Reliability and validity of the Chinese version of the spiritual health scale

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Background: In recent years, spiritual health became a focus of interest and nurses' spiritual health is crucial to the quality of their own lives and patients' health care. In China, high workloads, tense nurse-patient relationships, and low social status have been found to have negative impacts on the work attitude and nursing quality and spiritual health offers direction for solving this problem. This study assessed the spiritual health levels of nurses on the Chinese mainland using a revised Chinese version of the spiritual health scale (SHS-C).

Methods: A total of 747 nurses were recruited in Zhejiang Province, China. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) of the revised SHS-C were performed using convenience sampling, with 291 and 456 nurses used for each analysis type, respectively. Items on the SHS-C were screened using the discrete trend method, the extreme group approach, correlation analysis, and EFA to create a revised mental health questionnaire for nurses. An internal consistency test and CFA were then performed to verify the spiritual health questionnaire for nurses. A self-reporting questionnaire consisting of demographic questions and the revised SHS-C items was used for this cross-sectional correlation study.

Results: The revised SHS-C included 6 subscales comprising a total of 28 items. Cronbach's α and retest reliability for the revised questionnaire were 0.90 and 0.73, respectively. The fit of the model was analyzed by CFA [χ^2/df =1.79; goodness of fit index (GFI) =0.83; adjusted GFI (AGFI) =0.79; root mean square error of approximation (RMSEA) =0.06; normed fit index (NFI) =0.86; comparative fit index (CFI) =0.93; non-NFI (NNFI) =0.92; incremental fit index (IFI) =0.93; parsimony NFI (PNFI) =0.76; parsimony CFI (PCFI) =0.83; and parsimony GFI (PGFI) =0.69; with each index score higher than those of the 5-subscale SHS short form previously developed by Hsiao *et al.*]. A reliability test showed that the overall Cronbach's α was 0.93, with a Cronbach's α of between 0.82 and 0.92 for each section. This study developed and validated a revised SHS-C.

Conclusions: Our research will help policymakers, administrators, nursing leaders, and educators to identify areas for improvement regarding nurses' spiritual health, which could translate into significant improvements in patients' health care.

Keywords: Nursing; spiritual health; assessment tool

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Introduction

In recent years, increasing attention has been paid to holistic health, with emphasis not only on the physical, psychological, and social aspects of health but also on spiritual health (1). Spiritual health is a dynamic, developmental, conscious, multidimensional, and universal process that activates connections within oneself and with others, nature, or the transcendent through spiritual awareness, personal capacity, and the potential for transcendence (2). It is considered a major asset associated with an individual's perception of their health status and a predictor for other health issues (3). Many studies have confirmed that higher levels of spiritual health are associated with better physical and psychological health and health-promoting behaviors (4-6).

In contrast, high workloads, tense nurse-patient relationships, and low social status have been found to have negative impacts on the work attitude and nursing quality in China (7-9). Most notably, nurses who are subjected to violence in the workplace can feel disillusioned with their careers (10). Spirituality, as the individual's inner power, is urgently needed to help nurses deal with these problems and rebuild their confidence in the nursing profession, ultimately improving their quality of life and the quality of care they provide for patients. In addition, spiritual care is important for patients' wellbeing, and management-level nurses need to be fully aware of the aspects of spirituality and spiritual care (11). The role of nurses is crucial in this regard, and their personal spirituality can impact the spiritual care of their patients (12). Therefore, it is important to develop a valid, reliable, and comprehensive instrument to evaluate nurses' spiritual health and indicate when intervention is required to improve individuals' spiritual health status.

At present, most existing spiritual health assessment tools have been generated based on Western culture, rooted predominantly in Judaism or Christianity. An example is the spiritual wellbeing scale (SWBS), in which half of the items concern the relationship between individuals and the Judeo-Christian God (13). However, the great cultural influences of Confucianism, Taoism, and Buddhism over the centuries should be concerned in China (14). Therefore, it is inappropriate to choose an assessment scale based on the Judeo-Christian tradition to assess the spiritual health status of Chinese people (15). This study aimed to develop and evaluate a more comprehensive assessment instrument for Chinese nurses based on the 24-item the spiritual health scale short form (SHS-SF) devised by Hsiao et al. (15).

