in both inventories was determined to be above 0.80 (IBI, 0.94; ISI, 0.97). According to the literature, the score for the content validity of a scale should be greater than or equal to 0.80,^{29,30} which indicates that the language and content validity of the inventories were high.

As the construct of a variable measured in CFA is known in advance, the aim is to verify the factor structure of the measurement instrument.³¹ Therefore, CFA was performed for the construct validity of the inventories. The regression weights (estimates) of the pathways in the models related to the IBI consisting of six

TABLE 1 Results of CFA analysis of the IBI

Items		Subdimension	Estimate	SD	Critical rate	<i>p</i>	Factor loadings/standard regression coefficients
IBI-3	< ---	IG	1.000	...	...	***	0.800
IBI-2	< ---	IG	0.937	0.069	13.559	***	0.713
IBI-1	< ---	IG	1.002	0.074	13.566	***	0.713
IBI-6	< ---	IS	1.000	...	...	***	0.713
IBI-5	< ---	IS	1.187	0.090	13.259	***	0.772
IBI-4	< ---	IS	1.092	0.085	12.864	***	0.746
IBI-10	< ---	IC	1.000	...	...	***	0.768
IBI-9	< ---	IC	0.983	0.062	15.826	***	0.832
IBI-8	< ---	IC	1.036	0.084	12.356	***	0.661
IBI-7	< ---	IC	1.104	0.081	13.633	***	0.723
IBI-16	< ---	IO	1.000	...	...	***	0.818
IBI-15	< ---	IO	1.023	0.072	14.127	***	0.770
IBI-14	< ---	IO	0.898	0.093	9.627	***	0.532
IBI-20	< ---	OO	1.000	...	...	***	0.651
IBI-19	< ---	OO	1.101	0.089	12.328	***	0.806
IBI-18	< ---	OO	1.149	0.096	12.001	***	0.774
IBI-17	< ---	OO	1.068	0.089	11.937	***	0.769
IBI-13	< ---	ISA	1.000	...	...	***	0.742
IBI-12	< ---	ISA	1.191	0.089	13.321	***	0.769

Abbreviations: CFA, confirmatory factor analysis; IBI, Innovative Behavior Inventory; IC, idea communication; IG, idea generation; IO: involving others; IS, idea search; ISA, implementation starting activities; OO, overcoming obstacles.

****p* < 0.001.

subdimensions and the ISI composed of three subdimensions were considered significant. The six- and 3-factor structures were preserved with the CFA.

When the goodness of fit indices of the inventories were evaluated, the CFI and GFI values, which were close to 1, indicated

that the fit was very good, and χ^2/df , which was 2.473, indicated that the fit was acceptable.³² In the present study, the RMSEA value was 0.064 (RMSEA \leq 0.05), which indicated that the fit was very good.³² The results showed that the model was supported and that the dimensions were confirmed. Because the fit indices

TABLE 2 Results of CFA analysis of the ISI

Items		Subdimension	Estimate	SD	Critical rate	<i>p</i>	Factor loadings/standard regression coefficients
ISI-5	< ---	MS	1.000	...	...	***	0.830
ISI-4	< ---	MS	0.853	0.054	15.943	***	0.688
ISI-3	< ---	MS	1.071	0.057	18.758	***	0.881
ISI-2	< ---	MS	0.626	0.063	9.977	***	0.521
ISI-1	< ---	MS	0.960	0.061	15.825	***	0.759
ISI-8	< ---	OS	1.000	...	...	***	0.874
ISI-7	< ---	OS	1.056	0.048	22.115	***	0.905
ISI-6	< ---	OS	0.989	0.056	17.810	***	0.777
ISI-12	< ---	CS	1.000	...	...	***	0.621
ISI-11	< ---	CS	0.969	0.081	11.908	***	0.593
ISI-10	< ---	CS	1.484	0.114	12.994	***	0.933
ISI-9	< ---	CS	1.421	0.111	12.798	***	0.860

Abbreviations: CFA, confirmatory factor analysis; CS, cultural support; ISI, Innovation Support Inventory; MS, managerial support; OS, organizational support.

