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Translation and validation of Arabic version of maternal responsiveness questionnaire

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Abstract--Objectives: Aim to translate the original maternal responsiveness questionnaire from English to Arabic language and validate it. In addition to achieving equivalence between the original and adapted questionnaire. Method: maternal responsiveness questionnaire was translated into the Arabic language by using the WHO guideline of translation technique (translation – back translation and bilingual technique). A cross-cultural study design was used in this study to adapt the English version of the instrument to the new version in the Arabic language. Results: The translated Arabic maternal responsiveness questionnaire demonstrated a high degree of accuracy of translation and high estimates of content validity (S-CVI/Ave =0.96) and the Cronbach alpha showed a high level of internal consistency for questionnaire sub-scale as follow; 0.85 for responsiveness; 0.89 for delayed responsiveness; and 0.73 for non-responsiveness. Conclusion: The Arabic version of the maternal responsiveness questionnaire is highly reliable and has sufficient content validity and a culturally adapted form that can be used to measure the maternal responsiveness for Arabic-speaking mothers.

Keywords---Maternal responsiveness, mother response Arabic translation, instrument validation, reliability.

Introduction

The maternal responsiveness questionnaire (MRQ) is an important tool used to assess the mothers' responses to their infant babies in different types of situations. The original instrument was developed by Leerkes & Qu in the English language as the self-reported measurement of maternal responsiveness and is composed of 49 items, these items are divided into three categories or subscales; responsiveness, non-responsiveness and delayed responsiveness (1).

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The literature about maternal responsiveness emphasizes the importance of the mother-infant interaction and how the mother responds to infant distress can affect their distress, with the likelihood that the distress decreasing after mother positive response and increasing after mother insensitive behaviors (2).

Newborns' survival and safety depend on the caregiver behaviors (more often the mothers) and environment, and what is more, that the infants' developmental outcomes are shaped by the early context of care and interactional processes occurring with their mothers (3). The mothers play a vital role in nurturing regulative emotional, cognitive, and social abilities of infants, and this is because of their ability to respond to infant's basic needs (such as feeding, sleep, and temperature regulation) (4). In conclusion, The Quality of mother-infant interactions consider as a keystone in the development of infants' cognitive, social competence, and general intelligence (5)

Methods or Methodology

The MRQ is a 49-items instrument originate in English language and it composite of three categories or subscale; the responsiveness subscale include 25 items, non-responsiveness subscale includes 13 items and delayed responsiveness subscale involve 11 items all of these items were measured via 5-point Likert scale, where 1 = never and 5 = always.

The translation process of instrument

Begin after receiving agreement from the authors of the original instrument of MRQ. The following translation steps were applied: according to WHO guideline of translation and adaptation of instruments (6)

Forward translation of Questionnaire

After obtaining permission from Prof. Dr. Esther Leerkes the pioneer of the original version of MRQ in the English language to translate and validate it to Arabic language. The forward stage begins to translate the MRQ to Arabic form independently by two Arabic native speakers who are an assistant lecturer in College of Nursing and proficient in English; first one have M.Sc. in child health nursing and the second one have M.Sc. in maternal and newborn care both are academic researchers.

Review of the translated version (researcher evaluation)

The Arabic form was reviewed by a panel of 4 Arabic native experts who are also proficient in English and they match the English form with the Arabic form and give their opinions about the semantic structure of some items and the change was made by the researchers. The panel included assistant prof. in pediatric nursing, prof. in community health nursing, assistant prof. in psychology and mental health, and Ph.D. student in health science. The final review of the Arabic version was made by assistant prof. specialist in Arabic linguistic and additional modifications was done for the final Arabic version according to his recommendation.

Questionnaire back-translation

Assistant prof. who is a specialist in the English language and professional academic lecturer at the University of Babylon, was asked to do a back-translation of the MRQ-AR (Arabic to English). The translator does not participate in the expert panel and was blinded to the content of the original MRQ. After completing the back-translation, the translator was shown the original MRQ and was asked to compare it with a back-translated version of MRQ-AR in order to report the potential inconsistencies of the meaning.