We present the following article in accordance with the SURGE reporting checklist (available at https://apm.amegroups.com/article/view/10.21037/apm-22-188/rc).

Methods

Participants

A revised Chinese spiritual health scale (SHS-C) was tested between June 2015 and August 2015 on the Chinese mainland and then used to investigate the prevalence and influence of factors associated with the spiritual health of nurses in China between July 2015 and September 2015. Nurses were recruited from several communities and hospitals in the Zhejiang Province. The inclusion criteria for participants in this study were as follows: (I) be a professional nursing education background, (II) hold a practicing nurse certificate of the People's Republic of China, (III) be currently on the job, and (IV) be willing and able to sign an informed consent to participate in the study. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by Ethics Review Board of the Hangzhou Normal University (No. 20190103) and informed consent was taken from all the participants.

Recruiting participants with the help of the head nurse. The researcher members received uniform training in questionnaire management and interview techniques. researcher members clarified the research purpose, the principle of anonymous filling, and the format of answering the written questionnaire. A total of 836 questionnaires were distributed to nurses, and once the questionnaires were completed, they were returned to the research team. In total, 747 valid responses were returned, providing an effective response rate of 89.35%.

Revision of a Chinese version of the SHS-SF for mainland China

Hsiao et al. developed and examined the reliability and validity of an SHS-SF in Taiwan, with Cronbach's α of 0.93 (15). However, for our purposes, some words or sentences in the Chinese version of the SHS-SF needed to be altered due to linguistic differences between mainland China and Taiwan, China.

Unlike the SHS-SF tested by Hsiao et al. (15), several similar scales, such as the spiritual wellbeing questionnaire

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(SWSQ) (16), the spiritual health inventory (SHI) (17), and the spirituality scale (SS) (18), include a subscale related to nature. A harmonious relationship between humans and nature has been a concern in China for thousands of years. For instance, Taoism, in which Tao is an inherent and stable power emphasizing unity with nature, is an essential tenet of traditional Chinese culture. At present, people often find a sense of connection with nature through various activities, such as photography and climbing. Therefore, we considered a relationship with nature to be an important part of spirituality.

The revision and testing procedures in this study were completed in 3 steps. First, after analyzing spiritual-health-related scale (15-18), we conclude that spiritual health should include 6 dimensions, including 5 dimensions mentioned id SHS-SF and "connection with nature". Ultimately, SHS-C includes 6 dimensions, that is the connection to others, meaning derived from living, transcendence, religious attachment, self-understanding, and connection with nature. Based on common linguistic habits and the social situation on the Chinese mainland, several items from the 24-item SHS-SF developed by Hsiao *et al.* (15) were altered. The revision resulted in the addition of 4 items regarding a connection with nature, drawn from the existing scales mentioned above. This addition took the number of items on the questionnaire from 24 to 28.

Secondly, a total of 9 experts, academic professors, and lecturers were invited to participate in 2 rounds of consultation to evaluate the validity of the items and subscales in the questionnaire. Among these 9 experts, there were 4 in nursing, 3 in psychology, and 2 in sociology. During the first round of consultation, the experts were asked to advise on how relevant each item was to its section. A revised questionnaire was then generated, incorporating the advice received. In the second round of consultation, experts were again asked to score this new questionnaire in terms of the relationship between the subscales and the relevance of the items in each. Scores were from 1 (not relevant) to 4 (very relevant). As the number of participants in this stage was greater than 6, the item-content validity indices (I-CVI) were 0.78 or above, and the scale-content validity index (S-CVI) was 0.93, the validity of the questionnaire content was deemed to be good (19). The first definitive version of the questionnaire was drawn up accordingly.

Thirdly, 10 clinical nurses were recruited and asked to examine the new version of the questionnaire and decide whether the items were clear and easy to understand. The response rate was 100%, and scores for each item ranged from 1 (not at all clear or easy to understand) to 5 (very clear and easy to understand). The mean scores for all the items in the questionnaire were above 3, and therefore no further revisions were made.