****p* < 0.001.

TABLE 3 Test-retest results regarding the IBI and ISI ($n = 35$)

Subdimension	1st application Mean (SD)	2nd application Mean (SD)	Test value (t)/ p	Correlation (r)/ p
IG	4.20 (0.5)	4.12 (0.4)	0.984/0.332	0.520/0.001*
IS	4.3 (0.5)	4.10 (0.6)	1.675/0.103	0.542/0.001 ^a
IC	3.84 (0.6)	3.82 (0.6)	0.81/0.936	0.652/0.000 ^a
ISA	3.77 (0.7)	3.61 (0.8)	1.622/0.114	0.700/0.000 ^a
IO	3.95 (0.6)	3.98 (0.6)	-0.265/0.793	0.389/0.021*
OO	3.64 (0.8)	3.56 (0.8)	1.056/0.298	0.875/0.000 ^a
IOutput	3.34 (0.8)	3.41 (0.8)	-0.721/0.476	0.736/0.000 ^a
MS	3.30 (0.6)	3.21 (0.8)	0.691/0.494	0.595/0.000 ^a
OS	3.27 (0.7)	3.34 (0.7)	-0.604/0.550	0.463/0.005*
CS	2.65 (0.8)	2.70 (0.9)	-0.459/0.649	0.709/0.000 ^a

Abbreviations: CS, cultural support; IBI, Innovative Behavior Inventory; IC, idea communication; IG, idea generation; IO, involving others; IOutput, innovation output; IS, idea search; ISA, implementation starting activities; ISI, Innovation Support Inventory; MS, managerial support; OO, overcoming obstacles; OS, organizational support.

* $p < 0.05$, ** $p < 0.001$.

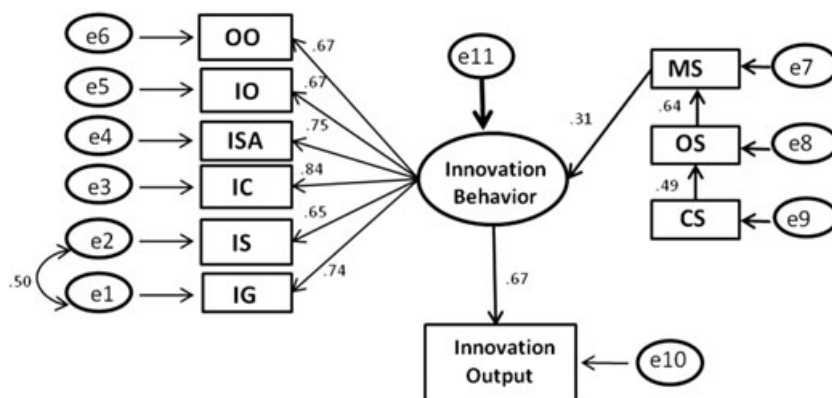
TABLE 4 Descriptive findings, correlations, and Cronbach's α values for the subscales of the inventories ($n = 360$)

	Mean (SD)	1	2	3	4	5	6	7	8	9	10
1. IG	4.1 (0.6)	(0.789)									
2. IS	4.2 (0.6)	0.710**	(0.787)								
3. IC	3.9 (0.6)	0.571**	0.582**	(0.817)							
4. ISA	3.7 (0.7)	0.462**	0.478**	0.608**	(0.805)						
5. IO	3.9 (0.6)	0.487**	0.526**	0.575**	0.523**	(0.731)					
6. OO	3.7 (0.7)	0.390**	0.368**	0.567**	0.542**	0.390**	(0.836)				
7. IOutput	3.5 (0.7)	0.366**	0.362**	0.566**	0.528**	0.389**	0.548**	(0.696)			
8. MS	3.0 (0.8)	0.184**	0.192**	0.241**	0.265**	0.197**	0.174**	0.256**	(0.855)		
9. OS	2.9 (1.0)	0.111*	0.182**	0.282**	0.264**	0.174**	0.189**	0.294**	0.637**	(0.883)	
10. CS	2.7 (0.9)	0.189**	0.174**	0.258**	0.269**	0.179**	0.244**	0.279**	0.395**	0.475**	(0.852)

Abbreviations: CS, cultural support; IC, idea communication; IG, idea generation; IS, idea search; ISA, implementation starting activities; IO, involving others; OO, overcoming obstacles; IOutput, innovation output; MS, managerial support; OS, organizational support.