Pretest and understanding of the MRQ-AR

The MRQ-AR was administered in a paper form to a group of 10 mothers that have a child under 1 year recruited from Al-Sadiq Teaching hospital (5 medically educated and 5 client women were non-medically educated), mean age 24.1 ± 2.6 years; their level of education ranged from secondary education to diploma and above, The aim of the interview was to assess the clarity of the questionnaire on a five-point Likert scale range from (1) incomprehensible to (5) "extremely comprehensible to gather the responses as shown in Table (3). The respondents were asked in a structured way in 15 minutes to identify their degree of understanding of each statement in the MRQ-AR questionnaire after received oral Informed consent from all the participants.

Readability of the MRQ-AR

A pilot study was conducted on 248 mothers that have infant babies by administered the questionnaire in electronic form (google form) to assess the reliability of the MRQ-AR. The sample size of pilot study was based on subject to item ratio. (7) The data were processed by using the SPSS-26 version to calculate the Cronbach alpha of the questionnaire sub-scale. Cronbach's alpha has been described as "one of the most important and pervasive statistics in research involving test construction and use" (8) and the Cronbach alpha shows a high level of internal consistency as the following: .85 for responsiveness sub-scale; .89 for delayed responsiveness sub-scale; and .73 for non-responsiveness sub-scale.

Validation of the MRQ-AR

Content validity testing was undertaken by the researchers on a group of experts to determine the clarity and relevance. The experts were specialists in pediatrics, maternity, psychology, and mental health. They were interviewed in a semi-structured way in 15 minutes and asking them to rate each item's relevancy via using a 4-point scale from 1 (irrelevant) to 4 (extremely relevant); after taken inform consent from them orally and given verbal instructions and definition of each subscale (9). The content validity index for the total scale (S-CVI), calculated by averaging the I-CVI responses from the eight experts and dividing by the number of items, was equal to 0.96 as shown in table 1. Several scientific literatures indicated that an S-CVI .78 to 1.0 is acceptable depending on the number of experts (10) (9)

Results

Table 1
Sociodemographic characteristics of 248 participants (mothers and their infants)

Items	Mean	Std. Deviation
Mother age per years	26.07	6.474
Child age per months	8.03	3.455
Child gender	Frequency	Percent
Male	144	58.1
Female	104	41.9
Child order	Frequency	Percent
1 st	77	31
2 nd	66	26.6
3 rd	49	19.8
4 th	13	5.2
5 th	11	4.4
6 th	2	0.8
Mother education attainment	Frequency	Percent
Illiterate	8	3.2
Primary education	79	31.9
Secondary education	81	32.7
Diploma and above	80	32.3
Mother occupation	Frequency	Percent
Working	71	28.6
Not working	177	71.4

Table 2
Content Validity Index for a 49-Item Scale with 8 Expert Raters

NO. of Expert Raters	Items Rated 1 or 2 *	Items Rated 3 or 4**	I.CVI
Expert 1	4	45	0.918367
Expert 2	0	49	1
Expert 3	0	49	1
Expert 4	11	38	0.7755102
Expert 5	0	49	1
Expert 6	0	49	1
Expert 7	0	49	1
Expert 8	0	49	1
		S-CVI/Ave	0.961734

I-CVI, item-level content validity index. S-CVI, scale-level content validity index.

*Ratings of 1- irrelevant; 2=somewhat relevant. **Ratings of 3=quite relevant; 4=extremely relevant

Table 3
Summary of the Items Modified to identify the Comprehensibility of the instrument
for 10 participants

