THAI FAMILY HEALTH ROUTINES: SCALE DEVELOPMENT AND PSYCHOMETRIC TESTING

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Abstract. The aims of the study were to develop and test the psychometric properties of the Thai Family Health Routines (TFHR) scale, a 70-item self-report questionnaire used to measure the health of Thai families through their routine behaviors in daily life. Development of the TFHR was based on the structural domains of Denham's Family Health Model. The TFHR scale was initially composed of 85 items and tested on 1,040 families living in the central region of Thailand. The confirmatory factor analysis, with an acceptable factor structure model, yielded 70 items aligned with six factors: self-care, safety and prevention, mental health behavior, family care, family caregiving, and illness care routines. The preliminary psychometric properties demonstrated that the TFHR scale had satisfactory internal consistency, criterion validity, and construct validity. The test results suggested that the TFHR scale has potential benefits for family and community nurses to assess Thai family health for both research and clinical purposes.

INTRODUCTION

Over the last few decades, the number of Thai families at risk for health disparities has been increasing due to the effects of changes in social, economic, and cultural environments, as well as advances in science and technology (Tienhavon *et al*, 1999; Office of Woman's Affairs and Family Development, 2006). The impacts of these changes have significantly altered daily-routine health behaviors that directly and indirectly affect the health of Thai families. Therefore, assessing the family health routines of Thai family is crucially important to identify which families are healthy, at risk for becom-

ing unhealthy, or unhealthy. Because of social changes, the living patterns of many Thai families have altered, from simple and sufficient lifestyles to competitive ones, in which achievement or success is based on money, property, and honor instead of virtue and family well-being. Thai people are also spending more time working hard and less time taking care of themselves and their families.

In competitive situations, studies have found that Thai families often practice unhealthy routine behaviors, including irregular meals and sleep patterns, inactivity, and poor eating habits; as well as risk-taking behaviors, such as alcohol abuse, tobacco use, unprotected sexual activities, substance addiction, risky driving practices, and violence (Office of Woman's Affairs and Family Development, 2006; Ministry of Public Health, 2007). These unhealthy routine be-

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haviors are causally linked with chronic diseases, with increases indicated by the trends in the major morbidity and mortality of the Thai population that have shifted from infectious diseases to behavioral etiologies (Ministry of Public Health, 2007). Married women, who normally would have worked at home, are compelled to work outside, and they have less time to take care of their families (Ministry of Public Health, 2007). The Warmth Relationship Index, a measure of love, respect, attachment, and concern within Thai families, indicated a decrease from 80.85% in 1996 to 70.77% in 2002 (National Institute for Child and Family Development, 2002). Other indications of family trends were from a report that almost one-third of Thai families (29.1-35.9%) were "unhealthy," and the number of these families was predicted to increase in the future (Population Research Institute, 1995). Additionally, the divorce rate (percentage of divorces per marriages) in Thailand has increased from 15.7% in 1997 to 32.6% in 2007 (Department of Provincial Administration, 2007).

As in western countries, changes in living patterns alter not only the health behaviors of Thai families but also the leisure routine activities. Thai family members are spending more of their free time watching television, listening to radio, and surfing the internet. When these media are unscreened, Thai children are exposed to obscene language and antisocial behaviors that they may imitate. Moreover, traditional and religious practices of Thai families have been changing; many distance themselves from religious principles and cultural traditions (Aimpradith, 1996; Ministry of Public Health, 2007). Decreasing concern with traditional morality, such as gratitude, is a primary cause for increasing neglect of elderly parents (Office of Woman's Affairs and Family Development, 2006).

In summary, studies generally indicate that the number of at-risk Thai families due to unhealthy routine behaviors has been increasing. Health behaviors linked with the health of Thai families need to be observed, assessed, and possibly modified. If Thai family health is in jeopardy, community nurses could assume important roles by using routine family assessments to detect unique health concerns and prevent health problems or risks from becoming more serious, especially those behaviors practiced in their homes. To support the potential role of a nurse, an effective instrument is needed that can investigate unhealthy routine behaviors at the beginning of the problem or when problems are more easily resolved.

