Clinical Nursing Research
21(4) 467–485
© The Author(s) 2012
Reprints and permission:
sagepub.com/journalsPermissions.nav
DOI: 10.1177/1054773812440810
http://cnr.sagepub.com
SAGE

Development and Psychometric Testing of the Nursing Culture Assessment Tool

Susan M. Kennerly, PhD, RN, WCC[1], Tracey L. Yap, PhD, RN, WCC[2], Annette Hemmings, PhD[3], Gulbahar Beckett, PhD[4], John C. Schafer, PhD[1], and Andrea Borchers, MSN, RN[1]

Abstract

A valid and reliable nursing culture assessment tool aimed at capturing general aspects of nursing culture is needed for use in health care settings to assess and then reshape indicated troubled areas of the nursing culture. This article summarizes the Nursing Culture Assessment Tool's (NCAT) development and reports on a cross-sectional, exploratory investigation of its psychometric properties. The research aims were to test the tool's psychometric properties; discover its dimensionality; and refine the item structure to best represent the construct of nursing culture, an occupational subset of organizational culture. Empirical construct validity was tested using a sample of licensed nurses and nursing assistants ($n = 340$). Exploratory and confirmatory factor analysis (CFA) and logistical regression yielded a 6-factor, 19-item solution. Evidence supports the tool's validity for assessing nursing culture as a basis for shaping the culture into one that supports change, thereby accelerating, improving, and advancing nursing best practices and care outcomes.

[1]College of Nursing, University of Cincinnati, Cincinnati, Ohio, USA
[2]School of Nursing, Duke University, Durham, North Carolina, USA
[3]Edgewood College, Madison, Wisconsin, USA
[4]School of Education, University of Cincinnati, Cincinnati, Ohio, USA

Corresponding Author:
Susan M. Kennerly, PhD, RN, WCC, College of Nursing, University of Cincinnati, Cincinnati, Ohio, USA
Email: Susan.Kennerly@uc.edu

Keywords

health care settings, nursing actions, staffing (culture, teamwork, communication, expectations, behavior, job satisfaction, professional commitment)

An effective health care workforce performing within the context of a positively toned cultural environment is central to a health care organization's ability to achieve high quality of care outcomes. Many factors that affect performance of workers, organizational culture, and more specifically, nursing culture are believed to affect workplace efficiency, effectiveness, and safety of both workers and patients (Gibson & Barsade, 2003). Nursing culture is an occupational subculture of organizational culture (Kontos, Miller, & Mitchell, 2010). Although there are many overlapping features in the definitions of organizational culture and climate, culture underscores deeper tacit values and assumptions, whereas climate highlights the member's perceptions closer to the surface of the organization (Sleutal, 2000). There is a range of existing instruments measuring various characteristics of organizational culture, but experts do not agree on the essential dimensions of culture that should be measured (Scott, Mannion, Davies, & Marshall, 2003), and these existing tools typically focus on organizational culture, not occupational subcultures such as the nursing culture. For example, Patient Safety Culture Assessment Tools (AHRQ, 2011) designed for hospital, medical office, and nursing home use assess safety-focused behaviors and expectations but do not assess the nursing culture. Also, tools that assess nurse perceptions of the work environment like the popular Nursing Work Index-R (Aiken & Patrician, 2000) ask respondents to rate the importance of work environment characteristics that support their practice (Flynn, Dickson, & Moles, 2007), but does not capture the commonly shared beliefs, values, and norms that guide group behaviors. These aspects of culture are captured by the newly developed Nursing Culture Assessment Tool (NCAT). The purpose of this article is to present the steps in the NCAT's development and methods used in its psychometric testing along with a discussion of implications for leadership in practice and research.

A positive nursing culture is one in which the beliefs, attitudes, values, and norms of the staff interact to develop patterns of behavior and care practices that consistently produce quality care outcomes. Nursing culture is manifested along six dimensions: behaviors, expectations, teamwork, communication, satisfaction, and professional commitment (Borchers, Kennerly, & Yap 2010; Yap, Kennerly, Hemmings, & Beckett, 2010). These dimensions reflect shared rituals, norms, values, beliefs, and other assumptions and meanings

that guide actions and interactions of nursing staff. Every day nursing culture frames the workplace context within which nurses practice, for example, job roles to which registered nurses (RNs), licensed practical nurses (LPNs), and certified nursing assistants (CNAs) are assigned influence the formation and expression of the unique overall nursing culture because these job roles give rise to a set of shared expectations related to duties of each group.

