

Improving the Face Validity of Self-Report Scales through Cognitive Interviews Based on Tourangeau Question and Answer Framework: A Practical Work on the Nursing Talent Identification Scale

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Abstract

Background The Nursing Talent Identification self-report Scale is a recently developed to assess the fit of nursing applicants' characteristics for the profession. In such scales, respondents may perceive items in a variety of ways. Hence, while developing such scales, cognitive interviews are used to identify problematic and ambiguous items. The present study aimed to determine how respondents understand and answer to items through cognitive interviews to assess the user-friendliness of the scale and increase its face validity.

Methods In this Qualitative-descriptive study, Tourangeau's four-stage question and answer model was used as a theoretical framework. The participants included 20 first-year nursing students from three western provinces of Iran.. Data were collected through thinking aloud and concurrent and retrospective verbal probing methods. For data analysis, the framework proposed by d'Ardenne and Collins (2015) was used.

Results Through conducting 20 interviews with the participants, problems related to item comprehension, information retrieval, judgment and reporting appropriate answers were identified. Based on the results, out of 95 items, 20 items were modified. The 'instructions' section of the scale was also revised by making the necessary explanations and providing an example.

Conclusions Cognitive interview was effective in identifying problematic items of the Nursing Talent Identification Scale. Although cognitive interviewing is very time-consuming and costly, using this method ensures that the scale has the necessary validity to assess the suitability of nursing applicants to the characteristics of the profession.

Background

The human resources of each discipline need specific talents and individual characteristics based on the philosophy of the discipline and the professional context (1, 2). Identifying talented individuals is critical to improve organizational performance (3). Achieving the philosophy and goals of the nursing profession requires the fit of nurses' talents with the characteristics of the profession; and this ultimately improves the health of society (3). Nurses have a wide range of roles and responsibilities, including care, support, protection, coordination, and training ones. Performing such activities and tasks requires special talents and characteristics in nurses (4). The Nursing Talent Identification Scale is a self-report questionnaire with 54 items, which aims to identify the nursing talents of applicants willing to enter the profession. In this way, the most suitable individuals are employed, which results in job satisfaction and guarantees the quality of nursing care provided by nurses after employment.

An instrument that aims to measure a subjective concept like aptitude has to be constructed carefully. In order for researchers to judge the quality of the instrument, the necessary information about the development process and psychometric properties of the instrument must be provided (5). In selecting health measurement instruments, three characteristics of the instrument including validity, reliability, and

responsiveness should be considered (6). One of the important types of validity in instrument development is face validity (7). Face validity means that the target population considers all instrument items as relevant. If the participants feel that a measurement lacks face validity, they are likely to withdraw to participate in a study (5, 8). Therefore, it has been suggested that participants need to be included in the process of developing self-reporting instruments (6). The validity of self-administered instruments can be threatened by three components, including comprehension problems, validity problems, and processing difficulties (9). The more effort is put into building validity, the greater the trustworthiness of the instrument. For this purpose, mixed methods including quantitative method (item impact index) (10) and qualitative method (cognitive interview) should be used to determine face validity (5, 11).

Cognitive interview is used to determine how respondents understand and respond to instrument items (12, 13). Researchers can identify the problems in the questionnaire through conducting semi-structured interviews with the target population and make the necessary corrections to facilitate responding to the items (14). This leads to a reduction in incomplete data collection and response error (15). Thinking aloud and verbal probing are common techniques in cognitive interviewing (16, 17). In the thinking aloud method, respondents are requested to express their thoughts when finding answers to the items. The verbal probing technique can be concurrent or retrospective, in other words, it can be performed during or after completing the questionnaire. In the concurrent probing, the respondent presents a verbal argument of his / her thoughts while answering the instrument. In the retrospective probing, after the respondent has answered the items, he/she engages in the given answers and expresses the problems in them verbally. Both methods are recommended (17, 18).