Examination of the validity and reliability of the revised SHS-C

Item analysis and exploratory factor analysis (EFA)

A total of 340 nurses were recruited and screened to evaluate the sensitivity, representation, discrimination, and formatting of the items, as well as the usefulness of the instrument. Of them, 291 were eligible for the study and completed the questionnaire. The response rate was 85.6% (*Table 1*).

The following methods were used to analyze each item. The discrete tendency method, in which standard deviations (SDs) were used to reflect discrete tendencies, and any item with an SD <0.8 was deleted (20,21). The extreme groups approach was used to examine whether there were significant individual differences when answering the items. The items were scored from low to high. The top 27% was marked to be the high score group, while the last 27% was marked as the low score group. Independent *t*-tests were performed, and items with statistical difference between the two groups (P<0.01) were retained (20). In the correlation coefficient method, which evaluated the correlation between items and the whole scale, items with a Pearson correlation coefficient (r) of >0.4 were retained (21).

EFA was used to analyze the common factors in the data and to explain the basic structure of the data with as few factors as possible (22). First, Kaiser-Meyer-Olkin (KMO) and Bartlett's tests were conducted. A KMO value of less than 0.5 suggested that the data were unsuitable for factor analysis (23). Principal components analysis was used, followed by Varimax rotation with Kaiser normalization. This method used the factor loading of the item on the common factor. Generally, values ≥0.4 were set as the selection criteria (19,21,22). Based on these tests, the final version of the revised SHS-C was drawn up.

Test-retest reliability and validity

The intra-class correlation coefficient (ICC) was used to examine test-retest reliability. Of the 291 participants, 28 nurses were invited to do the same survey again after 2 weeks. This period was chosen as a suitable time interval between the survey distributions as it was unlikely that respondents

Table 1 Demographic characteristics of participants EFA and CFA

Characteristics	Items analysis & EFA (n=291)	CFA (n=456)	CFA for model 1 (5 factors) (n=200)	CFA for model 2 (6 factors) (n=200)
Mean age ± SD [range]	31.86±7.15 [20–55]	32.41±7.28 [18–55]	31.68±7.49 [21–50]	32.57±7.20 [18–55]
Female, n (%)	282 (96.9)	433 (95.0)	180 (90.0)	197 (98.5)
Educational level, n (%)				
Secondary technical	9 (31.1)	8 (1.8)	3 (1.5)	3 (1.5)
Diploma program	82 (28.2)	159 (34.9)	75 (37.5)	68 (34.0)
Bachelor degree or the higher	200 (68.7)	289 (63.3)	122 (61.0)	129 (64.5)
Religion, n (%)				
Have religion	51 (17.5)	75 (16.4)	32 (16)	35 (17.5)
Have no religion	240 (82.5)	381 (83.6)	168 (84.0)	165 (82.5)

EFA, exploratory factor analysis; CFA, confirmatory factor analysis; SD, standard deviation.

would have greatly altered their perceptions in that time (23). Cronbach's α was used to assess internal consistency. A Cronbach's α of >0.7 denoted acceptable internal consistency (19,21).

During enrollment, the purpose of the study was explained by trained study staff, and informed consent was obtained from those who agreed to the terms of the study. The SHS-C was self-administered by most participants. To determine test-retest reliability, all participants took home another SHS-C questionnaire to complete after 2 weeks. Their responses were mailed back to our office. Up to 2 reminder phone calls were made if necessary.

Confirmatory factor analysis (CFA)

A total of 496 nurses were recruited, and 456 completed questionnaires were selected for the analysis (*Table 1*). The effective response rate was 91.9%. CFA was conducted to verify the structural validity of the revised SHS-C. The 5-subscale, 24-item SHS-SF was chosen as an alternative model, while the 6-subscale, 28-item SHS-C developed in this study was regarded as the hypothetical model. To minimize errors, 200 nurses were randomly assigned to each of these two models.