Some existing instruments measure family health through family functioning, but these are limited to psychosocial and spiritual dimensions. These include measures such as the Family Assessment Device (FAD) (Epstein *et al*, 1983), the Family Adaptability, Partnership, Growth, Affection, and Resolve (APGAR) (Smilkstein, 1978), the Family Assessment Measure (FAM) (Skinner *et al*, 2000), the FACES IV (Franklin *et al*, 2001), the Feetham Family Functioning Survey (FFFS) (Hohashi *et al*, 2008), and the Self-report Family Inventory (SFI) (Beavers *et al*, 1985). The constructs of these measures often lack the physical aspects relevant to family health reflected by patterned behaviors that influence individual's health or that of collective family members. Moreover, instruments developed with a bias toward western culture may be unsuitable for the Thai context.

Previously, most instruments used to assess the health of the Thai family contained indices for characteristics of the "desirable family." For example, the Questionnaire of Changing Health Behavior of Urban Impoverished Families (Jongudomkarn *et al*, unpublished project report, Faculty of Nursing,

Khon Kaen University, 2003), the Well-being Family Index (National Institute of Child and Family Development, 2002), and the Desired Family Index (Tienhavon *et al*, 1999) are instruments that have been used for survey research purposes; instruments with psychometric properties that have not been well established. Other instruments that measure family functioning and family health promoting behaviors, such as the Thai Family Functioning Scale (Suttiamnuaykul, 2002), and the Chulalongkorn Family Inventory (CFI) (Trankasombat, 1997) reflect only the psychosocial health dimension of Thai families. Moreover, these instruments have some measurement items that are modified from western instruments and may have limitations when used in the context of Thai families. While some instruments, such as the Family Health Promoting Behavior Scale (Suwanpatikorn, 2001), measure family health holistically, many behaviors that have the potential to destroy, regain, or maintain the health of individual members or the health of the whole family are not included. An instrument to evaluate the health of Thai families that incorporated routine health behaviors has not been developed.

Responding to this need, an instrument that measures overall family health aspects through routine health behaviors was proposed for development based on Denham's Family Health Model (Denham, 1999a,b,c,d, 2003b). This ecological model has three interrelated domains (ie, contextual, functional, structural) to describe the family health phenomena from different perspectives. The contextual domain describes family health as the internal and external family environments that are capable of affecting individual and family health risks and potentials. The context is integral to health and pervades family life by influencing where members interact and develop beliefs, gather health information, identify support system, and establish health routines. The functional domain describes family health in terms of family functioning, the bi-directional person-to-person interactions that occur within the family context and influence the family health outcomes. Functions have potential to affect health routines and are the antecedents for the value-associated behaviors constructed into family patterned behaviors. The structural domain describes the family health routines constructed and practiced as dynamic behavioral patterns relevant to health to which members rather consistently adhere and can be recalled, described, and discussed. The primary objectives of this study were to develop and test the preliminary psychometric properties of a self-reported questionnaire, the Thai Family Health Routines (TFHR) scale.

Conceptual framework

Ideas about the Family Health Model's structural domain (Denham, 2002, 2003a) were used as the guiding factors to conceptualize a framework for this study. The term structure has been used to described family characteristics, such as member roles, family subsystems, family forms (*eg*, nuclear, single parent, blended), power structures (*eg*, matriarchal, patriarchal), communication processes, and value systems (Friedman *et al*, 2003). However, the idea of structure, based on the Family Health Model (Denham 2003a) considers family health routines in terms of the ways that family members use beliefs, values, attitudes, information, knowledge, resources, and prior experiences to create patterned behaviors as daily life structures, which can or have potential to affect their health (Denham, 1999a,b,c,d). Although the structural domain does not cover all perspectives of family health, the family health routines demonstrated by family members in their daily lives provide visible and describable phenomena to assess holistically many qualities of family health

(Denham, 2002, 2003a).