The healthy work environment goes beyond shared role expectations by promoting values, norms, and other aspects of positive culture related to teamwork, clear and respectful communication, and appropriate behavior toward both colleagues and patients (American Association of Critical-Care Nurses, 2005). Nursing culture and its interaction with patient care processes affect staff productivity and can contribute to high staff turnover (Castle & Engberg, 2005; Castle & Engberg, 2007). Such workforce instability leads to an increase in human and fiscal costs organizations experience, especially when high-performing staff leave and must be replaced. Prior research indicates that stabilized, lower turnover rates may be linked to effectual cultures (Pfefferle & Weinberg, 2008). Reshaping the nursing culture is one means of promoting successful nursing workforce performance, improving the workforce's retention (Boan & Funderburk, 2003; Buerhaus, Donelan, Ulrich, DesRoches, & Dittus, 2007; Hooper & Charney, 2005), and promoting achievement of high-quality care outcomes (Aiken, Clarke, Sloane, Lake, & Cheney, 2008; Castle, Wagner, Ferguson, & Handler, 2011). The development of positive cultural patterns is an important springboard to the successful adoption of evidence-based best practices and achievement of quality care outcomes. Nursing culture provides a critical connection between staff views of care standards and the set of behaviors they believe are appropriate to use. By examining nursing culture, nurse leaders can gain a new perspective on the values and beliefs that underlie staff perceptions of the work and use this knowledge to engage staff in activities that help align workplace behavior and expectations with known best practices. Hence, it is crucial to assess nursing culture so that interventions can be designed to actively shape/reshape the culture into one that supports change, thereby improving, and advancing nursing care outcomes.

An excellent first step in enabling nurse leaders to shape a positive culture would be the completion of a comprehensive assessment of the extant nursing culture; however, an appropriate, valid and reliable tool did not exist. Therefore, this interdisciplinary team of researchers (including an anthropologist/sociologist and social linguist specialist) developed the NCAT based on Schein's (1996) theoretical work on organizational culture (Borchers et al., 2010; Yap et al., 2010). With this tool, health care organization leaders

will ultimately be able to conduct a global or overall assessment, thereby enabling them to design and implement intervention strategies that can refine processes for known best practices, such as pressure ulcer and fall prevention practices. In keeping with an anthropological approach, this assessment can be used in combination with a leader's own work-related observations to modify leadership behaviors and promote a nursing culture that reduces psychosocial stressors in the workplace, thus improving work-related outcomes and reducing turnover and its negative latent impact on workload and worker performance.

Defining and Measuring Nursing Culture

Effective workplace change requires understanding what culture means in order to positively affect worker performance (Gibson & Barsade, 2003). Schein (1990) describes the "occupational culture" as the group of individuals who share a common culture, such as the subculture of nursing. By understanding nursing culture, it is more likely that goals and associated behaviors can be communicated clearly, thus influencing staff implementation of best practices, including adherence to care processes and standards in ways that can improve performance effectiveness and lead to quality outcomes.

An occupational culture, more specifically nursing culture, is configured by the contingency relationships demonstrated between behaviors, expectations, teamwork, communication, satisfaction, and professional commitment (Yap et al., 2010). For example, there is a dynamic interaction between behaviors that workers bring to the work situation and expectations leaders and colleagues hold for each other's behavior. Teamwork represents the work group's ability to exhibit behaviors that demonstrate respect and trust, and to carry out expected roles while reflecting a sense of connection to each other. Communication, the effective transfer of information (Tourangeau, 2010) or the "exchange of understanding between sender and receiver" (Forbes-Thompson, Gajewski, Cawiezell, & Dunton, 2006, p. 936), provides a critical link between knowledge of work practices and the ability to exercise behaviors that support team functioning and meet workplace expectations, while generating quality care outcomes.

Members of a team that is high functioning are more likely to express job satisfaction and maintain commitment to the work and profession (Kalish, Lee, & Rochman, 2010). Furthermore, worker satisfaction, the positively toned state that results from a match between worker and workplace expectations (Han & Jekel, 2010), is generally associated with a sense of personal job commitment—responsibility or obligation—to the profession of nursing.

Similarly, professional commitment and job satisfaction that are also known to be connected to professional performance (McCloskey & McCain, 1988; Teng et al., 2009) coupled with work expectations are inextricably linked to each other and are closely associated with worker intent to leave the job (Han & Jekel, 2010; Lachman & Aranya, 1986; Teng, Shyu, & Chang, 2007). Creation of a positive workplace culture is a necessary foundation for workers to be able to see and experience the benefits of accountability, autonomy, safety, and teamwork and to become committed to the profession and organization and be satisfied with the job (Kennerly, 2000; McGuire & Kennerly, 2006; O'Hagan & Persaud, 2009).

Nursing culture, the driver of all nursing best practices, is a composite reflection of the dynamics among behaviors, expectations, teamwork, communication, satisfaction, and professional commitment. These dynamics must be examined in totality to comprehend the overall influence of the nursing culture and implications for achieving high-quality care outcomes. The NCAT is the first tool that aims to effectively assess nursing culture from a multifaceted perspective in both hospital and nonhospital settings. Hence, the aim in NCAT design is to offer leaders a comprehensive, yet easy to use means of interpreting and identifying cultural patterns that can be targeted as the basis for designing/redesigning care practices.