Statistical analyses

All statistical analyses were performed using SPSS software, version 17.0 (IBM Corp., Armonk, NY, USA), and a P value <0.05 was considered statistically significant. Frequencies and percentages were used for the statistical description of

the respondents' basic information. Item analysis (discrete trend method, extreme group approach, and correlation analysis) and EFA were used to analyze each item in the SHS-C. The construct validity was considered as a good fit if $\chi^2/df<3$, root mean square error of approximation (RMSEA) <0.1, goodness of fit index (GFI), adjusted GFI (AGFI), normed fit index (NFI), non-NFI (NNFI), comparative fit index (CFI), and incremental fit index (IFI) >0.9, parsimony GFI (PGFI), parsimony CFI (PCFI), and PGFI >0.5.

Results

Participant characteristics

As shown in *Table 2*, the mean age of the responding nurses was 32.17 years old (SD =7.235), and women made up 95.7% of the study population. Among the nurses, 33.9% had worked for less than 5 years, 26.8% had worked for 6 to 10 years, 23.2% had worked for 11 to 20 years, and 16.2% had worked for more than 20 years. A small number of nurses (5.9%) had reached the level of deputy chief nurse or above. Most of the nurses (83%) did not have religious beliefs.

Results related to the revised SHS-C

Content validity and face validity assessment

In the 2 rounds of consultation, the I-CVI scores for all the items were above 0.78, and the S-CVI score was 0.93. In the face validity test, the mean value of all the items was above 3, and therefore no revisions to the items were made.

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Table 2 Demographic characteristics of all participants in this study (n=747)

Patient	Number	Percentage (%)
Age		
≤29	333	44.6
30–39	261	34.9
≥40	153	20.5
Gender		
Female	715	95.7
Male	32	4.3
Working years		
≤5 years	253	33.9
6–10 years	200	26.8
11–20 years	173	23.2
>20 years	121	16.2
Professional ranks		
Nurse	189	25.3
Senior nurse	282	37.8
Supervisor nurse	232	31.1
Deputy chief nurse or above	44	5.9
Education background		
Secondary	17	2.3
Tertiary education	240	32.1
Bachelor's degree or above	490	65.6
Marriage		
Married	518	69.3
Unmarried	210	28.1
Divorced	16	2.1
Widowed	3	0.4
Physical status		
Very healthy	189	25.3
Fairly healthy	360	48.2
Minor health problems	183	24.5
Major health problems	15	2.0
Religious beliefs		
Yes	127	17
Buddhism	97	13.0

Table 2 (continued)

Table 2 (continued)

Patient	Number	Percentage (%)
Christianity	18	2.4
Taoism	3	0.4
Others	9	1.2
No	620	83
Reading habits and enrolmenting courses		
Yes	304	40.7
No	443	59.3
Exercise		
Usually	386	51.7
Hardly	361	48.3

Item analysis

Discrete tend analysis showed that the SD values of all the items were above 0.8, except for items 3 (SD =0.79) and 4 (SD =0.78), indicating that these 2 items should be eliminated. The Pearson correlation coefficient (r) between the item and whole scale was above 0.4, except for the items 17 to 20 (r values from 0.16 to 0.30), indicating that items 17 to 20 should be eliminated. The r values between the items with an effect size >0.7 indicated that all the items should be retained.

EFA, test-retest reliability analysis, and internal reliability analysis

Our results showed that the KMO value was 0.91, and Bartlett's test of sphericity showed P<0.01, suggesting that factor analysis could be conducted. Six underlying factors were revealed (*Table 3*), and the accumulated variance was 66.62%. Factor 1 (including 6 items) corresponded to transcendence over limitation and was named "Transcendence". Factor 2 (including 6 items) corresponded to the meaning of life and was named "Meaning derived from living". Factor 3 (including 4 items) corresponded to the relationship with nature and was named "Connection to nature". Factor 4 (including 4 items) corresponded to the relationship with belief/religion and was named "Religious attachment". Factor 5 (including 4 items) corresponded to the relationship with oneself and was named "Self-understanding". Factor 6 (including 4 items) corresponded to relationships with others and was named "Connection to

Table 3 Results of EFA to assess the internal structure of the SHS-C (n=291)