The Nursing Talent Identification scale has been newly developed to measure the fit of nursing applicants' characteristics with the profession. In such scales, respondents may perceive items in a variety of ways. When developing such scales, cognitive interview is used to identify problematic and ambiguous items (12). The present study aimed to determine how respondents perceive and respond to items through cognitive interviews to assess the user-friendliness of the scale and increase its face validity.

Methods

The study design

The present descriptive qualitative study is part an approved doctoral dissertation at Tabriz University of Medical Sciences, Iran. The theoretical framework of the study is comprised of Tourangeau's four-stage question and answer model. This model includes examining the respondent's comprehension of items, information retrieval, the respondent's judgment to find the answer and reporting the appropriate response (19). Based on this model, problems of misinterpretation, missing or excessive details, incomplete recalling and social desirability of the instrument are identified (20).

Participants and Setting

The participants of this study included 20 first-year nursing students from Nursing and Midwifery Schools in three large provinces in western Iran. Sampling was done using purposive sampling up to data saturation.

Data Collection

Cognitive interviews were conducted with the participants in the Nursing and Midwifery Schools. The probing questions used in the interview process are listed in Table 1. To collect data, the think-aloud and concurrent and retrospective verbal probing methods were used (21). During the completion of the instrument, the behavior of the respondents was observed and notes were taken about skipping items, changing the response of the items, scale-related problems, and hesitations when responding. Participants were requested to think aloud as they completed the scale and to tell the interviewer whatever came to their mind. Semi-structured interviews were also conducted with the aim of exploring clarity, comprehensibility of items and appropriate face validity of the scale. Each interview lasted approximately 40 to 50 minutes (11, 21). When obtaining informed consent, the interviewer provided the participants with the necessary explanations about both of the interviewing techniques and thinking aloud. The interviews were audio-recorded so that the interviewer could concentrate on the interviews and not be distracted by taking notes.

Table 1: probing Questions Used in the Cognitive Interviews

Types of probes	Sample probing Question
General probes	What do you think of the scale (order of items, font size and item length, etc.)
Observation probes	Why did you not answer this item? Why did you change your answer? I noticed you are hesitant in your answer. Tell me, what were you thinking?
Comprehension probes	What do you think this item means? Can you explain the meaning of this item in your own words? What is the meaning of this word in this item?
Retrieval probes	How did you choose the answer to this item?
Comfort probes	Did you feel uncomfortable when answering any items?
Content probes	Is this item relevant for assessing nursing aptitude? Is there any missing item to identify nursing aptitude?

Ethical Considerations

This study is part of an approved doctoral dissertation in Nursing at Tabriz University of Medical Sciences, Iran. The study protocol was approved by the Ethics Committee of the University (IR.TBZMED.REC.1397.583). Prior to the study, the objectives of the study were explained to the participants and written consent to participate in the study and audio-recording of the interviews was obtained from all participants.

Data Analysis

Data analysis was performed based on the proposed framework for analyzing cognitive interviews. First, the transcript of each interview was read several times by a researcher to gain a full understanding of the text of the interviews. This helped to identify the main problems of the items from the text of the interviews. Each item was then placed in a separate matrix with eight columns. The column headings were based on the framework proposed by d'Ardenne and Collins (2015) as well as common problems identified in the items from the interviews, including respondent details, survey answers, findings from observations and think-aloud method, general probes, comprehension probes, retrieval probes, comfort probes, and other findings (22, 23) (Table 2). After analyzing the data, the findings were discussed with the members of the research team in a panel session.

Table 2: Example of an Empty Matrix for Item 7

Item 7: I promptly notify an error when it needs to be corrected.							
Respondent details (ID, age, and gender)	Survey answer	Thinking aloud/ observations	General probes	Comprehension probes	Retrieval probes	Comfort probes	Other

Results

The mean age of participants was 20 years (standard deviation [SD] = 2.5) and 11 (57.89%) of them were female. The problems related to the general aspects of the scale, misinterpretation, missing or excessive details, and incomplete item recalling were identified and corrected. Based on the results, out of 95 items, 20 items were revised. Findings were reported based on Tourangeau's four-stage question and answer model (19). Table 3 illustrates the results of the cognitive interview.

