Developing and Testing the Short-Form Knowledge, Efficacy, and Practices Instrument for Assessing Cultural Competence

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Abstract: The importance of educating dental students in cultural competence has been widely emphasized, but there is a need to assess cultural competence in a consistent and reliable way. The aims of this study were to determine latent constructs for the initial measure of cultural competence for oral health providers, the Knowledge, Efficacy, and Practices Instrument (KEPI), and to determine how well these factors related to previously identified latent constructs. Data were collected in surveys of dental students and from dental hygiene, dental assisting, and dental faculty members in 44 academic dental institutions from 2012 to 2015. There were a total of 1,786 respondents to the surveys; response rates to individual surveys ranged from 35% to 100%. There were 982 (55%) female and 804 (45%) male respondents, 286 (16%) underrepresented minority (URM) and 1,500 (84%) non-URM respondents, and 339 (19%) faculty and 1,447 (81%) student respondents. Three latent constructs were identified. Female respondents scored significantly higher on the culture-centered practice and efficacy of assessment factors, while URM respondents had significantly higher scores on all three of the KEPI factors. Measurements indicated that the long-form KEPI could be shortened by ten questions and still have three meaningful measurements. Continued research in assessing other health care providers' cultural competence is needed to expand the KEPI to measure providers' cultural competence with patients with minority sexual orientation and gender identity issues and those with physical disabilities, mental illness, and autism to advance patient-centric communication.

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Recent reports and accreditation bodies support the need to ensure that prospective dental practitioners are culturally competent. Cultural competence is defined as patient-centered communication skills that are responsive to interacting with and effectively treating patients from diverse sociocultural and linguistic populations. The U.S. surgeon general and others have advocated nurturing the development of culturally competent and socially responsible dental students and practitioners to address widespread health care disparities.[1-6]

Institute of Medicine reports[7,8] and the most recent Commission on Dental Accreditation (CODA) standards for dental and dental hygiene education also emphasize these issues.[9,10] Optimal student preparation was found by Berwick et al. to occur in environments that facilitate "culturally competent health care; recognition of health care disparities; . . . development of solutions; meeting the health care needs of dentally underserved populations; and . . . professional attributes of . . . altruism, empathy, and social accountability needed [for] . . . effective care in a multi-dimensionally diverse society."[11] Young and Guo suggest these skills are essential to improving the patient experience associated with population health and in reducing per capita health care costs.[12]

Oral health care disparities are projected to grow as the U.S. population increases and to continue to have a disproportional impact on racial and ethnic minority groups.[13] However, as more dental schools seek to expand curricular emphasis on developing students' cultural competence, one of the sustained challenges has been how to best measure current and changing levels of cultural competence. Though, according to Betancourt, research on cultural competence is in an early stage,[14] Brach and Fraser noted back in 2000 that the imperative for assessment had intensified.[15] In their study, Way et al. found that

providing culturally sensitive care led to enhanced patient outcomes and satisfaction.[16]

After we reviewed several assessment measures, it became apparent to us that dentistry would benefit from development of its own psychometrically sound scale. To address this need, two of the authors along with others developed the Knowledge, Efficacy, and Beliefs Instrument (KEPI) and established its preliminary validity (the instrument in its long and short forms is available from the corresponding author). The original list of items is provided in Behar-Horenstein et al.[3]

The KEPI provides a measure of three subscales related to cultural competence: efficacy of assessment, knowledge of diversity, and culture-centered practice. Items on the KEPI are scored using a four-point scale from 1=lowest to 4=highest. Knowledge of diversity scores reflect an individual's understanding of sociocultural and linguistically diverse groups. Scores on efficacy of assessment provide a measure of how capable individuals believe they are in determining culturally diverse patient oral health needs. Scores on culture-centered practice reflect awareness of sociocultural and linguistically diverse dental patients' oral health care needs. Findings from our concordance study suggested that the KEPI is measuring a unidimensional construct.[17] The aims of this study were to determine latent constructs for the KEPI and to determine how well these factors related to previously identified latent constructs.

Previously Developed Scales

The Tucker-Culturally Sensitive Health Care Inventory (T-CSHCI-PF), as described in Mirsu-Paun et al., measures cultural sensitivity along the dimensions of patient-centeredness, interpersonal skills, disrespect/disempowerment, competence, and cultural knowledge/responsiveness.[18] The scale has a final five-factor solution and 53 items.