No.	Original	Arabic	Back translation	Comprehensibility (mean \pm SD)	
1.	“When you are trying to do housework, pay the bills, or make dinner, how often do you”	عند قيامك بأعمال المنزل كالطبخ والتنظيف، مالذي تفعلينه لطفلك عادة	When you do house-works like cooking and cleaning, what do you usually do for your infant?	4.80	.632
a.	“Respond in a playful manner if your baby smiles or coos at you”.	تستجيبين باستمتاع لطفلك/ طفلتك عندما يباغي او يبتسم لك	Respond with pleasure to your infant when he/she babbles or smile to you	4.80	.632
b.	Place your baby where you can see each other.	تضعين طفلك في مكان يمكن ان يرى احكما الاخر	Put the infant in place where you can see each other.	4.70	.675
c.	Initiate interaction with your baby (play peek-a-boo or talk to your baby if he/she seems bored).	تبدأين بالتفاعل مع طفلك (مثل لعب الغموضه او التتكم معه/ها) عند شعوره/ها بالملل	initiate interaction with your infant (such as playing hide-and-seek or talking with him/her) when he/she feels bored	4.50	.972
d.	Check to see how your baby is feeling.	تحققين لتري كيف يشعر طفلك	Check to see how your infant feels.	4.30	.949
e.	“Play with your baby if he/she seems lonely”	تقومين بالعب مع طفلك عندما يبدو وحيداً	Play with your infant when he/she seems lonely	4.70	.675
f.	“Make a point of interacting with your baby every few minutes”	تتفاعلين مع طفلك بين الحين والآخر (كل بضع دقائق)	Interact with your infant from time to time (every few minutes)	4.80	.632
g.	Get out something fun for your baby to do or something interesting to see while you are busy.	تجدين شيء مسل لاشغال طفلك او تضعين له شيء ممتع لمشاهدته اثناء انشغالك	Find something interesting to keep your infant busy or put something fun to watch while you are busy	4.80	.632
h.	Stop what you are doing immediately if your baby seems to need or want your attention.	التوقف عن ما تقومين به فوراً عند احتياج طفلك لك او عند رغبته لجذب انتباهك	Stop the work immediately when your infant needs you or wants to get your attention	4.80	.632
i.	“Find a way to finish your work while involving your baby” (put him/her in the suggli pack/sling while cleaning, or make up a song about cooking dinner).	إيجاد طريقة لانهاء عملك اثناء انشغالك برعاية طفلك (مثل حملك له/لها بحماله الأطفال وانت تعملين)	Find a way to finish your work while you are occupied in caring of your infant (such as carrying him/her with infant by sling while you are working)	4.00	1.054
j.	“Let your baby cry for a few seconds while you quickly finish what you are doing”	تتركين طفلك يبكي لعدة ثواني بينما تنتهين عملك سريعاً	let your infant cry for a few <u>seconds</u> while you quickly finish your work	4.80	.422
k.	“Let your baby cry for a	تتركين طفلك يبكي لعدة دقائق	let your infant cry for a few	4.80	.632

	few minutes while you finish what you are doing”.	بينما تنهين عملك	<u>minutes</u> while you finish your work		
1.	“Let your baby cry for 10 minutes while you finish what you are doing”.	تتركين طفلك يبكي لمدة 10 دقائق بينما تنهين عملك	let your infant cry for <u>10 minutes</u> while you finish your work	5.00	.000
m.	Let your baby cry until you are done, no matter how long that takes.	تتركين طفلك يبكي لحين اكمالك عملك بغض النظر للوقت الذي يستغرقه ذلك	Let your infant cry until you finish your work, regardless of how long it takes.	5.00	.000
2.	“When your baby is crying because he/she is frustrated by something (e.g., can’t reach a toy he/she), how often do you”...	عندما يبكي طفلك بسبب انزعاجه من شيء ما (مثل عدم قدرته للوصول للعبة التي يريدتها)، مالذي تفعلينه عادةً	When your infant cries because he/she annoyed by something (e.g. cannot reach the toys he/she wants), what would you usually do?	4.80	.632
a.	Comfort your baby.	تقومين بتهدئة طفلك	You soothing your infant	4.70	.675
b.	“Get your baby interested in a fun activity”.	تجعلين طفلك يستمتع بنشاط مسل	Make your infant enjoy with an interesting activity	4.80	.632
c.	“Let your baby cry for a few seconds before responding”.	تتركين طفلك يبكي لعدة ثواني قبل ان تستجيبين له /لها	Let your infant cry for a few <u>seconds</u> before you respond to him/her.	4.20	1.033
d.	“Let your baby cry for a few minutes before responding”.	تتركين طفلك يبكي لعدة دقائق قبل ان تستجيبين له /لها	Let your infant cry for a few <u>minutes</u> before you respond to him/her.	4.30	1.160
e.	“Let your baby cry for 10 or more minutes before responding”.	تتركين طفلك يبكي لمدة 10 دقائق او اكثر قبل ان تستجيبين له /لها	Let your infant cry for <u>10 minutes</u> or more before you respond to him/her.	4.70	.675
f.	“Let your baby cry until your baby stops crying on his or her own, no matter how long that takes”.	تتركين طفلك يبكي الى ان يتوقف عن البكاء بغض النظر للوقت الذي يستغرقه ذلك	Let your infant cry until he/she stops crying, regardless of how long that takes.	4.50	.850
3.	“When your baby is crying because he or she is sick or ill (e.g., has a cold, is teething, is feeling poorly after shots), how often do you”...	عندما يبكي طفلك بسبب الألم او المرض كالزكام اوالم التسنين او بعد اخذه اللقاح ،مالذي تفعلينه عادةً	When your infant cries because of pain or illness such as a cold or teething pain or after taking a vaccine, what do you usually do?	4.90	.316
a.	Get your baby interested in a fun activity.	تجعلين طفلك يستمتع بنشاط مسل	Make your infant enjoy with an interesting activity.	4.90	.316
b.	Respond to your baby immediately.	تستجيبين لطفلك فوراً	Respond to your infant immediately.	4.80	.632
c.	“Let your baby cry for a few seconds before	تتركين طفلك يبكي لعدة ثواني قبل ان تستجيبين له /لها	Let your infant cry for a few <u>seconds</u> before you	4.60	.966