Development of the NCAT

A multiphase, cross-sectional, qualitative field study (Yap et al., 2010) that used researchers' interpretations of clinical field observations, transcribed interviews, validation by a panel of experts, and the literature to verify culture components and clarify interactions among organizational culture, turnover, and nursing care provider practices (resulting in a post hoc characterization using triangulation). These results identified core dimensions of culture to conceptualize and develop a theoretical model to guide tool development. Schein's (1990, 1996) theoretical work on organizational culture informed researchers' decisions about how the concept of nursing culture would be explored and tool design and item structure would be refined. A total of 22 items composed of declarative statements about nursing and organizational culture in the work setting using ordinal scaling for responses (*strongly disagree* = 1, *disagree* = 2, *agree* = 3, *strongly agree* = 4) were initially proposed and reviewed for representativeness of the construct by a panel of RN, LPN, and CNA experts. In addition, items were structured to achieve appropriate functional literacy and reading levels. The NCAT has two parts, one focused on nursing culture assessment within the health care

organization (18 declarative statements) and assessment of the worker's personal perceptions of professional commitment (four items) within that culture. Teng et al.'s (2009) Professional Commitment scale was selected as it already included all aspects of professional commitment as representative of this nursing culture dimension and had strong reliability estimates. The Professional Commitment scale's wording regarding profession was adapted to be consistent with the nursing profession. Six dimensions (expectations, behavior, satisfaction, teamwork, communication, and professional commitment) were hypothesized as forming the NCAT's subscale structure. Finally, the NCAT's empirical construct validity and properties were tested and item structure refined allowing common features of nursing culture that exist across health care settings to be ascertained.

A total NCAT summed score inclusive of all 6 subscales of the final 19-item tool has a range from 19 to 76 and can be calculated using unit-based weighting by summing the numerical value to the answer marked for each item (*strongly disagree* = 1, *disagree* = 2, *agree* = 3, *strongly agree* = 4). As all items are stated in the declarative format, reverse scoring is not required for any item. In instances of missing data for an item, substitution of the group's mean for that item is recommended. Expectations, Communication, and Satisfaction subscale scores can be calculated by summing item scores for that scale. In the case of Behavior and Teamwork subscales, Item 6 must be included in items summed for each of these subscales, as this item cross-loaded on both subscales during confirmatory factor analysis (CFA). Ideally, a positive nursing culture would be reflected by ratings that reflect strong agreement or agreement with the NCAT's items.

Method

Design, Sample, and Setting

A cross-sectional design was used to collect survey data from a sample ($n = 340$) of Kentucky RNs (170) and LPNs (83) and Ohio CNAs (87). Use of different states was needed due to provisions in state laws related to purchase of address lists. Individuals invited to participate in the study were selected from publicly available lists purchased from their respective state boards by using a table of random numbers. The study's inclusion/exclusion criteria addressed threats to internal and external validity with greatest concerns emerging regarding potential bias from the self-selection process associated with voluntary participant consenting. Participants had to be either a licensed nurse or CNA with a U.S.

mailing address. The sample was drawn without regard to race, ages, ethnicity, physical ability, or gender. Age was not identified as a selection criterion, as nurses must be at least 18 years old to hold a U.S. nursing license. The only exclusion criterion was "unemployment." Each person had to be currently employed and working in a health care setting to be eligible for participation. After institutional review board approval (IRB), a mailed questionnaire approach was used to collect responses to a demographic tool and the NCAT. Based on results of power analysis, rolling participant enrollment was conducted to achieve a minimum of 300. Confidentiality of responses was protected via numerical coding of data collection materials. Each survey packet included the letter describing the study, demographic survey, NCAT, and IRB required consent to participate document. Participants were asked to answer the demographic survey and to rate each NCAT item from his or her own perceptions about the current health care work environment in which employed. A final separate page in the packet requested the participant's name and address, so that a US$5 coffeehouse gift card could be mailed to thank study participants contingent on return of the completed package within 3 weeks. A gift card incentive was offered, as a low response rate was expected based on use of a single-mode survey (Dillman, Smyth, & Christian, 2009). A total of 369 individuals chose to participate, but surveys of 19 were removed from consideration due to issues with missing item responses resulting in a total of 340 participants. The study's overall response rate is 13% of rolling participant enrollment (Response rates: RN 19%, LPN 10%, CNA 10%) after accounting for mail returned due to bad addresses. Although a tailored design approach (Dillman et al., 2009; Huang, Hubbard, & Mulvey, 2003) may have elicited a higher response rate, this low overall response rate is consistent with the 10% to 16% minimum response rates seen in nonprofit organizations (Hager, Wilson, Pollak, & Rooney, 2003). The lower LPN and CNA group response rates may also suggest this survey's topic was viewed as having limited salience for nursing practice. A lower response rate allows for potential nonresponse bias and coverage error (Dillman et al., 2009). In this case, potential coverage error cannot be addressed, as statistics are not available in publicly accessible databases to explore the similarities of the study's sample and the total population in these states. However, this study's sample characteristics are similar in distribution to the findings from the 2008 National Sample Survey of Registered Nurses (U.S. Department of Health and Human Services, Health Resources and Services Administration, 2010), which shows RNs by gender to be 93.4% females and 6.6% males and 75% of RNs to be at the age of 30 to 59 years and 15.6% >60 years. In addition, statistical analyses

conducted in this study did not reveal statistically significant within and across group response differences. Power analysis determined that with a sample size of 300, overestimation of a population value would not occur 95% of the time. With 300 nurses and CNAs responding to the survey, an 80% power demonstrated a Cronbach's alpha (α) statistic of .92 for the final 19-item NCAT and its six subscales.