Recently, Tucker et al. tested the race-specific applications to see whether the model fit equally well for African American patients and non-Hispanic white American patients.[19] They explored three factors: the direct and indirect effects of this model with respect to the impact of patient-perceived provider cultural sensitivity on patients' sense of trust in their provider, satisfaction with their providers' care provision, and sense of interpersonal control; the effect of the latter two variables on treatment regimen; and physical stress, satisfaction with providers' care provision, and sense of interpersonal control on treatment regimen adherence indicators. Significant links between patient-perceived provider cultural sensitivity and adherence to treatment with some differences associated with race/ethnicity were found. The limitations of the study were self-reported data and low internal consistencies, a lack of evidence to support that the race-specific measures actually measured the same construct, and the lack of confirmatory factor analysis testing, which was observed in the original T-CSHCI-PF.[18,19]

Frequently cited (86 times in Google Scholar since 2012) in the literature, the Inventory of Assessing the Process of Cultural Competence Among Health Professionals (IAPCC-R) is a 25-item test that measures the level of cultural competence among health care professionals.[20] Studies have found that the IAPCC-R lacks a definitive factor analysis and strong inter-item correlations. Olt et al. reported internal consistencies varying between -0.01 and 0.65 for the subscales and weak correspondence between items and the underlying model.[21] Their exploratory factor analysis revealed eight factors in contrast to the originally proposed five factors, while a confirmatory factor analysis did not confirm the proposed structure of the instrument. Ho and Lee found weak reliability and a weak internal structure,[22] and Vito et al. reported weak internal consistency and low item-total correlation.[23] Other studies found that the IAPCC-R evidenced acceptable reliability[24,25] and acceptable validity.[26]

More importantly, as observed by Betancourt, it is difficult to validly assess individuals' attitudes towards cultural competence.[27] For example, neither the T-CSHCI or IAPCC-R scale reports efforts to assess social desirability bias (SDB), which occurs when an individual selects a response considered favorable by society. In the presence of SDB, determining the veracity of the findings can be problematic because participants who exhibit SDB tend to overreport their responses, thus calling into question the validity of or invalidating their responses. As defined by Crowne and Marlowe, the motive behind socially desirable responding is "the need of subjects to obtain approval by responding in a culturally appropriate and acceptable manner" (p. 353).[28] Individuals tend to give answers that portray themselves in a more positive light when asked questions on sensitive topics.[29,30] SDB can manifest because of the respondent's desire

to impress the researcher, unwillingness to disclose particular behaviors or attitudes, or effort to influence the study outcomes.[31]

The Multicultural Awareness, Knowledge, and Skills Scale-Counselor Edition (MAKSS-CE) informed the original development of the KEPI. Studies by Kim et al. and D'Andrea et al. confirmed the structure of the MAKSS-CE and its subscales (multicultural awareness, knowledge, and skills) and ensured adequate construct validity.[32,33]

Methods

Approval to conduct this study was granted by the University of Florida's Institutional Review Board (U-989-2013). Participants were dental students and dental hygiene, dental assisting, and dental faculty members in 44 institutions from 2012 to 2015. In total, the KEPI survey was administered 19 times. All respondents were invited to participate in individual survey administrations using the professional and encrypted version of SurveyMonkey.

One purpose of doing a factor analysis is to identify latent constructs. Latent constructs are not directly measurable, but instrument items provide an indirect measure of the construct. In order to perform an exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA), the data collected from 1,786 participants from the 19 surveys were split to ensure unique data points for the two factor analyses (see Table 1 for definitions of terms and Table 2 for information on participants in surveys). The Statistical Analysis Software (SAS) SURVEYSELECT

procedure was used with a sample rate of 0.50. After splitting, half of the observations were used in the EFA, and the other half were used in the CFA.

Responses to the 27 items of the KEPI were subjected to an EFA using squared multiple correlations as prior communality estimates. The principal factor method was used to extract the factors, followed by a promax (oblique) rotation. Due to factor loadings below 0.35, ten items were eliminated. After this, the EFA was rerun with 17 items. A scree test suggested three meaningful factors. The CFA was done using the CALIS procedure in SAS.