Comprehension (Assessing the Respondent's Comprehension of Items)

The participants provided detailed feedbacks about the problematic items as follows:

Participants did not interpret item 31 [*"I am in contact with many people"*] in the intended manner. The students reported that the item could be associated with any communication and was incomprehensible to them. They pointed out that "*why one should interact with everyone*" (P.12). Thus, according to the participants, this item was changed to: "*I have good social relationships with others*". In item 34, [*"I am an eloquent and audible speaker"*], the participants reported that "*the words eloquent and audible have difficult meaning*" (P.3). Meanwhile, some participants expressed that: "*This item implies speaking frankly*" (P.11). Therefore, this item was also modified as follows: "*I speak to others in a simple and understandable way*". In item 72 [*"I can do a lot of things without feeling tired"*], the participants stated that this item looks a bit unusual. They stated that "*Surely a lot of work tires a person. It is better to say*

that I get tired quickly with the least amount of work" (P.7). This item was changed according to the participants. In item 85 [*I evaluate the situations with a broad view and through considering the relationships between the components*], the participants reported: "*I did not understand what you mean by 'the relationships between the components'; it is vague*" (P.8). The item was modified as follows: "*I try to consider all aspects of a problem*". In item 93 [*I am slow in performing my tasks accurately*], the participants' perception was that "*To do things accurately, you must be slow*" (P.18), while this was completely different from the intended meaning of the research team. The participants also stated that "*The words 'accurate' and 'slow' imply opposite meanings and make the sentence difficult to understand*" (P.17). The item was modified as follows: "*While I am fast, I am careful enough when doing things*". In item 94 [*I respond quickly to visual and auditory stimuli such as sound and light*], the participants' comprehension was negative and different from the research team. Their perception was that "*This item means that they are bothered by sound and light*" (P.5). The item was modified as follows: "*I use my senses to be aware of my surroundings*".

Information Retrieval (determination and how to find the answer to an item)

This component evaluates participants' responses based on the strategies they use when responding to the item. During the interview with the participants, no problems with information retrieval were identified while responding to the items. Participants retrieved the past and present information from their memory to respond to the items. They constantly thought about their actions and behaviors during these periods, and then responded to the items.

Judgment (respondent's judgment to find the answer)

Many participants did not interpret item 7 [*I promptly notify an error when it needs to be corrected*] in the intended manner and there were different interpretations. Participants reported that "*It is not clear whether the error was made by the individual or other people*" (P.9). The item was corrected as follows: "*If I make a mistake that needs to be corrected, I report it immediately*".

In item 87 [*I pay attention to important details in doing things compared to others*], the participants stated that "*A person may be much more precise (being very meticulous is not really needed in nursing profession) compared to the respondent*" (P.16). When rewriting this item, '*Compared to*' was removed.

Response (choose answer options or find the right words to respond to the item)

Participants were asked about the usefulness of the questionnaire guide. They suggested that how to respond to items be mentioned with an example in the scale guide. Participants were also asked to comment on the appropriateness of the item response options. Participants agreed on a five-point Likert scale (strongly agree to strongly disagree) to respond to items. They reported answers such as "*they are reasonable*" (P.13) or "*did not notice a problem*" (P.8). However, some participants suggested that the scale be reduced to only two or three answer options: "*it is sufficient to ask to agree or disagree*". "*There is no need for strongly agree or strongly disagree*" (P.11). Many participants preferred that the five-point Likert

scale was easier and more accurate than the two or three-point Likert scale. The interviewer observed that participants had difficulty responding to negative items. This was especially evident in item 83: "*I do not insist on my wrong ideas and opinions*". This item was reviewed and rewritten with an affirmative sentence.