* $p < 0.05$ (Pearson's ρ), ** $p < 0.01$ (Pearson's ρ).

FIGURE 1 Path analysis results of the model. CS, cultural support; IC, idea communication; IG, idea generation; IO: involving others; IS, idea search; ISA, implementation starting activities; MS, managerial support; OO, overcoming obstacles; OS, organizational support



were in the desired intervals, it was decided that the model could be used.

The analysis of the factor loadings demonstrated that factor loadings of all the items ranged between 0.532 and 0.832 in the IBI and between 0.521 and 0.933 in the ISI. In Lukes and Stephan's¹⁷ study, in the IBI, except for one item in the "involving others" subscale (0.351), factor loadings of all the items were found to be above 0.40. Kline³³ emphasized that this rate's being greater than 40% was an important indicator of construct validity.

Reliability estimates are used to assess the consistency of measurements performed with the same individuals at different times (test-retest reliability), or to assess the equivalence of a set of items in the same test (internal consistency).³⁴ In this respect, in the reliability analysis of the inventories, test-retest and Cronbach's α reliability coefficients were examined. The correlation between the initial and final measurements was assessed with the test and retest technique.³⁴ In the paired sample *t* test administered between the first and second applications, no statistically significant difference was determined for any subdimension ($p > 0.05$). There was a significant positive, weak, and moderate correlation between the measurements obtained from the subdimensions of the inventory in the first and second applications ($p < 0.001$). However, the correlation for the idea communication subscale was very high.³⁵

Cronbach's α coefficients for each subdimension of the inventories ranged from 0.73 to 0.88. The Cronbach's α coefficient is required to be higher than 0.80.³⁵ Although the Cronbach's α coefficient was 0.70 for three subscales, the inventory can be assumed to be reliable because the Cronbach's α coefficient was higher than 0.80 for most of the subdimensions. In the original scales, the internal consistency coefficient of the items ranged from 0.60 to 0.88.¹⁷

4.2 | Analysis of the model

To determine the relationship between the six subdimensional innovative behavior scale, which constitutes the IBI and the innovation outputs, and the relationship between innovation support and innovative behavior, the model developed by Lukes and Stephan¹⁷ was tested. The results showed that the model was supported. The effects of cultural support on organizational support and the effect of organizational support on managerial support were significant. In addition, the effect of managerial support on innovative behavior and the effect of innovative behavior on innovation output were statistically significant. The direction and effect level of the relationship in the model are similar to those of the study conducted by Lukes and Stephan¹⁷ on workers and entrepreneurs in Europe.

The nurses' mean innovation output scores were lower than their mean scores for the subdimensions of the IBI, indicating that the nurses' innovative behaviors did not always yield innovative outputs. However, it was determined that the nurses' innovative behaviors had significant and high effects on innovation outputs. Weng et al,⁵ who pointed out that nursing innovation had three dimensions (creation of knowledge, innovative behavior, and diffusion of

innovation) found that the nursing innovation score was average and that the score for the innovative behavior which they considered as a subdimension was high.

In the present study, as in Lukes and Stephan's¹⁷ study, managerial support had the closest contextual effect on innovative behavior. Similarly, in several studies conducted on the issue, it has been reported that there is a relationship between managerial support and nurses' innovative behaviors.^{6,7,9,21,22} The strongest positive relationship between the transformational leadership and nurses' innovative work behaviors was determined when confidence in the supervisor and avoidance of ambiguity were high.⁸ Weng et al⁵ found a weak correlation between nurses' innovative behaviors and manager support and hospital support.