To interpret the rotated factor pattern, an item was said to load on a given factor if the loading was the maximum of the three factors. In order to measure internal consistency, Cronbach's alphas were computed for each factor. The interclass correlations (ICCs) between each of the original KEPI factors and the KEPI-short factors were assessed using the SAS MIXED procedure. Normative values were computed for each factor, and also by gender and underrepresented minority (URM) status. T-tests were used to compare groups on each of the KEPI-short factors.

Five items were loaded to the factor known as knowledge of diversity; five items were loaded to the factor known as culture-centered practice; and seven items were loaded onto the factor known as efficacy of assessment (Table 3). To measure internal consistency, Cronbach's alphas were computed for each factor. For the culture-centered practice factor, the Cronbach's alpha was 0.80. For the knowledge of diversity factor, the Cronbach's alpha was 0.87. For the efficacy of assessment factor, the Cronbach's alpha was 0.95.

Table 1. Definitions of terms

Term	Definition
Confirmatory factor analysis	A statistical method that confirms how well factors load on constructs
Exploratory factor analysis	An iterative process that identifies factors that characterize latent measures of an instrument
SAS survey select procedure	An SAS procedure that randomly splits a sample into two pieces
Sample rate	An SAS command that specifies size of the two pieces in survey select procedure
Promax oblique rotation	A statistical technique used in an exploratory factor analysis that allows for factors to be correlated and enhances interpretability
Cronbach's alpha	A measure of internal consistency
Scree test	A statistical method for visually determining the number of factors that should be used in an exploratory factor analysis
ICC (interclass correlation)	A descriptive statistic used to measure the relatedness of factors to each other
CALIS procedure	An SAS procedure used for analysis of covariance structure models

Table 2. Characteristics of participants in surveys conducted in study

Population	Faculty Included	Participants/Total Population Size	Response Rate	Percentage
Southeast Class of 2015	No	77/84	91.7%	3.75%
Southeast Class of 2016	No	72/83	86.8%	3.70%
State 1 dental hygiene/dental assistant faculty	Yes	49/66	74.2%	2.74%
Southeast Class of 2014	No	37/78	47.4%	2.07%
Southeast Class of 2018	No	92/153	60.1%	5.15%
Southeast Class of 2017	No	92/100	97.9%	5.15%
State 2 dental hygiene/dental assistants faculty	Yes	171/291	58.8%	9.57%
Western dental #1 2013	No	163/298	54.7%	9.29%
National dental	No	381/916	41.6%	21.31%
Southeast faculty	Yes	64/115	55.7%	3.58%
Western dental #2 fourth year	No	158/286	55.2%	8.85%
Western dental #2 first year	No	46/72	63.9%	2.58%
Midwest 1st year	No	88/92	95.7%	4.93%
Midwest faculty 2018	Yes	55/157	35.0%	3.08%
Western dental #3 first and third years	No	63/64	98.4%	3.53%
Western dental #3 Class of 2013	No	65/65	100%	3.64%
Western dental #3 Class of 2016	No	68/69	98.6%	3.81%
Western dental #3 Class of 2018	No	61/68	89.70%	3.42%

Note: The "Percentage" column shows the proportion of participants from each population site that contributed to the overall number of participants. The "Population" designations refer to the location in the U.S. from where the participant sample was drawn. "Southeast," "Western," and "Midwest" refer to students from a dental school located in the southeastern, western, and midwestern U.S., respectively. "State" refers to dental hygiene/dental assistant programs in Florida. "National dental" refers to a sample of dental students drawn from dental schools across the U.S.

Results

There were 1,786 participants in the surveys (response rates for each group are shown in Table 2). The participants were 982 (55%) female and 804 (45%) male; 286 (16%) URM and 1,500 (84%) non-URM; and 339 (19%) faculty and 1,447 (81%) students. The CFA yielded the following fit statistics: 1) Pr > chi-square <0.0001; 2) Root Mean Square Residual=0.03; 3) Goodness of Fit Index=0.87; 4) Bentler Comparative Fit Index=0.91; and 5) Bentler-Bonett NFI=0.90. The CFA indices fell well into the range of acceptable values to support the validity to the factor structure obtained from the EFA.