The participants were requested to comment on the usefulness of the scale guide. They suggested that the way of responding to the items be mentioned with an example in the guide section. Participants were also asked to comment on the appropriateness of the item response options. They agreed on a five-point Likert scale (strongly agree to strongly disagree) to respond to the items. They reported answers such as "*They are reasonable*" (P.13) and "*I did not notice a problem*" (P.8). However, some participants suggested that the answer options of the scale be reduced to two or three options: "*I agree' and 'I disagree' options are OK and there is no need for 'strongly agree' or 'strongly disagree' options*" (P.11). Meanwhile, many participants preferred that the five-point likert scale was easier and more accurate than the two- or three-point likert scale.

In addition, the participants had difficulty responding to negative items. This was especially evident in item 83: "*I do not insist on my wrong ideas and opinions*". This item was rewritten with an affirmative sentence.

Table 3: Problematic Items and Corrections made Based on Participant Feedback

Item no.	Problematic items	Interview findings	Modifications made to the items
2	I try to perform the assigned tasks correctly and completely.	What does 'assigned' mean? I did not understand the meaning of this word.	I try to do my tasks correctly and completely.
7	I promptly notify an error when it needs to be corrected.	It is vague; do you mean a mistake by me or others?	If I make a mistake that needs to be corrected, I notify you immediately.
11	I easily adapt to an environment with strict rules and regulations.	Putting the words 'easy' and 'strict' together makes it difficult to understand the meaning. The word 'strict' gives a negative impression and the image of a military camp comes to my mind. What is meant by 'strict regulations'?	I can comply with workplace rules and regulations.
12	In my view, it is important to observe the rules and regulations.	Why don't you measure pragmatism? You are measuring the view, but action is more important.	I respect the rules and regulations.
18	I enjoy caring for others.	It reminded me of taking care of something. Rewrite it as: "I enjoy taking care of others". Delete the word 'for'.	I enjoy taking care of others.
19	While dealing with people in pain, I try to alleviate their suffering.	I did not understand the meaning of alleviation. Can you express it with a clearer meaning?	While dealing with people in pain, I try to reduce their suffering.
20	I feel obligated to care for and support people in need and the helpless.	The word 'obligated' implied compulsion and it did not make me feel good. Maybe it would be better to use the word 'willing' instead of it. The item is long and difficult to understand; I read it three times to find out the meaning.	I consider it my moral responsibility to support the needy and disabled.
23	I listen to others with interest.	Which conversations do you mean? Who do you mean by others? Do you mean friendly chat?	I listen carefully to someone speaking.
31	I am in contact with many people.	It is associated with any kind of communication. It gives different meanings. Interact with everyone? Why interact with everyone? Have a lot of friends?	I have good social relationships with others.
33	I can change people's beliefs and attitudes by	It implied religious beliefs to me. Why do I have to change people's religious beliefs?	I can change people's views and attitudes by providing

	providing logical explanations.		logical explanations.
34	I am an eloquent and audible speaker.	Two meanings came to my mind: 'to speak bluntly' and 'to speak frankly'.	I speak to others in a simple and understandable way
41	I listen to the views of the opposition.	It is vague and distracting. If you mean teamwork, then add the word 'in teamwork' or 'collective decision'.	I listen to the views of the opposition in teamwork.
47	Without judging, I see things from the perspective of others.	This sentence was difficult to understand and participants had a long pause to respond to the item.	I can understand the problems of others without judging.
55	When others are aggressive, I calmly listen to them.	The sentence is unusual. You cannot be calm in aggressive situations, but the person tries to behave calmly.	When others are aggressive, I try to listen to them calmly.
72	I can do a lot of things without feeling tired.	It is somehow unusual or in other words exaggerated. It is an abnormal expectation. Certainly, a lot of work tires a person.	I get tired quickly with the least amount of work.
83	I do not insist on my wrong ideas and opinions.	The sentence is negative and confusing. I had a problem answering this question.	I insist on my wrong ideas and opinions.
85	I evaluate the situations with a broad view and through considering the relationships between the components.	It seemed a little vague; I did not understand the relationship between the components.	I try to consider all aspects of a problem.
87	Compared to other people, I pay attention to important details when doing things.	'Compared to other people' can be omitted from the beginning of the sentence. A person may be much more precise (being very meticulous is not really needed in nursing profession) compared to the respondent.	I pay attention to important details when doing things.
93	I am slow in performing my tasks accurately.	My impression of this item is that in order to be careful in doing things, the person should act slowly. The words 'accurate' and 'slow' imply two opposite meanings and make the sentence difficult to understand.	While I am fast, I am careful enough when doing things.
94	I respond quickly to visual and auditory stimuli such as sound and light.	It sounds to me as being bothered by sound and light.	I use my senses to be aware of my surroundings