The sample of 318 (93.5%) females and 22 (6.5%) males ranged in age from 18 to 60 years with 73% from 30 to 60 years and only 8% being greater than 60 years. Participants were health care workers employed in a variety of clinical settings, including long-term care (107; 31.5%), acute care hospital (132; 38.8%), and out-of hospital settings, such as home care (26; 7.6%), physician/advanced practice nurse office (20; 5.9%), outpatient/ambulatory care (22; 6.5%), and other settings (33; 9.7%). Other settings were described by participants as occupational health, rehabilitation and cancer centers, school nurse, and case management in home/community/insurance companies. Total years working at current institution ranged from 1 month to 44 years (M = 8.06 years). In contrast, total number of years of experience working in nursing ranged from 1 month to 50 years (M = 15.23 years).

Statistical Analysis

Data analysis was conducted to ascertain the NCAT's dimensionality, reliability, and empirical construct validity. SPSS (Version 18) software was used for descriptive analyses and to analyze overall scale and subscale internal consistency reliabilities using Cronbach's α. Cronbach's α internal consistency reliabilities were computed for the groups of items on each scale. Principal components exploratory and confirmatory factor analyses (CFAs) were performed with structural equation modeling software M*plus* (Version 6.1), to assess tool dimensionality and aid in investigating empirical construct validity. Item cross-loadings and interitem correlations were examined to determine item functioning. The polytomous universal model (PLUM), an adaptation of the generalized linear model (GLZM) of McCullagh and Nelder (1989) also described by Norusis (2010) as the PLUM model of McCullagh (1980), was chosen as the proper model for probing differential item functioning (DIF). DIF analyses were then conducted to conclude whether uniform (consistent across the range of the scale) or nonuniform DIF existed as a function of the nurses' licensure status or the setting (Holland & Wainer, 1993). These analyses were conducted using logistic regression models (LRM) and followed the recommended procedure in

Camilli and Shepard (1994) for using linear regression modeling to identify uniform and nonuniform DIF.

Results

Descriptive Analysis

Individual item responses in the 340 usable surveys included the full range of possibilities from 1 to 4, strongly disagree to strongly agree, respectively, with no data missing. Analysis of the original 22-item NCAT revealed a mean General Nursing Culture score of 45.5 (SD = 8.3; range of 18 to 60) and a mean Total NCAT Scale score of 60 (SD = 9.3) with a range from 22 to 76. No significant differences were observed for participant Employment Setting in relation to total score for General Nursing Culture ($\chi^2 = 13.56, p = .56$) and Total NCAT Scale Score($\chi^2 = 263.49, p = .78$). In addition, significant differences were not observed for RN, LPN, and CNA participants.

Factor Analysis

The NCAT's dimensionality was assessed using exploratory and CFA of its psychometric properties to determine the extent of relationships between the hypothesized factors (subscales) and survey items. Empirical construct validity was sought by subjecting the item variance–covariance matrix to successive iterations of CFA (Muthén & Muthén, 2010). A reciprocal weighting factor was applied to correct for inflation in goodness-of-fit indexes and by adding or subtracting a correction factor to alter the distribution's mean (Satorra & Bentler, 2010). This approach is implemented in M*plus* as mean- and variance-adjusted maximum-likelihood (MLMV) estimator.

Nineteen items with six principal subscales labeled as Behaviors, Expectations, Teamwork, Communication, Satisfaction, and Professional Commitment emerged from factor analysis. The six principal instrument subscales were estimated as six correlated factors, and a second-, or higher order factor was estimated to represent an overall or total score for the instrument. The fit of the six-factor model was improved by progressive examination of the model to improve goodness-of-fit and by allowing several factors to correlate. The second-order factor did not account for all of the correlations among the factors, and Item 6 cross-loaded on both Factor 2, Behavior, and Factor 3, Teamwork. The completely standardized factor loadings resulting from the CFA ranged from .508 to .90 for all items retained in the NCAT