	responding”.		respond to him/her.		
d.	“Let your baby cry for 10 or more minutes before responding”.	تتركين طفلك يبكي لمدة 10 دقائق او اكثر قبل ان تستجيبين له /لها	Let your infant cry for <u>10 minutes</u> or more before you respond to him/her.	4.80	.632
e.	“Let your baby cry until your baby stops crying on his or her own, no matter how long that takes”.	تتركين طفلك يبكي الى ان يتوقف عن البكاء بغض النظر للوقت الذي يستغرقه ذلك	Let your infant cry until he/she stops crying, regardless of how long that takes.	4.90	.316
4.	“When you have a few free minutes to relax to yourself, how often do you”...	عند توفر عدة دقائق للاسترخاء و الاهتمام بنفسك، مالذي تفعلينه عادةً	When you have a few minutes to relax and take care of yourself, what do you usually do?	4.80	.422
a.	“Respond in a playful manner if your baby smiles or coos at you”.	تستجيبين باستمتاع لطفلك /طفلتك عندما يباغي او يبتسم لك	Respond with pleasure to your infant when he/she babbles or smile to you	4.90	.316
b.	Place your child where you can see each other.	تضعين طفلك في مكان يمكن ان يرى احدهما الاخر	Put the infant in place where you can see each other.	4.50	.850
c.	Initiate interaction with your baby (play peek-a-boo or talk to your baby if he/she seems bored).	تبدأين بالتفاعل مع طفلك (مثل لعب الغموضه او التتكم معه/ها) عند شعوره/ها بالملل	initiate interaction with your infant (such as playing hide-and-seek or talking with him/her) when he/she feels bored	4.50	.850
d.	Check to see how your baby is feeling.	تحققين لتري كيف يشعر طفلك	Check to see how your infant feels.	4.30	1.059
e.	“Play with your baby if he/she seems lonely”.	تقومين بالعب مع طفلك عندما يبدو وحيداً	You play with your infant when he/she seems lonely	4.80	.422
f.	“Make a point of interacting with your baby every few minutes”.	تتفاعلين مع طفلك بين الحين والآخر (كل بضع دقائق)	Interact with your infant from time to time (every few minutes)	4.30	1.059
g.	Get out something fun for your baby to do or something interesting to see while you are relaxing.	تجدين شيء مسل لاشغال طفلك او تضعين له شيء ممتع لمشاهدته اثناء استرخائك	Find something interesting to keep your infant busy or put something fun to watch while you are busy	4.90	.316
h.	Stop what you are doing immediately if your baby seems to need or want your attention.	التوقف عن ما تقومين به فوراً عند احتياج طفلك لك او عند رغبته لجذب انتباهك	Stop what you are doing immediately when your infant needs you or wants to get your attention	4.70	.949
i.	“Let your baby cry for a few seconds before responding”.	تتركين طفلك يبكي لعدة ثواني قبل ان تستجيبين له /لها	Let your infant cry for a few <u>seconds</u> before you respond to him/her.	4.60	.699
j.	“Let your baby cry for a few minutes before responding”.	تتركين طفلك يبكي لعدة دقائق قبل ان تستجيبين له /لها	Let your infant cry for a few <u>minutes</u> before you respond to him/her.	4.70	.675
k.	“Let your baby cry for 10 or more minutes	تتركين طفلك يبكي لمدة 10 دقائق او اكثر قبل ان	Let your infant cry for <u>10 minutes</u> or more before	5.00	.000