The ICC, which measures a bivariate relation among variables, was used to compare the original and KEPI-short factors. The ICC between the original knowledge of diversity KEPI factor and the KEPI-short factor was 0.97. The ICC between the original culture-centered practice KEPI factor and the KEPI-short factor was 0.96. The ICC between the original efficacy of assessment KEPI factor and the KEPI-short factor was 0.95. These values indicate almost perfect agreement between the original KEPI factors and the KEPI-short factors.

Table 4 shows the KEPI-short factors overall, by gender, by URM, and by gender and URM. Females had significantly higher scores on the knowledge of diversity (3.31 vs. 3.26, p=0.0321) and efficacy of assessment (2.90 vs. 2.78, p<0.0001) factors. URM respondents had significantly higher scores on all three of the KEPI-short factors (Table 5). URM respondents had a mean of 3.41 compared to non-URM respondents' mean of 3.26 (p<0.0001) on knowledge of diversity. URM respondents had a mean of 2.60 compared to non-URM respondents' mean of 2.43 (p<0.0001) on culture-centered practice. URM respondents had a mean of 2.95 compared to non-URM respondents' mean of 2.85 (p=0.0231) on efficacy of assessment.

Discussion

The study found excellent agreement between the original KEPI subscales and the revised short form. The measure's utility was enhanced by the provision of normative data based on a large sample. The short form omitted items that were problematic and had factor loadings below 0.35, as noted in Henry and Crawford's study of a different scale.[34] These

Table 3. Factor analysis results

Knowledge of Diversity (factor 2) Cronbach's alpha=0.87	Culture-Centered Practice (factor 3) Cronbach's alpha=0.80	Efficacy of Assessment (factor 1) Cronbach's alpha=0.95	Item
6	45	32	9. How would you rate your understanding of "patient management" for treating patients from ethnically/culturally diverse groups?
			For items 10-17, question was: "At the present time, how would you rate your own understanding of the following term?" followed by a term:
75	7	-3	10. Culture
76	1	4	11. Ethnicity
86	-20	0	12. Racism
18	43	25	13. Culturally diverse oral health care practices
76	-14	15	14. Prejudice
57	16	11	15. Culturally diverse patients
7	50	13	16. Pluralism
6	47	16	17. Cultural encapsulation
			For items 19-27, question was: "How would you rate your ability to" followed by a phrase:
11	44	22	19. Effectively secure information and resources to better serve patients of different ethnic/cultural groups?
0	-19	100	21. Accurately assess the oral health care needs of women?
-2	-19	101	22. Accurately assess the oral health care needs of men?
-7	-2	92	23. Accurately assess the oral health care needs of older adults?
-3	-5	89	24. Accurately assess the oral health care needs of gay, lesbian, bisexual, and transgendered individuals?
-10	13	78	25. Accurately assess the oral health care needs of patients with disabilities?
-2	1	84	26. Accurately assess the oral health care needs of persons who come from low socioeconomic groups?
5	19	64	27. Identify your own strengths and weaknesses in oral health care treatment planning for persons from ethnically/culturally diverse groups?

Note: Numbers indicate the factor loadings.

findings suggest that the short form can be reliably used, thus saving respondent time.

Limitations of the study were the use of a convenience sample, self-reported data, and the lack of a control group. The initial development of the KEPI[3] and other research suggest that it is measuring a unique construct.[14] The report of its short form as described in this article is a step forward in describing and measuring a difficult to measure construct.

In addition to dental practitioners, future research is needed to assess the cultural competence of other health care providers. Continued research is needed to assess dental and other health care providers' cultural competence with patients who have physical disabilities, mental illness, and autism, among others. Use of this scale and additional adaptations are needed for researchers interested in developing empirical measures of cultural compe-