Table 1. Standardized Factor Loadings and Standard Errors

Subscale	Item number	Factor loading	SE
Expectations	1	1.00	—
	2	0.89	.02
	3	0.90	.02
Behaviors	4	1.00	—
	5	0.81	.04
	6	0.26	.06
Teamwork	6	1.00	—
	7	0.51	.05
	8	0.83	.02
	9	0.85	.03
	10	0.84	.02
Communication	11	1.00	—
	12	0.76	.03
	13	0.62	.04
Satisfaction	14	1.00	—
	15	0.81	.03
Commitment	16	1.00	—
	17	0.78	.03
	18	0.87	.04
	19	0.88	.03

except for Item 6. Cross-loading estimates were .255 and .529 with the larger loading on Teamwork. Table 1 summarizes the completely standardized factor loadings of selected NCAT items. The first item on each scale was set to one to fix the factor scale and to aid in identification, a common procedure recommended by Gorsuch (1983). Correlations between subscales were low to moderate (.270 to .740) indicating sufficient unique variance among the subscales. In addition, overall, the goodness-of-fit indexes for the final model ($\chi^2/df = 159.64/80$; comparative fit index = .94; root mean square of approximation = .057) suggest that the model provides an acceptable fit to these data in support of the empirical construct validity of the instrument (Bollen & Long, 1993).

Differential Item Functioning (DIF) Analyses

DIF is the current term used to describe a construct and set of methodological procedures for quantifying and providing empirical support for

identifying what was formerly referred to as *item bias* (Hambleton & Swaminathan, 1985; Holland & Wainer, 1993). DIF refers to the probability that studied subgroups will score differently on a given item. Identification of DIF is a key element of the scale construction process. A wide variety of methods exist to identify DIF (Camilli & Shepard, 1994). The PLUM approach applied in this study is implemented under the general rubric of ordinal regression based on what Norusis (2010) terms the PLUM model of McCullagh (1980). PLUM is an adaptation of the GLZM of McCullagh and Nelder (1989).

The PLUM was selected over the one-parameter (Rasch) models, and two- and three-parameter models and the broadly termed *contingency table–based approaches*, an example of which is the Mantel–Haenszel log odds ratio (1959), due to its adequacy and efficiency in detecting uniform and nonuniform DIF (Camilli & Shepard, 1994). The PLUM is similar in approach to the proportional odds LRM (Agresti, 2002) that produces much less output by assuming that the dependent variable (DV) is ordinal and that the slope of the odds is the same across DV categories. A total of 80 DIF analyses were conducted as the model was applied to gender, age, licensure/certification, job title, and employment setting. No significant differences were observed for participant's Employment Setting in relation to the total score for General Nursing Culture ($\chi^2 = 13.56$, $p = .56$) and Total NCAT Scale Score($\chi^2 = 263.49$, $p = .78$). The PLUM model could not be estimated in 18 analyses, and an alternative multinomial LRM was used where the DV was considered to only be at least at the nominal measurement level. No evidence of DIF was found in analyses for the last three Professional Commitment items by Setting.

In the foregoing analyses, remarkably, only one analysis, Professional Commitment-Item 2 by Nursing Licensure status, demonstrated possible DIF. Nonuniform DIF was detected by the presence of a significant interaction term, indicating a complex relationship between levels of Professional Commitment-Item 2 and Nursing Licensure status across the dimension of the total Professional Commitment score. Further study is indicated to explore this interaction.

Reliability

The indexes representing the Cronbach's α internal consistency reliability for each scale are presented in Table 2—Reliability Statistics. All subscales, with the exception of Behavior that performed at the .60 level, are within the commonly accepted threshold of .70 for Cronbach's α (Nunnally &

Table 2. Reliability Statistics

Scale	Scale items	Cronbach's α
Expectations	1, 2, 3	.86
Behavior	4, 5, 6[a]	.60
Teamwork	6[a], 8, 9, 10	.83
Communication	11, 12, 13	.75
Satisfaction	14, 15	.79
Professional commitment	16, 17, 18, 19	.91
General nursing culture	1-15	.93
NCAT total scale score	1-19	.92

Note: NCAT = Nursing Culture Assessment Tool.
[a]During confirmatory factor analysis (CFA), Item 6 cross-loaded on Behavior and Teamwork subscales.

Bernstein, 1994). The Behavior subscale's less than desirable reliability may be accounted for in part by the previously discussed cross-loading of Item 6 on Behavior and Teamwork subscales. Standardized factor loadings for the final factor model reported in Table 1 do not suggest low consistency in the factor structure. Indeed, allowing Item 6 to cross-load enhanced the factor model stability. Although variation in reliability values is expected for attitudinal measures (Nunnally & Bernstein, 1994), the lower reliability for the behavior subscale does suggest the need for further subscale evaluation with a larger sample. The .92 Cronbach's α for the NCAT Total Scale score is adequate to support the NCAT's use in assessing worker perceptions of the nursing culture and the use of the results to guide change in workplace culture.