It was found that organizational support affected managerial support and thus nurses' innovative behaviors. In a study conducted in Iran, it was found that entrepreneurial leadership, which improved idea generation, idea implementation, and idea advocacy showed its greatest effect on idea search, which has a positive influence on nurses' innovative work behaviors.²⁰ In another study, it was determined that there was a direct and positive relationship between transformational leadership and the innovative working behaviors of employees and that a climate of organizational innovation played a mediating role between the transformational leadership and innovative behavior.³⁶ Li-Ying et al³⁷ found that intensive care nurses' knowledge sharing behaviors differently affected their innovative behaviors through written, organizational communication, and personal interaction, depending on the structural, process and outcome control of the quality of care in the unit. Polster and Villines³⁸ study conducted in a magnet hospital to determine nurses' individual and organizational innovation perceptions demonstrated that almost all of the nurses perceived their individual innovation as high, and their organization as innovative.

Lukes and Stephan¹⁷ stated that innovative behaviors of employees could be affected by national cultural support as much as by managerial and organizational support. In the present study, the national cultural support score which was above the average was lower than those of the others. Nählinder³⁹ stated that women's innovative behaviors were hindered due to their low self-esteem and due to the lower priority of work over family or household affairs. The fact that the majority of nurses in Turkey are women may have been the cause of the lower cultural support.

5 | CONCLUSION

The validity and reliability results obtained in the present study show that the Turkish version of the IBI and ISI developed by Lukes and Stephan¹⁷ is a valid and reliable measurement tool. It was determined that the IBI-ISI was suitable for Turkish culture, that they represented the domain to be measured and that its content validity was established. In addition, the nurses' innovative behaviors were found to have a significant and high impact on innovation outputs. It was also found that managerial support had a proximal

effect on the nurses' innovative behaviors. Another finding was that cultural support affected organizational support significantly, and organizational support had a significant influence on managerial support. These results show that nurses' innovative behaviors should be increased if better innovation outputs are to be achieved, and that managerial support plays an important role in this issue and has priority.

The contribution of the study results to practice is that the IBI and ISI which were adapted into Turkish can be used to determine the innovative behaviors of employees and the factors supporting innovation. It can be presumed that the IBI developed by combining the existing scales after their incomplete dimensions were eliminated can assess not only the innovative behavior of the employees but also all the stages of innovation. It is recommended that the IBI and ISI should be used to assess nurses' innovative behavior levels in Turkish society. As the inventory does not include nursing-specific terms and applications, its Turkish version can also be administered to other occupational groups/employees besides nurses. However, it is also recommended that the validity and reliability of the inventory should be tested in different samples to assess employees' innovative behaviors and managers' perceptions of innovation support.

The results of the present study indicate that nurses' innovative behaviors should be developed and supported so that they could generate innovative outputs. It is necessary that nurses' individual interests and creative abilities should be supported by the managers and other hospital workers, that they should be enabled to generate the desired results by allocating the necessary resources to them, and that the innovation providing added value should be created by trying and revising the new product or application after putting it into practice. An environment in which nurses can demonstrate their innovative behaviors can be created through project-based and multidisciplinary studies.

In future studies, inventories can also be used to determine the innovative behaviors of individuals, to identify innovation outputs, and to assess the employees' perceptions of innovation support. They can also be used to assess the effect of cultural support on nurses' innovative behaviors. Other affecting factors can be discovered through intercultural comparisons.

5.1 | Limitations

The present study was carried out in a private hospital and a public hospital having different organizational structures. However, the fact that the study was conducted in tertiary care hospitals in a big city may have been a cause for the high outcome. The fact that the sample was determined by the random sampling method can also be considered as a limitation.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

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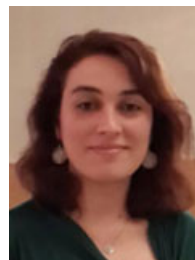
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How to cite this article: Sönmez B, İspir Ö, Önal M, Emiralioglu R. Turkish psychometric properties of the Innovative Behavior Inventory and Innovation Support Inventory: A model analysis on nurses. *Nurs Forum*. 2019;54:254-262. <https://doi.org/10.1111/nuf.12325>