Construct/item	Component					
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
My relationship with others						
1. I have people around me who can talk heart-to-heart with me	0.58					
2. I like to help others	0.65					
3. I can get help from people around me when I am in difficulty	0.57					
4. I can live in harmony with others	0.57					
Meaning of life						
5. I often think about how to make life more fulfilling		0.69				
6. I often think about what my long-term goals in life are		0.77				
7. I try my best to live a meaningful life		0.67				
8. I plan my life		0.76				
9. I try my best to play my chosen role in life		0.55				
10. I endeavor to achieve my long-term goals		0.66				
Transcendence over limitation						
11. I can regard a setback as a challenge			0.68			
12. I can face setbacks calmly, without fear			0.74			
13. I believe I have the ability to recover, when facing a setback			0.69			
14. I often have an optimistic attitude to setbacks			0.76			
15. I still believe life is beautiful when I am facing a setback			0.77			
16. Setbacks help me perceive my own strengths			0.71			
The relationship with religion						
17. I hope deities (God/Bodhisattva...) bless me				0.57		
18. I believe religion can help me pull through				0.92		
19. Religious activity (prayer/worship…) helps me a lot				0.92		
20. I believe deities' (God/ Bodhisattva...) blessings me brings me peace				0.91		
The relationship with oneself						
21. I can perceive my virtues					0.54	
22. I can accept my shortcomings					0.64	
23. In general, I like myself					0.75	
24. I think I am a valuable person					0.69	
The relationship with nature						
25. I feel I am closely related to nature						0.64
26. I stand in awe of nature						0.82
27. Nature amazes me						0.82
28. Nature always makes me feel peaceful						0.76

The table was modified with permission from Wiley (https://www.wiley.com/en-us/permissions). EFA, exploratory factor analysis; SHS-C, spiritual health scale-Chinese.

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Table 4 Fit indices of two models for the alternative and hypothetical models

Model fit	Model 1 (5 subscales)	Model 2 (6 subscales)	Acceptable criteria
Absolute fit indices			
χ^2/df	2.20	1.79	<3
GFI	0.83	0.83	>0.9
AGFI	0.79	0.79	>0.9
RMSEA	0.08	0.06	<0.1
Relative fit indices			
NFI	0.84	0.86	>0.9
CFI	0.91	0.93	>0.9
NNFI	0.89	0.92	>0.9
IFI	0.91	0.93	>0.9
Parsimony fit indices			
PNFI	0.74	0.76	>0.5
PCFI	0.80	0.83	>0.5
PGFI	0.68	0.69	>0.5

GFI, goodness of fit index; AGFI, adjusted GFI; RMSEA, root mean square error of approximation; NFI, normed fit index; CFI, comparative fit index; NNFI, non-NFI; IFI, incremental fit index; PNFI, parsimony NFI; PCFI, parsimony CFI; PGFI, parsimony GFI.

others". The ICC value of SHS-C for retest was 0.73, and Cronbach's α for the whole instrument was 0.93, with the 6 sub-scales ranging from 0.82 to 0.92.

CFA

Both the alternative model (including 5 subscales) and the hypothetical model (including 6 subscales) fulfilled the criteria for acceptability (22,23), although most indices for the hypothetical model were a little higher than those of the alternative model (*Table 4*). These results suggest that the hypothetical model was superior to the alternative model for mainland Chinese nurses.

Discussion

Our results indicated that the 28-item SHS-C established herein was a reliable and valid tool for measuring mainland Chinese nurses' spiritual health status. As no consensus has been reached on the definition of spiritual health, and spirituality is closely related to the local culture (24), there were two major points of concern in designing the spiritual health status assessment tool: (I) the concept and specific factors of spiritual health and (II) the quality assessment. The concept and specific factors were generated based on

Chinese culture and extensive literature, including definitions in existing assessment tools and spirituality-related theories. The SHS-SF tool developed by Hsiao *et al.* was rooted in traditional Chinese culture, consistent with the concepts of the present study, and showed good reliability and validity (15). Therefore, the 6-subscale, 28-item SHS-C designed in this study, was based on the 5-subscale, 24-item SHS-SF. A subscale concerning the relationship with nature was added to the revised SHS-C. Two rounds of expert consultation and face validity tests were performed to guarantee the questionnaire's theoretical and practical contents and structure, and a large sample size survey was conducted to test the tool. EFA and CFA were performed to assess the internal structure of the scale, and Cronbach's α and test-retest analysis were used to investigate its internal consistency and stability.