Study Limitations

Limitations of this study are associated with sampling and response. The research was performed with the convenience sampling method, so participants should not be considered fully representative of the population. In addition, response rates were lower than desired given the large number of surveys distributed. Although random selection was used to mail requests, those responding were mostly female and well educated; the CNA group had numerous uncompleted returned surveys due to address changes. Thus, the sample may not reflect the general nursing population. However, Berent &

Table 3. Sample NCAT Item(s) for Each Subscale Domain

NCAT subscale domain	Sample item(s)
Expectations	Standards of care tasks and rules are followed by staff in their daily duties
Behaviors	Nurses effectively carry out their roles and responsibilities
Communication	Staff use appropriate language with residents and family
Teamwork	Staff show respect for one another
	Staff feel connected to one another
Satisfaction	Overall, the culture of this organization is positive and helps to make sure residents are given high-quality care
Professional commitment	I really care about the nursing care profession

Note: NCAT = Nursing Culture Assessment Tool.

Anderko (2011) states that "past research has found that a smaller percentage of survey response in homogeneous populations, which is true for this study, is often acceptable" (p. 207). Other limitations of the current study pertain to external validity of the results. Coffeehouse cards chosen for the participant incentive were later learned to be potentially less of a preference for this population than a superstore shopping gift card that may have led to an increased participation rate. It is recognized that the study could have been enhanced with more advance consideration to these tailored preferences of the participants.

Furthermore, researchers acknowledge limitations in the generalizability of the tool due to the cross-sectional approach selected for Phase 3. Researchers determined that it was first important to ascertain the common features of nursing culture that exist across health care settings, instead of examining how the features of nursing culture cluster in a given organization and in differing regions and countries. As culture is best understood when the patterns of shared experiences are considered, the next phase of the tool's development should be a revalidation of the tool within selected organizations with attention given to potentially differing perceptions of culture based on length of employment. This revalidation will offer new insights into the functionality of the NCAT and will permit researchers to examine participant responses in relation to the design of care processes and best practices for selected quality outcomes.

Discussion and Application

Use and Interpretation of the NCAT

The NCAT is designed to measure worker perception of the cultural environment. The psychometric validation process confirms its reliability and validity for use in a wide variety of inpatient and outpatient health care settings. Each of the tool's six subscales and the overall tool performed well regardless of whether completed by a RN, LPN, or CNA. Thus, the NCAT is regarded as appropriate for use in all health care settings, requires less than 15 min to complete, can be self-administered, easily scored, and is designed to be used to capture perspectives about occupational subculture of nursing that exists within differing types of nursing staff work groups.

Table 3 presents selected items for subscale domains. Each NCAT subscale can be interpreted individually. Total and subscale score interpretations should be done within the organization's context and goals. The NCAT offers a reliable means of ascertaining staff perceptions of their work relationships through an examination of individual and group attitudes and behaviors. The tool offers a vehicle for baseline assessment of clinical unit or facility nursing culture. A desired positive overall culture is reflected by a total scale score ranging from 57 to 76, which reflects agreement to strong agreement with each NCAT item. The higher the staff member's rating or scores the more positive their perception of the culture. The NCAT can be useful in the initial assessment to bring about targeted culture change or in monitoring the impact of organizational change that has the potential for direct or latent impact on the nursing culture.

Implications for Leadership

Nurse leaders play a pivotal role in determining how and whether changes in health care culture will result in improved and sustainable practices that lead to quality care outcomes. Although further exploratory evaluation of the NCAT's usability in all settings and in varied regions and countries is appropriate, leaders can be confident in the process undertaken to develop the tool and can begin to use it as a means of establishing a baseline assessment of their nursing culture. For example, the tool could be used to conduct a facility- or unit-based assessment of nursing culture and then introduce and guide changes in workplace environments, engaging in periodic reassessments. NCAT assessment results provide leaders with knowledge of staff perceptions along the identified six dimensions of nursing culture. Closer examination of total scores for individual groups will help the leader identify one or more nursing culture dimensions that are in need of change or could be

strengthened through additional support. For example, strategies can be designed to engage staff by clarifying behaviors and expectations, enabling teamwork, modifying communication patterns, and probing areas that could enhance satisfaction and professional commitment. When shared decision making is applied, staff can self-administer and interpret the NCAT for their respective clinical group and work collaboratively with nursing leaders to design and bring about changes in cultural patterns of concern.

NCAT results can be used to guide targeted quality improvements in care practices and care outcomes. By better understanding the nursing culture and its effect on licensed nurses and CNAs, it will be possible to design intervention strategies to reduce psychosocial stressors, thus reducing turnover and its latent impact on worker performance.

Future Research Implications

As with any newly developed and tested tool, there is the continued need to conduct follow-up validation studies to further explore cross-loading of Item 6, cross-validation of the internal consistency reliability of the Behavior subscale at or above a preferred .70 level, and to further enhance the tool's generalizability. More specifically, the 19-item NCAT's psychometric properties should be cross-validated in a larger sample that is representative of nursing's ethnic, racial, and gender diversity and encompasses regional and national participation. Protection against single- and multiple-group threats to internal and construct validity should be closely considered in the sample selection process and the evaluation of research with a larger sample. Additional strategies need to be explored to encourage higher voluntary participation rates to ensure broad representation of the sample selected. As a follow-up to the large sample study, it would also be appropriate to conduct additional field observations of nursing culture in multiple settings to reevaluate and reconfirm the construct validity of the NCAT.