	before responding”.	تستجيبين له / لها	you respond to him/her.		
1.	Let your baby cry until you are done, no matter how long that takes.	تتركين طفلك يبكي لحين انهاء ما تقومين به بغض النظر للوقت الذي يستغرقه ذلك	Let your infant cry until you finish what you are doing, regardless of how long that takes.	5.00	.000
5.	“When your baby awakens in the middle of the night and cries, how often do you”...	عند ما يستيقظ طفلك في الليل ويبيكي، مالذي تفعلينه عادةً	When your infant wakes up at night and cries, what do you usually do?	5.00	.000
a.	“Let your baby cry for a few seconds before responding”.	تتركين طفلك يبكي لعدة ثواني قبل ان تستجيبين له / لها	Let your infant cry for a few <u>seconds</u> before you respond to him/her.	4.90	.316
b.	“Let your baby cry for a few minutes before responding”.	تتركين طفلك يبكي لعدة دقائق قبل ان تستجيبين له / لها	Let your infant cry for a few <u>minutes</u> before you respond to him/her.	4.60	.843
c.	“Let your baby cry for 10 or more minutes before responding.”	تتركين طفلك يبكي لمدة 10 دقائق او اكثر قبل ان تستجيبين له / لها	Let your infant cry for <u>10 minutes</u> or more before you respond to him/her.	4.80	.422
d.	“Let your baby cry himself or herself back to sleep, no matter how long that takes”.	تتركين طفلك يبكي الى ان يتوقف عن البكاء ويرجع الى النوم بغض النظر للوقت الذي يستغرقه ذلك	Let your infant cry until he/she stops crying and goes back to sleep, regardless of how long that takes.	4.70	.949
6.	“When your baby is crying because he/she is afraid of something or someone (e.g., loud toy, a dog, an unfamiliar person), how often do you”...	عند ما يبكي طفلك بسبب الخوف من شيء ما او شخص ما (مثل الصوت العالي او نباح الكلب او رؤيته لشخص الغريب)، مالذي تفعلينه عادةً	When your infant cries because of fear of something or someone (such as a loud sound, a dog barking, or seeing a stranger) ، what do you usually do?	4.90	.316
a.	Comfort your baby.	تقومين بتهدئة طفلك	You soothing your infant	5.00	.000
b.	Get your “baby interested in a fun activity”.	تجعلين طفلك يستمتع بنشاط مسل	Make your infant enjoy with an interesting activity	4.70	.675
c.	“Let your baby cry for 10 or more minutes before responding”.	تتركين طفلك يبكي لمدة 10 دقائق او اكثر قبل ان تستجيبين له / لها	Let your infant cry for <u>10 minutes</u> or more before you respond to him/her.	4.50	.707
d.	“Let your baby cry until your baby stops crying on his or her own, no matter how long that takes”.	تتركين طفلك يبكي الى ان يتوقف عن البكاء بغض النظر للوقت الذي يستغرقه ذلك	Let your infant cry until he/she stops crying, regardless of how long that takes.	4.50	.850
7.	“When your baby is crying even though he or she is well fed, well-rested, and has a fresh diaper, how often do you”...	عند ما يبكي طفلك بالرغم من كونه شبعان ومرتاح و حفاظته نظيفة، مالذي تفعلينه عادةً	When your infant cries despite being full and rested and his diaper is clean, what do you usually do?	4.50	.850
a.	Comfort your baby.	تقومين بتهدئة طفلك	You soothing your infant	4.50	.850

b.	Get your “baby interested in a fun activity”.	تجعلين طفلك يستمتع بنشاط مسل	Make your infant enjoy with an interesting activity	4.70	.675
c.	“Let your baby cry for a few seconds before responding”.	تتركين طفلك يبكي لعدة ثواني قبل ان تستجيبين له / لها	Let your infant cry for a few <u>seconds</u> before you respond to him/her.	4.30	1.160
d.	“Let your baby cry for a few minutes before responding”.	تتركين طفلك يبكي لعدة دقائق قبل ان تستجيبين له / لها	Let your infant cry for a few <u>minutes</u> before you respond to him/her.	4.50	.850
e.	“Let your baby cry until your baby stops crying on his or her own, no matter how long that takes”.	تتركين طفلك يبكي الى ان يتوقف عن البكاء بغض النظر للوقت الذي يستغرقه ذلك	Let your infant cry until he/she stops crying, regardless of how long that takes.	4.80	.632

The above Table demonstrates the Comparison of the original, Arabic, and back-translated versions of the MRQ. Comprehensibility was estimated by using a 5-point Likert scale (1) “incomprehensible” to (5) “extremely comprehensible”.