Several methods were applied to test the items in this study. The results from the discrete tend analysis suggested that items 3 (I can get help from people around me when I am in difficulty) and 4 (I can live in harmony with others) could have been deleted. However, they were retained because their SD values (0.79 and 0.78, respectively) were very close to the elimination threshold of 0.8. Moreover, other tests indicated these 2 items should be retained, and

an expert panel called in to discuss the 2 items agreed that they reflected personal interactions and experiences that were important for the subscale concerning connection to others and should not be deleted.

Although Pearson correlation coefficient analysis suggested that items 17 to 20 should be deleted, we also chose to retain these items. First, the demographic data showed that 82.5% of participants had no religion, which may lead to the findings analysised by Pearson correlation coefficient analysis. Several studies have found that religious belief is significantly related to natural disasters and violence, as religion can comfort religious people to some extent in these situations of powerlessness (25,26). China trains individuals to prepare for disasters and has timely disaster responses, which might influence the low rates of religious belief (27). However, this does not mean there is no religion or that spirituality does not involve religion on the Chinese mainland. Secondly, as stated above, religion is an important factor in spirituality. The expert panel considered that people could attain spiritual wellbeing through religion. Thirdly, EFA showed that their factor loading values were higher than 0.5, implying that these items should be reserved. These results suggested that these items were very important to the subscale concerning religion.

The 24-item SHS-SF directly contributed to the development of our SHS-C. After literature analysis, a subscale concerning a participant's relationship with nature in the SHS-C was added as an aspect of spirituality. As mentioned above, a harmonious relationship between humans and nature has been a concern in China for thousands of years. For instance, Taoism, in which Tao is an inherent and stable power emphasizing unity with nature, is an essential tenet of traditional Chinese culture. At present, people often connect with nature through various activities such as photography and climbing. Therefore, we considered the subscale concerning a participant's relationship with nature an important part of spirituality.

In the 24-item SHS-SF, all the items in the subscale concerning connection to others focused on family relationships, which might be because the participants in that study were predominantly nursing students (15). However, the interpersonal relationships of clinical nurses are more complex. After becoming independent from their families, other social relationships, such as those with colleagues and friends, can take on greater importance. Consequently, in the revised 28-item SHS-C, the "others" referred to in the subscale concerning connection to others

meant "people around me", which, in turn, referred to romantic, social, and family relationships.

The limitations of this study included the fact that only nurses in Zhejiang, China participated, as convenience sampling was used. It remains to be seen if the SHS-C will be useful for the general population. Another potential limitation may have been that no qualitative analysis was performed on the concept and connotations of spiritual health, as it is a difficult and unfamiliar concept for the Chinese. Therefore, this study could not provide a more accurate concept and connotations of the term to fit the current situation on the Chinese mainland.

Conclusions

In conclusion, our results showed that our revised, 28-item SHS-C was a reliable and valid instrument for measuring nurses' spiritual wellbeing on the Chinese mainland, with a Cronbach's α of 0.93, which may help to identify the spiritual health status of nurses. Accordingly, tenable strategies could be implemented to enhance the nurses' spiritual health. The tool could also be used as a reference for assessing other people's spiritual health and improving their quality of life.

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Footnote

Reporting Checklist: The authors have completed the SURGE reporting checklist. Available at https://apm.amegroups.com/article/view/10.21037/apm-22-188/rc

Data Sharing Statement: Available at https://apm.amegroups.com/article/view/10.21037/apm-22-188/dss

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://apm.amegroups.com/article/view/10.21037/apm-22-188/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are

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appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). This study was approved by the Ethics Review Board of the Hangzhou Normal University (No. 20190103) and informed consent was taken from all the patients.

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