The Family Health Model (Denham, 2003a) suggests six categories of routines to consider in the usual individual and collective behaviors families use to overcome or prevent injuries and illness in their daily lives. First, self-care routines include dietary practices, sleep and rest patterns, hygiene care, exercise and physical activity, and sexuality. Second, safety and prevention routines consist of behaviors in relation to the prevention of diseases and injuries, and avoidance of risk behaviors. Third, mental health behaviors are routine behaviors related to self-esteem, personal integrity, work and play, and stress management. Fourth, family care routines were religious and traditional practices. Fifth, family caregiving routines include household task, health teaching, resource management, and socialization. Sixth, illness care routines include the ways a family copes with illness conditions of family members. In this study, the construction of TFHR scale included these six health routine areas (Fig 1).
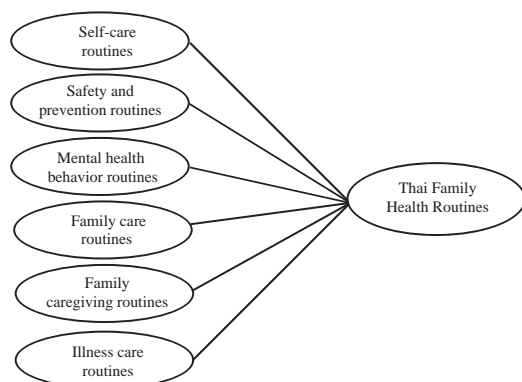

Fig 1–Components of the structural domain of the Family Health Model (Denham, 2003a).

MATERIALS AND METHODS

Research procedure

Scale development, using both qualitative and quantitative methods, was used as a methodological study design. Specifically, guidelines for scale development (Burns and Grove, 2001; DeVillis, 2003) were applied to develop and test psychometric properties of the TFHR scale. The study consisted of two phases: scale construction and psychometric testing.

Phase I: Scale construction

The processes of constructing the TFHR scale started with a broad review of the literature about existing family instruments, and the indicators, indices, and health practices of desirable families. A qualitative approach was used to obtain rich narratives about the routine health behaviors of Thai families. Information from the literature review and the qualitative approach was use to generate an item pool, followed by content validity, item review, and item analysis.

Participants

To identify participants in the qualitative approach, a community nurse working at the Saraburi Provincial Public Health Office helped to identify families. Inclusion criteria for family selection included residence (*ie*, urban or rural); family types (*ie*, nuclear or extended); having no ill family members; and a willingness to participate in the study. A semi-structured questionnaire that included the six family health routines identified in the Family Health Model (Denham, 2003a) guided these interviews. The snowball sampling technique started with an urban family living in Bangkok and a rural family living in Saraburi Province. When no new information emerged from either location, the interview process ended with 13 families: nine urban families from Bangkok and four rural families from Saraburi. All of these families were Buddhist

and included one nuclear family without a child, eight nuclear families with at least one child, and four multi-generational extended families.

Generating an item pool

Generating an item pool started by identifying operational definitions of the six dimensions of family health routines based on the Structural Domain of the Family Health Model (Denham, 2003a). Reviewing the literature, existing knowledge relevant to operational definitions of the six health routines were clustered accordingly. A qualitative approach was used because it can accommodate a composite of realities constructed by people to shape and create truths from personal experiences (Polit and Hungler, 1999). In-depth interviews were used to collect information about the routine health behaviors from the 13 families in the qualitative approach. Information from the literature review and findings from the interviews were integrated to construct statements for the original item pool.

Examples of the questions are: "Could you tell me the meaning of family health?" and""Please tell me about the different routine behaviors that influence your family's health from waking up until going to bed on workdays, weekends, and holidays, etc?" During the interviews, responses to the questions were taped. After extracting data from the recordings, content analysis procedures (Graneheim and Lundman, 2004) were used to generate item statements. The content of interview data, which described health behaviors of Thai families regularly used to regain, sustain, and promote health, was collected from individual and family perspectives. Data from each family were extracted and brought together into a family text, which constituted the unit of analysis. The text was highlighted to identify meaning units. A meaning unit is the group of words or statement that contains aspects related to each other and to the central meaning through their content (Graneheim and Lundman, 2004). Subsequently, the meaning units were condensed while still preserving the core. Then, the condensed meaning units were abstracted and labeled with a code.

After labeling each of condensed meaning units with a code, all of condensed meaning units were checked for coverage of family interview data. Then, the various codes were grouped based on differences and similarities. The codes were identified based upon the operational definitions of the six categories of family health routines. Item statements were then generated from the condensed meaning units of the interview data. Based on the families' narratives and the literature, an initial pool of 206 statements was hypothesized to represent the six categories for the Thai family health routines (Table 1).