Table 4. Normative values

	KOD		CCP		EOA	
Variable	Mean (SD)	95% CI	Mean (SD)	95% CI	Mean (SD)	95% CI
Overall	3.29 (0.49)	(3.27, 3.31)	2.48 (0.57)	(2.45, 2.50)	2.88 (0.70)	(2.84, 2.91)
Gender						
Male	3.26 (0.47)	(3.23, 3.29)	2.45 (0.57)	(2.41, 2.49)	2.78 (0.70)	(2.74, 2.83)
Female	3.31 (0.49)	(3.28, 3.34)	2.49 (0.57)	(2.45, 2.52)	2.90 (0.70)	(2.90, 2.99)
URM						
No	3.26 (0.48)	(3.24, 3.29)	2.43 (0.56)	(2.40, 2.46)	2.85 (0.71)	(2.81, 2.88)
Yes	3.41 (0.48)	(3.35, 3.47)	2.60 (0.56)	(2.53, 2.66)	2.95 (0.67)	(2.87, 3.03)
Gender and URM						
Male URM	3.43 (0.44)	(3.34, 3.52)	2.62 (0.60)	(2.50, 2.74)	2.88 (0.66)	(2.75, 3.01)
Male not URM	3.23 (0.47)	(3.20, 3.27)	2.41 (0.55)	(2.37, 2.45)	2.75 (0.70)	(2.70, 2.81)
Female URM	3.40 (0.49)	(3.32, 3.47)	2.58 (0.53)	(2.50, 2.67)	2.99 (0.68)	(2.89, 3.10)
Female not URM	3.29 (0.49)	(3.25, 3.32)	2.45 (0.57)	(2.41, 2.49)	2.93 (0.70)	(2.88, 2.98)

KOD=knowledge of diversity; CCP=culture-centered practice; EOA=efficacy of assessment; URM=underrepresented minority

Note: Response options were on scale from 1=lowest to 4=highest.

Table 5. Group comparisons

	KOD		CCP		EOA	
Variable	Mean (SD)	p-value	Mean (SD)	p-value	Mean (SD)	p-value
Gender						
Male	3.26 (0.47)	0.0321	2.45 (0.57)	0.1580	2.78 (0.70)	<0.0001
Female	3.31 (0.49)		2.49 (0.57)		2.90 (0.70)	
URM						
No	3.26 (0.48)	<0.0001	2.43 (0.56)	<0.0001	2.85 (0.71)	0.0231
Yes	3.41 (0.48)		2.60 (0.56)		2.95 (0.67)	

KOD=knowledge of diversity; CCP=culture-centered practice; EOA=efficacy of assessment; URM=underrepresented minority

Note: Response options were on scale from 1=lowest to 4=highest.

tence. As noted by Prescott-Clements et al., there has been considerable pressure to ensure the cultural competence of current and future practitioners.[35] The ability to train health care providers who can provide quality care for diverse populations requires that cultural competence is addressed in educational programs.[36-38] Measures of cultural competence should not be regarded as sufficient to guaranteeing the enactment of cultural competence. Differences between assessments of sensitivity to cultural differences are considerable possibilities.

Simply put, scores on the KEPI may provide an indication of individual's intent to demonstrate cultural competence. We recommend that scores be used to identify those who lack an awareness of culture as well as those who are prone to making cultural assumptions that may hinder care. For example, in a baseline study of cultural competence, Jackson found differences between visiting minority health care providers' ability to treat minority individuals in the local community compared to whites.[39] These results helped pinpoint the barriers that the respondents believed impeded community members' use of their services. Findings from a baseline measure of cultural competence among third-year medical students identified their knowledge levels and lack of understanding.[40] Those results were used to identify content areas for emphasis in cultural competence curriculum development.

Using a cultural competence measure does not guarantee an individual's ability to move beyond an intention to demonstrate cultural competence to the actual enactment of such behaviors.[41] To provide culturally competent behavior practice, while receiving feedback in a more deliberate manner, Kleinman and Benson recommended engaging in ethnography

and interviews to acquire an increased understanding of sociocultural and linguistically diverse patients' lives.[42] Use of the KEPI has greater promise when combined with their approach since it may assist dental providers in better understanding how and why the practice of cultural competence is essential.

To assess the correspondence between assessment and enactment, future research should extend inquiry to observing dental practice. Until behaviors can be observed, assessing cultural competence knowledge, beliefs, and skills or the benefits of teaching culture will be difficult. Anecdotal evidence of student behavior in clinic, patient feedback, and pre- and post-testing provide some insight. Measuring cultural competence using a shortened version of the KEPI is a starting point.

Conclusion

This study's results support the discovery of factors reported in the initial development of the KEPI. Ten items not contributing to the measure were eliminated, thus reducing respondent burden. The results reported here addressed the assessment criticisms attributed to other cultural competence scales. Evidence of measuring a unique construct, its validity for the factor structure, and acceptable estimates of reliability imply that the KEPI is a psychometrically sound instrument.

Acknowledgments

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