The initial validation of the NCAT sets the stage for its use in all types of inpatient and outpatient health care organizations in performing culture assessments to guide group and system thinking about the organization. This creates the possibility of being able to further explore factors that contribute to culture formation and its evolution as planned and unplanned organizational changes occur. These insights will no doubt add to the body of knowledge about the nursing role, care processes, and other aspects of work environment that affect behaviors, expectations, teamwork, communication, satisfaction, and professional commitment.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research study was partially supported by the National Institute for Occupational Safety and Health Pilot Research Project Training Program of the University of Cincinnati Education and Research Center Grant No. T42/)H008432-06; a grant from the Robert Wood Johnson Foundation's Interdisciplinary Nursing Quality Research Initiative (INQRI) program; and the College of Nursing, University of Cincinnati, Dean's Award.

References

Agency for Healthcare Research and Quality (AHRQ). (2011). *Preventing pressure ulcers in hospitals: A toolkit for improving quality of care*. Rockville, MD: Agency for Healthcare Research and Quality.

Agresti, A. (2002). *Categorical data analysis*. Hoboken, NJ: Wiley.

Aiken, L., Clarke, S., Sloane, D., Lake, E., & Cheney. T. (2008). Effects of hospital care environment on patient mortality and nurse outcomes. *Journal of Nursing Administration, 38*, 223-229.

Aiken, L., & Patrician, P. (2000). Measuring organizational traits of hospitals: The Revised Nursing Work Index. *Nursing Research, 49*(3), 146-153.

American Association of Critical-Care Nurses. (2005). *AACN standards for establishing and sustaining healthy work environments*. Aliso Viejo, CA: Author.

Berent, G., & Anderko, L. (2011). Solving the nurse faculty shortage. *Nurse Educator, 36*, 203-207.

Boan, D., & Funderburk, F. (2003). *Healthcare quality improvement and organizational culture*. Easton, MD: DelMarva.

Bollen, K., & Long, J. (1993). *Testing structural equation models*. Thousand Oaks, CA: SAGE.

Borchers, A., Kennerly, S., Yap, T., Hemmings, A., Beckett, G., & Schafer, J. (2010). *Workplace culture: psychometric evaluation of the Nursing Culture Assessment Tool*. Funded grant T42/OH008432-05, National Institute of Occupational Health and Safety Sponsored Education Research Center's Pilot Research Program, University of Cincinnati, Cincinnati, OH.

Buerhaus, P., Donelan, K., Ulrich, B., DesRoches, C., & Dittus, R. (2007). Trends in the experiences of hospital-employed registered nurses: Results from three national surveys. *Nursing Economic$, 25*(2), 69-79.

Camilli, G., & Shepard, L. A. (1994). *Methods for identifying biased test items*. Thousand Oaks, CA: SAGE.

Castle, N., & Engberg, J. (2005). Staff turnover and quality of care in nursing homes. *Medical Care, 43,* 616-626.

Castle, N., & Engberg, J. (2007). The influence of staffing characteristics on quality of care in nursing homes. *Health Services Research, 42,* 1822-1847.

Castle, N., Wagner, L., Ferguson, J., & Handler, S. (2011). Safety culture of nursing homes: Opinions of top managers. *Health Care Management Review, 36,* 175-187.

Dillman, D., Smyth, J., & Christian, L. (2009). *Internet, mail, and mixed-mode surveys: The tailored design method.* Hoboken, NJ: Wiley.

Flynn, L., Dickson, G., & Moles, D. (2007, November). Enhancing the nursing workplace. *Provider,* 35-37.

Forbes-Thompson, S., Gajewski, B., Cawiezell, J., & Dunton, N. (2006). An exploration of nursing home organizational processes. *Western Journal of Nursing Research, 28,* 935-954.

Gibson, D., & Barsade, S. (2003). Managing organizational culture change: The case of long-term care. *Journal of Social Work in Long-term Care, 1*(1/2), 11-34.

Gorsuch, R. (1983). *Factor analysis.* Hillsdale, NJ: Lawrence Erlbaum.

Hager, M., Wilson, S., Pollak, T., & Rooney, P. (2003). Response rates for mail surveys of nonprofit organizations: A review and empirical test. *Nonprofit and Voluntary Sector Quarterly, 32,* 252-267.

Hambleton, R., & Swaminathan, H. (1985). *Item response theory.* Boston, MA: Kluwer.

Han, G., & Jekel, M. (2010). The mediating role of job satisfaction between leader-member exchange and turnover intentions. *Journal of Nursing Management, 18*(8), 41-49.

Holland, P., & Wainer, H. (1993). *Differential item functioning.* Hillsdale, NJ: Lawrence Erlbaum.

Hooper, J., & Charney, W. (2005). Creation of a safety culture: Reducing workplace injuries in a rural hospital. *American Association of Occupational Health Nurses Journal, 53,* 394-398.