Content validity

All 206 statements were then reviewed by six experts in family nursing consisting of four Thai instructors; an American instructor, the author who developed the Family Health Model (Denham, 2003a) used as the conceptual framework of this study; and a community nurse who had been working closely with Thai families in community settings. The content validity in this study followed a qualitative procedure, which was guided by the test specification that contained two important issues (Polit and Hungler, 1999): clarity of expression and relevance in relation to the family health routines of Thai families. For clarity of expression, the adequacy of each item concerning the language used, offensiveness or appearance of bias, and redundancy were located at one point of a four-point scale for "clarity" (1 = not clear, 2 = somewhat clear, 3 = quite clear, 4 = very clear). The relevance to

Table 1
Examples of Thai Family Health Routines statement items.

Our family members eat their favorite food without regard to the nutrients they should get.
Our family members have a restless sleep, which makes them tired after getting up.
Our family members wash their hands before taking food into their mouths.
Our family members eat raw or medium cooked meat.
Our family members unplug electric appliances such as TV, fans, electric kettle, or water pump before leaving home or going to bed.
Our family members drink alcohol, beer or wine until they are drunk.
Our family members allow everyone to freely express their opinions and ideas.
Our family members tell jokes for fun and laugh together.
Our family members participate in religious practices on holy days such as making merit and listen to sermons in temples, churches, or mosques.
Our family members have conflict over household chores.
Our family members hesitate to see doctors until their symptoms are severe and medical treatment is more difficult.

the operational definition and content domain were examined using a four-point rating scale for "relevance" (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = very relevant).

The process of content validity involved the panel experts who suggested particular modifications, such as the item pool was too long, some items were too detailed, or statements were ambiguous and/or redundant. Items were deleted when three of the five experts so recommended, or when they rated an item's relevancy to operational definition as < 3. Items considered ambiguous by at least three of the five experts were revised. When there were redundant items, only the best one as judged by the researcher was selected. Of the pool of 206 items, 54 items were deleted and 10 items were combined into three items. No items were deleted because of their irrelevancy to the operational definitions. After completing content validity analysis, the 206 items were reduced for the first draft of the TFHR scale that consisted of six dimensions with 145 items that still covered the six constructs of

family health routines and reflected all aspects of routine health behaviors of Thai family provided in the operational definitions.

Item review

Item review was used to determine the appropriateness and clarity of wording of each item for the first draft of the TFHR scale. The first draft scale, comprising 145 items, was reviewed by 15 Thai mothers/wives selected by convenience sampling. During the pre-test, the researcher observed if respondents paused, skipped, or changed their answers. Their behaviors were recorded and reviewed for possible reasons, including misunderstanding, items difficult to understand, or reluctance to answer. Time used for completing the TFHR scale ranged from 16 to 55 minutes depended on respondents' age; the older they were, the more time they used. Because of this review, 17 items were modified to enhance the clarity of meaning.

Item analysis

Item analysis was used to select the best items for constructing the TFHR scale using

corrected item-total correlation and reliability before testing its construct validity.

To select an appropriate sample, one tenth of the sample size of the main study, conducted to test construct validity, was required for item analysis (Pett *at al*, 2003). Initially, sample size of the field-test study was appropriately 1,450 families, calculated by the criterion of ten times the number of items in the first-draft scale, which consisted of 145 items. Sample selection was expected to represent the same characteristics of the sample in the field test, and Saraburi Province and Bangkok were purposely selected. Districts from each location were randomly selected and families recruited using convenience sampling. The majority of these families were Buddhist (97.9%) from various family types: nuclear families with at least one child (75.8%) and without child (5.5%), extended families (15.2%), and single-parent families (3.5%). The sample living in an urban area (51.7%) was nearly equal to the sample living in rural areas (48.3%).

With the criterion of the corrected item-total correlation greater than 0.30, only 85 items of the first draft scale were retained to construct the TFHR scale. Internal consistency for the scale was well above the standard of 0.70 for a newly developed research instrument (Nunnally and Bernstein, 1994), alpha coefficient of the 85-item TFHR scale was 0.94 for the total scale.

Phase 2: Psychometric testing

There were two steps completed during this phase. First, a field test was done to examine the construct validity of the original 85-item TFHR scale. Second, a psychometric property testing consisting of contrast-group validity, criterion-related validity, and internal consistency reliability were undertaken to test the final version of the TFHR scale.