Discussion

Cognitive interviewing was very helpful in optimizing scale items and significantly improved the clarity, comprehensibility, and quality of scale items. This study showed that finding the appropriate answer for each item involves a complex process of comprehension, information retrieval, judgment, and response (19). In this study, the items containing probable response errors were identified through cognitive interviews. In addition, the way respondents comprehend and interpret the items, along with tool problems were identified.

Correct understanding of items by respondents is one of the important components in the cognitive interview process (5). This study showed that small changes in the appearance of the scale or words can lead to greater clarity in understanding items. According to COSMIN instructions, there is no reason to delete the item, but to improve the clarity of the item, words appropriate to the respondents' perception can be substituted (6). Research findings also indicate that scales designed with clear and unambiguous words for the target population, enable respondents to successfully answer the items (24, 25).

Most studies have reported that non-response to items of a scale occurs when the respondent is unable to understand the meaning of the item (25, 26). In cognitive interviewing, the process of responding to items is determined from the perspective of the respondents and the necessary corrections are made to the clarity the items, which leads to a reduction in non-response to items (26). In this study, participants had difficulty understanding some words and their meanings. It should be noted that the meaning of words should be considered in the context in which the scale is used. Words that are familiar to a group may be unfamiliar or have a different meaning for another group. Cognitive interviewing, facilitates understanding of the items and their interpretation by identifying problems of understanding the vocabulary of the scale for the respondents (27).

In this study, the participants had difficulty responding to items with negative words; this can confuse respondents in choosing a suitable option. Hence, in many studies, it has been recommended to avoid using negative words in the items as much as possible (5, 12).

Limitation

In our study, cognitive interview participants were selected from only three western provinces of Iran by purposive sampling. We may not have included the full range of all participants in the study.

Conclusion

Cognitive interviewing was effective in identifying problematic items in the Nursing Talent Identification Scale. Participants' feedback led to a significant improvement in the items of the scale. Although cognitive interview is a very time-consuming and costly, using it in the psychometric phase of the scale ensures that the Nursing Talent Identification Scale is a valid instrument for measuring the fit of nursing applicants for the characteristics of the professional.

Declarations

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Author's contribution

FB: concept design, data collection, data analysis and interpretation, drafting of manuscript; AGH: participated in the study design, data collection and analysis, manuscript revision; LV: data collection, data analysis and interpretation; VZ: concept design, data collection, data analysis and interpretation, drafting of manuscript, manuscript revision. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets used and/or analyses the current study are available from the corresponding author upon reasonable request.

Ethics approval and consent to participate

This study was approved by the Medical Ethics Committee of Tabriz University of Medical Sciences (Code: IR.TBMED.REC.1397.583). The study followed accepted ethical standards, as outlined in the Declaration of Helsinki. Before conducting the interviews, the purpose of the study was explained to the participants and a written informed consent was obtained. They were also assured that the recordings would be used anonymously, and that the recorded audio would be deleted after the conversation was transcribed, and their name would not be mentioned in the publications resulting from the study. Participants were free to refuse to continue the interview at any stage.

Consent for publication

Not applicable

Competing interests

The authors declare they have no competing interests.

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