Huang, J., Hubbard, S., & Mulvey, K. (2003). Obtaining valid response rates: Considerations beyond the tailored design method. *Evaluation and Program Planning, 26,* 91-97.

Kalish, B., Lee, H., & Rochman, M. (2010). Nursing staff teamwork and job satisfaction. *Journal of Nursing management, 18,* 938-947.

Kennerly, S. (2000). Perceived worker autonomy: The foundation for shared governance. *Journal of Nursing Administration, 30*(12), 1-7.

Kontos, P., Miller, K., & Mitchell, G. (2010). Neglecting the importance of the decision making and care regimes of personal support workers: A critique of

standardization of care planning through the RAI/MDS. *The Gerontologist, 50*, 352-362.

Lachman, R., & Aranya, N. (1986). Job attitudes and turnover intentions among professionals in different work settings. *Organizational Studies, 7*, 279-293.

Mantel, N., & Haenszel, W. (1959). Statistical aspects of the analysis of data from retrospective studies of disease. *Journal of the National Cancer Institute, 22*, 719-748.

McCloskey, J., & McCain, B. (1988). Variables related to nurse performance. *Image: Journal of Nursing Scholarship, 20*, 203-207.

McCullagh, P. (1980). Regression models for ordinal data (with discussion). *Journal of the Royal Statistical Society, 42*, 109-142.

McCullagh, P., & Nelder, J. (1989). *Generalized linear models* (2nd ed.). New York, NY: Chapman and Hall.

McGuire, E., & Kennerly, S. (2006). Nurse managers as transformational and transactional leaders. *Nursing Economic$, 24*, 179-185.

Muthén, L., & Muthén, B. (2010). *Mplus user's guide*. Los Angeles, CA: Author.

Norusis, M. (2010). *PASW statistics 18 advanced statistical procedures*. Upper Saddle River, NJ: Prentice Hall.

Nunnally, J., & Bernstein, I. (1994). *Psychometric theory*. New York, NY: McGraw-Hill.

O'Hagan, J., & Persaud, D. (2009). Creating a culture of accountability in health care. *Health Care Manager, 28*(2), 124-133.

Pfefferle, S., & Weinberg, D. (2008). Certified nurse assistants making meaning of direct care. *Qualitative Health Research, 18*, 952-961.

Satorra, A., & Bentler, P. (2010). Ensuring positiveness of the scaled difference chi-square test statistic. *Psychometrika, 75*, 243-248.

Schein, E. (1990). Organizational culture. *American Psychologist, 45*(2), 109-119.

Schein, E. (1996). Culture: The missing concept in organizational studies. *Administrative Science Quarterly, 41*, 229-240.

Scott, T., Mannion, R., Davies, H., & Marshall, M. (2003). The quantitative measurement of organizational culture in health care: A review of the available instruments. *Health Services Research, 38*(3), 923-945.

Sleutal, M. (2000). Climate, culture, context, or work environment? Organizational factors that influence nursing practice. *Journal of Nursing Administration, 30*(2), 53-58.

Teng, C., Dai, Y., Shyu, Y., Wong, M., Chu, T., & Tsai, Y. (2009). Professional commitment, patient safety, and patient-perceived care quality. *Journal of Nursing Scholarship, 41*, 301-309.

Teng, C., Shyu, Y., & Chang, H. (2007). Moderating the effects of professional commitment on hospital nurses in Taiwan. *Journal of Professional Nursing, 23*(1), 47-54.

Tourangeau, A. (2010). Relationships among leadership practices, work environments, staff communication and outcomes in long-term care. *Journal of Nursing Management, 18*, 1060-1072.

U.S. Department of Health and Human Services, Health Resources and Services Administration. (2010). *The registered nurse population: Findings from the 2008 National Sample Survey of Registered Nurses*. Retrieved from http://bhpr.hrsa.gov/healthworkforce/nursing.html

Yap, T., Kennerly, S., Hemmings, A., & Beckett, G. (2010). *Development of a model for CNA sub-culture within long-term care*. Unpublished manuscript, College of Nursing, University of Cincinnati, Cincinnati, OH.

Bios

Susan M. Kennerly, PhD, RN, WCC, is an associate professor at the College of Nursing, University of Cincinnati, Cincinnati, Ohio. She can be reached at Susan.Kennerly@uc.edu

Tracey L. Yap, PhD, RN, WCC, is an assistant professor at the School of Nursing, Duke University, Durham, North Carolina.

Annette Hemmings, PhD, is professor and director of graduate and advanced programs at Edgewood College in Madison, Wisconsin.

Gulbahar Beckett, PhD, is an associate professor at the School of Education, University of Cincinnati, Cincinnati, Ohio.

John C. Schafer, PhD, is an associate professor at the College of Nursing, University of Cincinnati, Cincinnati, Ohio.

Andrea Borchers, MSN, RN, is a doctoral student in nursing program at the College of Nursing, University of Cincinnati, Cincinnati, Ohio.