Sample

The field-test study was undertaken with families located in the central region of Thailand, which is comprised of 27 provinces as officially recorded by the Ministry of Interior. Determining the minimum sample size, a ratio of 5-10 subjects per item was required to reduce sampling error (Naunnally and Bernstein, 1994; Devellis, 2003), and the size must meet an optimal sample size for factor analysis (Pett *et al*, 2003). Therefore, at least 1,000 families were needed for the instrument evaluation. To meet the criterion of at least 1,000 families, a four-stage sampling method started with simple random sampling to recruit four of the 27 provinces of the central region: Bangkok, Chai Nat, Saraburi, and Phra Nakhon Si Ayutthaya. From each of these provinces, four districts (*amphoe*) were selected by using simple random sampling. In each of the resulting 16 districts, 65 families were purposely selected with consideration given to variation of the demographic characteristics of the sample, such as family types, major occupational categories, family income, location, and housing status (*eg*, rent, owner, welfare, dependence). As the interview involved both delivering and receiving back the questionnaire forms on the same occasion, the response rate was 100%. The sample of 1,040 families was comprised of nuclear families with at least one child (41.1%) and without a child (11.0%), extended families (43.6%), and single-parent families (4.4%). The samples living in urban (53.3%) and rural (46.7%) areas were nearly equal.

The sample of contrasted-group validity testing included 60 families (*n* = 60) who were equally divided into two contrasting groups; in each group were 30 families. There was a special procedure for selecting extreme contrasting groups of healthy and unhealthy families. Based on the Family Health Model (Denham, 2003a), characteristics of healthy family were identified as

nurturing acts, emotional support, caring attributes, and member interactions that produce an outcome resulting in satisfying in members' needs. Additionally, being healthy or unhealthy, the family could be self-identified (Denham, 2003a). Thus, unhealthy families were determined by the criteria of having at least one of the following problems: low income, domestic violence, or having member(s) who have experienced physical or mental illness, and who are confirmed by identifying themselves as unhealthy families. In contrast to unhealthy families, healthy families were identified by having no problem, described above for the unhealthy family group, and confirmed by identifying themselves as healthy families.

Testing of criterion-related validity and internal consistency reliability were undertaken with families living in Saraburi Province. These families were selected by convenience sampling. The sample size was estimated based on the significant criteria at 0.05, power analysis = 0.8, and medium effect size for a significance of product-moment coefficient (r). The necessary sample size for those criteria would be 85 subjects (Cohen, 1992). With no dropouts, the sample size was 100 families, which were not the same as used in the field-test study. With a response rate of 100%, all of 100 families were used to be the samples of both tests.

Ethical clearance

Before data collection, Approval Document No. 026/2006 was obtained from the Ethical Review Committee for Research Involving Human Subjects and/or Use of Animal in Research, Health Science Group of Faculties, Colleges, and Institutes, Chulalongkorn University, Thailand. All participants, in both qualitative and quantitative studies, were informed about the study purposes and methods, and an informed consent was obtained. Participants were informed that study participation was voluntary and they could refuse to participate or withdrawal from the study at anytime. An explanation about the confidentiality of information was given, and the participants were informed that research reports or study publications would not identify them.

Data collection

After obtaining permission to collect data from the provincial governor of each province, sample codes and house locations of the respondents were recorded by the researcher or research assistants. The questionnaires, an informed consent form, a demographic data sheet, and the TFHR scale were personally delivered by the research assistants to the respondents (mothers/wives) of each participating family.

Data analysis

Three tests of psychometric properties were completed using LISREL (version 8.25, Scientific Software International, USA) and SPSS software (version 13.0, SPSS Inc, USA). First, confirmatory factor analysis (CFA) was carried out to test construct validity of the 85 item-TFHR scale by LISREL. After the construct validity was confirmed by CFA, contrasted-groups validity was tested on two contrasted groups using independent t-tests. Second, criterion related validity of the TFHR scale was tested against the Chulalongkorn Family Inventory (CFI), which had been previously validated, as a concurrent criterion. Pearson's correlation coefficients between the total score of the TFHR scale and the CFI were established. Finally, internal consistency reliability was analyzed using Chronbach's alpha.