Discussion

The Arabic version of the MRQ-AR was created through a careful process of translation and adaptation; its recommended by the WHO guideline for translation (6). In addition, the methodology used in this article was rigorous in the investigation of translation accurateness through back-translation and the final back-translation was accepted by the authors of the original version. Finally, the present form of MRQ-AR it seems to be equivalent to the original version in term of conceptual definition and items. Likewise, the practicability of the Arabic version was supported by administrating it to a sample of mothers to assess the comprehensibility and understanding.

The validation process using a combination of steps (forward translation, Panel of experts, back translation, pretest of instrument, and content validity index) to insure various evaluations of both the semantic and idiomatic equivalence between the English and Arabic version.

Psychometric properties have been examined in this study for the MRQ-AR version. The outcome results indicated that the Arabic form is valid and reliable. The Content validity “refers to the extent to which the items in a questionnaire are representative of the entire theoretical construct of the questionnaire” (11) and The S-CVI of the MRQ-AR was 0.96 as showed in Table(2) and this result considers highly representative and acceptable according to DeVon et al., (2007), Lynn, (1986). Also, The reliability of the MRQ-AR subscale showed a high level of internal consistency according to Crutzen & Peters, (2017), and Nunnally, (1978) after calculated the Cronbach’s alpha as the following: 0.85 for the responsiveness sub-scale, 0.89 for delayed responsiveness sub-scale, and 0.73 for the non-responsiveness sub-scale.

Ethical Considerations

All ethical principles are considered in this article. The participants were informed of the purpose of the research and its implementation stages. They were also assured about the confidentiality of their information. They were free to leave the study whenever they wished, and if desired, the research results would be available to them. Written consent has been obtained from the subjects.

Authors' contributions: All authors equally contributed to preparing this article.

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Conflict of interest: *the authors have no conflict of interest to declare*

References

1. Leerkes E, Qu J. The maternal (non) responsiveness questionnaire: Initial factor structure and validation. *Infant Child Dev.* 2017;26(3):e1992.
2. Kiel EJ, Gratz KL, Moore SA, Lutzman RD, Tull MT. The impact of borderline personality pathology on mothers' responses to infant distress. *J Fam Psychol.* 2011;25(6):907.
3. Trevathan W. Primate pelvic anatomy and implications for birth. *Philos Trans R Soc B Biol Sci.* 2015;370(1663):20140065.
4. Provenzi L, Scotto di Minico G, Giusti L, Guida E, Müller M. Disentangling the Dyadic Dance: Theoretical, Methodological and Outcomes Systematic Review of Mother-Infant Dyadic Processes. *Front Psychol* [Internet]. 2018 Mar 19;9:348. Available from: <https://doi.org/10.3389/fpsyg.2018.00348>
5. Fancourt D, Perkins R. The effects of mother-infant singing on emotional closeness, affect, anxiety, and stress hormones. *Music Sci* [Internet]. 2018 Jan 1;1. Available from: <http://journals.sagepub.com/doi/10.1177/2059204317745746>
6. WHO. Process of translation and adaptation of instruments [Internet]. World Health Organization. [cited 2020 May 1].
7. Osborne JW, Costello AB. Sample size and subject to item ratio in principal components analysis. *Pract Assessment, Res Eval.* 2004;9(1):11.
8. Taber KS. The use of Cronbach's alpha when developing and reporting research instruments in science education. *Res Sci Educ.* 2018;48(6):1273–96.
9. Lynn MR. Determination and quantification of content validity. *Nurs Res.* 1986;
10. DeVon HA, Block ME, Moyle-Wright P, Ernst DM, Hayden SJ, Lazzara DJ, et al. A psychometric toolbox for testing validity and reliability. *J Nurs Scholarsh.* 2007;39(2):155–64.
11. Shultz KS, Whitney DJ, Zickar MJ. *Measurement theory in action: Case studies and exercises.* Routledge; 2020.
12. Crutzen R, Peters G-JY. Scale quality: alpha is an inadequate estimate and factor-analytic evidence is needed first of all. *Health Psychol Rev.* 2017;11(3):242–7.
13. Nunnally JC. *Psychometric Theory: 2d Ed.* McGraw-Hill; 1978.