RESULTS

Construct validity

The TFHR scale initially consisted of six factors with 85 items. CFA was done to examine whether a particular factor model

provided a good fit to the data. The results of assessing measurement model fit showed that 15 items were deleted due to unsatisfied factor loadings, < 0.2, or non-statistically significant loading ($p < .05$). Therefore, the final version of the scale consisted of six factors with 70 items. The results of CFA on 70 item-TFHR scale indicated that Bartlett's test of sphericity was significant ($\chi^2 = 6715.100$, $p < .001$), and the Kaiser-Meyer-Olkin (KMO) value was 0.89. Six TFHR factors demonstrated regression weights ranging from 0.709 to 0.972 and were statistically significant at $p < .01$ (Table 2). Most fit indices of the model were acceptable, except the significant χ^2 (Table 3). Other indices fall within the range of threshold values.

Contrasted-group validity

The contrasted-group approach is a con-struct validity test using an analysis of the scale-separated groups that were different based on contrasting characteristics.

To demonstrate differences in the health of families, independent *t*-tests were completed to determine whether there were significant differences in health of families existed between the two groups: healthy families and unhealthy families. The results of the *t*-test showed that scores on the TFHR scale of healthy families were significantly different from unhealthy families (Table 4). Therefore, the TFHR scale was a valid instrument that could distinguish a group of healthy families from a group of unhealthy ones.

Criterion-related validity

The TFHR scale is intended for the measurement of the health of Thai families through their routine health behaviors. Be-

Table 2
Factor loadings of the TFHR scale ($n = 1,040$).

Factors	Number of items	Loadings
Self-care routines	17	0.731
Safety and prevention routines	16	0.850
Mental health behavior routines	15	0.972
Family care routines	4	0.709
Family caregiving routines	13	0.902
Illness care routines	5	0.792

The level of significant was set at the 0.01 level (2-tailed).

Table 3
Fit indices of the factor structure of the TFHR scale ($n = 1,040$).

Goodness-of-fit statistics	Threshold values	Studied values
Chi-square (χ^2)	$p > 0.05$	$p < 0.000$
Normed chi-square (χ^2/df)	< 3.00	2.983
Goodness-of-fit index (GFI)	> 0.90	0.947
Root-mean-square error of approximation (RMSEA)	< 0.05	0.044
Comparative Fit Index (CFI)	> 0.90	0.972
Parsimony Normed Fit Index (PNFI)	> 0.60	0.778

The level of significant was set at the 0.01 level (2-tailed).

Table 4

Mean and standard deviation for testing difference on THFR scores between healthy and unhealthy families (n = 60).

Family group	Mean	SD	t	df	Sig (2-tailed)
Healthy family (n = 30)	183.44	15.58	3.86	58	.001
Unhealthy family (n = 30)	165.63	19.87			

The level of significant was set at the 0.01 level (2-tailed).

Table 5

Pearson's product moment correlation between Thai family health routines and Thai family functioning scores (n = 100).

Measured concept	Mean	SD	Correlation
Thai family health routines	177.040	18.409	0.640
Thai family functioning	80.129	14.128	

The level of significant was set at the 0.01 level (2-tailed).

cause the Chulalongkorn Family Inventory (CFI) has been widely used to measure the health of the family in terms of family functioning, it was used as a concurrent measure to test the criterion validity of The TFHR scale. The relationships between the TFHR scale and CFI were examined with a different sample of Thai families (n = 100) that was used in the field-test study. Pearson's correlation, after investigation, showed that the TFHR scores were significantly positively correlated with the CFI scores at a moderate level (r = 0.64, p < .01) (Table 5). These findings support the criterion related validity of the TFHR.

Reliability

The internal consistency analysis for total scale and each subscale were calculated (Table 6). The total scale internal consistency of Chronbach's α was 0.91, and the subscale Chronbach's α ranged from 0.54 to 0.77.

DISCUSSION

The respondents in this study consisted of Thai families living in central region of Thailand. In a field-test study, the sample was purposively selected concerning representativeness of the target population. The respondents, mothers/wives, who could be accepted as representatives of their families (Denham, 2003a), were invited to complete the TFHR scale. In the item analysis, the selected sample represented the same characteristics as the sample for the field-test study (Nunnally and Berstein, 1994; Pett *et al*, 2003). Percentages of extended family and nuclear family with at least one child were different between the two samples; however, other family types and areas where the respondents lived were not different. Regarding the sample size in the field-test study, the 1,040 families included were sufficient for the generalization of findings to the tar-

Table 6

Internal consistency of the TFHR scale as estimated by Chronbach's α ($n = 100$).

Subscale	Chronbach's α
Self-care routines	0.70
Safety and prevention routines	0.67
Mental health behavior routines	0.75
Family care routines	0.77
Family caregiving routines	0.73
Illness care routines	0.54

The Chronbach's α of total scare is 0.91.
The Chronbach's α of subscales range from 0.54 to 0.77.

get population and reducing sampling error because the number of respondents met the ratio of respondents per item, which would be 10:1 or at least 1,000 subjects (Naunnally and Bernstein, 1994; Dixon, 2001; Pett *et al*, 2003). Considering the heterogeneity of the sample, data were collected from various settings using a multi-stage sampling method. The variety of the respondents' characteristics in the field-test study suggested that the TFHR scale could be used with families living in rural and urban areas, as well as with various family types (eg, nuclear, extend, single parent).

Construct validity of the TFHR scale was examined using CFA and then contrasted-group approach. Testing construct validity by using CFA was done by collecting empirical data to investigate whether or not a scale was related to other observed variables, and whether it was consistent with the theoretically derived predications (Streiner and Norman, 1999). The transition from a conceptual framework of family health routine concept to operational definitions indicates the validity of the TFHR scale. The conceptual and operational relationship is a measurement assumption that can be supported by validity testing (Mishel,

1998). The structural domain of the Family Health Model and the six categorical components of Family Health Routines (Denham, 2003a) were found to be useful in the development of the TFHR instrument. After reviewing literature and conducting in-depth interviews, the FHR constructs served to guide instrument development for use with Thai families in the original six categories: self-care, safety and prevention, mental health behavior, family care, family caregiving, and illness care routines. These categories were used as the factor structure for testing construct validity of the TFHR scale.

The results of the CFA indicated that most fit indices fell into acceptable ranges including normed fit chi-square (χ^2/df). Only the significant chi-square was not satisfied. The chi-square statistic (χ^2), however, is unrealistic for identifying a well-fitting hypothesized model in empirical research because of the sensitivity of the large sample size and excessive kurtosis (Bollen and Long, 1993; Bryne, 1998; Kline, 1998; Diamantopoulos and Siguaw, 2000). To reduce the sensitivity of the chi-square (χ^2) statistic to sample size, the value of chi-square (χ^2) was divided by degree of freedom (χ^2/ *df*). The χ^2/ *df* ratio less than 3 is an acceptable recommended threshold (Kline, 1998). Considering the factor loadings, regression coefficients of the six factors that ranged from 0.709 to 0.972 were statistically significant ($p < .01$). All indicators loadings were significant (at $p < 0.05$ or better), providing validity evidence of the indicators used to represent the construct of interest (Diamantopoulos and Siguaw, 2000). These findings demonstrate validity evidence of the six factors reflected the construct of the TFHR scale. Therefore, the proposed model was accepted as a good fit model, and the proposed factor structure of Thai family health routines based on the structural domain is supported by the em-

pirical data testing and reflects construct validity of the TFHR scale.

To use the TFHR scale as a research instrument and a screening tool in clinical practices, a contrasted-group approach tested construct validity with an independent t-test. This approach was used to determine the differences in routine health behaviors of healthy and unhealthy families. Findings indicated that the construct validity of the TFHR scale was supported and provided a valid scale to measure significant differences in which families tended to be healthy or unhealthy. According to Family Health Model, routines are regular behaviors that families use to maintain, regain, and promote the health of the family (Denham, 2003a). Thus, the results were congruent with this theoretical basis as the mean TFHR scores of healthy families were greater than those of unhealthy families were.

Establishing criterion validity involves determining the relationships between an instrument and an external criterion (Polit and Back, 2004). In this study, the relationship between the TFHR scale and the Chulalongkorn Family Inventory (CFI) was used as concurrent criterion. Although the criterion validity is indicated by a high correlation coefficient (Polit and Back, 2004), a moderate correlation between the TFHR scores and the CFI score were found to be statistically significant ($r = 0.64$, $p < .01$). It is important to point out that the moderate relationship between scores on TFHR and CFI might result from their measuring different aspects of family health used to guide the respective scale development. The CFI was developed using only the underlying psychosocial aspects of family health (Trankasombat, 1997), whereas the TFHR scale was developed using the underlying biophysical, psychosocial, spiritual, and cultural aspects of family health (Denham, 2003a). The two scales might share similari-

ties only on the psychosocial and spiritual constructs of family health. Thus, the moderate correlation may result from the lack of the physical aspects of family health in the CFI.

The internal consistency was used to test the reliability of the TFHR scale. Cronbach's alpha coefficient of the total scale was 0.91, which indicated that the reliability had an acceptable range (0.70) for a newly developed instrument (Nunnally and Bernstein, 1994). The total TFHR scale had satisfactory internal consistency reliability. However, the high Cronbach's alpha coefficient ($\alpha = 0.91$) may be influenced by a lengthy test of the scale, which was comprised of 70 items, or the scale itself is highly reliable (Waltz *et al*, 1991). Considering the subscale reliability, five of the six subscales (*ie*, self-care routines, safety and prevention routines, mental health behaviors routines, family care routines, and family caregiving routines) showed satisfactory levels of internal consistency reliability with Cronbach's alpha values close to 0.70. It could be concluded that each of the five subscales had adequate potential to measure the same concept, family health routines. However, the Cronbach's alpha value of'illness care routines was'unsatisfactory ($\alpha = 0.54$). For this subscale, the score was not suitable to interpret illness care routines of a family by itself. Therefore, further revision for this subscale is need.

The usefulness of the TFHR scale was addressed in term of its implications for nursing research and practice. The TFHR scale may be a significant contribution to the practice of family nursing. As family health is a nursing goal, the TFHR scale could be used as a tool for evaluating or monitoring health outcomes that result from nursing interventions. For example, nurses could use the scale to assess the current health of a family representative, or it might be used to as-

sess unhealthy routine behaviors and so further improve the health status of the whole family. The TFHR scale has potential for assessing future health risks for Thai families and guiding nurses' actions as they work with individuals and families. Nurses as well as other health workers can use the scale to prioritize needs linked with families' health routines. Each item of the scale represents a visible behavior that individual and collective members of the family routinely perform. If a family has a few low-score items, nurses can identify the family's behavioral problems and assist them to address the particular problematic routine health behaviors that negatively affect the health of individual family members and the family as a whole. Additionally, nurses can identify minor problems, and prevent these problems from becoming more serious, which would have negative future effects on family health. Finally, the TFHR scale appears to be a useful means to monitor changes in families following nursing care and treatment interventions.

Findings from this study indicated that the structural aspects of the Family Health Model (Denham, 2003a) were useful in the development and testing of the TFHR scale. The final scale is comprised of 70 items with 6 subscales, including self-care routines, safety and prevention routines, mental health behaviors routines, family care routines, family caregiving routines, and illness care routines. The scale is a self-reporting questionnaire with a four-point rating scale ranging from "1 = never" to "4 = always." The scale is composed of both positive and negative statements, and recoding score on negative statement items should be done before calculating the total score. The total score of the TFHR scale is obtained by summing raw scores across 70 items on six subscales can range from 70 to 280. A higher score indicates a greater likelihood of a healthy family. After testing the psychometric properties, the TFHR scale has demonstrated validity and reliability as a research instrument for measuring the health of Thai family. Nurses, as well as other health workers, schoolteachers, or family heads could potentially use the scale for evaluating the health of families and recommending appropriate interventions to improve health routines.

The TFHR scale appears to be a comprehensive, reliable, and valid family assessment instrument; however, two limitations are of concern. First, in the field-test study, though a large sample size was obtained, the research setting did not cover different regions, and most of the respondents were Buddhist. Therefore, caution should be exercised when use of the scale is intended for Thai families living in other regions with cultural and/or religious differences, especially minority family groups. Second, most of respondents were families with no ill members; therefore, using the scale with the families having members who experience acute or chronic illness or deformities may be inappropriate or might result in different findings.

The constructs of the TFHR scale was developed based upon an ethnographic study of American families (Denham, 2003a). Further research for revising the constructs of family health routines of Thai families using qualitative approaches should be undertaken. Revision of the subscale for illness care routines would be needed for higher reliability. Replication of the study or wide use of TFHR scale with a variety of family types and conditions would provide important understandings about the usefulness of the instrument. Additionally, to use the instrument as a diagnostic tool, a further study to determine cut-off point scores for classifying family types, healthy, at risk unhealthy, or unhealthy family is needed. Finally, evalu-

ation studies might be useful where the tool is used initially for assessment and later as a post-test measure to see if nursing or other interventions resulted in altered routine individual or family health behaviors.

ACKNOWLEDGEMENTS

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