# A Psychometric Evaluation of the Chinese Version of the 5D Itch Scale in Taiwanese Elderly

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## Abstract

***Purpose:*** *To translate the English version of the 5D itch scale into Chinese and test psychometric properties of the Chinese version of the 5D itch scale (C5D-IS) in a sample of 257 older adults with chronic pruritus lasting 6 weeks in Taiwan.* ***Results****: The expert's content validity index was 0.94. Concurrent validity between the C5D-IS and the Chinese version of Pittsburgh Sleep Quality Index was 0.30.Spearman's rho correlations between subscales were statistically significant (all p < 0.001). Item 3 (direction) had the lowest but item 2 (degree) had the highest correlation to other items. Cronbach's alpha test of internal consistency was 0.71 for the five domains of the C5D-IS.* ***Conclusion****: The C5D-ISis a reliable instrument that can help Chinese-speaking caregivers determine the pruritic symptoms of older adults and assess the effects of the treatment on the symptoms. However, further testing of the reliability of the scale in different population is recommended.*

**Keywords:** older adults, 5D itch scale, pruritus, psychometrics

## *1. Introduction*

Chronic pruritus is a common skin problem in the geriatric population. It is a complex phenomenon and usually defined as an unpleasant itching sensation which evokes a strong desire to scratch the affected skin at least three times within 2 weeks, lasting more than 5 minutes per episode and persisting for more than 6 weeks (Metz, Grundmann, & Stander, 2011; Zucker, Yosipovitch, David, Gafter, & Boner, 2003). It is also considered a human defense mechanism that may signal underlying diseases or malignancies (Chen & Yesudian, 2013). The prevalence rate of pruritus increases with age, ranging from 40% to 66%(Chen & Yesudian, 2013; Cowdell, 2009; Patel &Yosipovitch, 2010).Shive and colleagues (2013) found that 26% of seven million people who searched for medical care due to pruritus were older adults.

Although chronic pruritus is not a life-threatening disease, it can pose profound impacts on older adults' health and quality of life by disturbing their daily activities, nocturnal sleep, and social relationships(Berger, Shive, & Harper, 2013; Cohen, Frank, Salbu, & Israel, 2012; Davidson & Giesler, 2010; Patel &Yosipovitch, 2010; Rothenbuhler, 2015). If pruritus is not treated, it may cause complications, such as Lichen simplex chronicus and pustulosis, and even cause severely dangerous infection due to damaging the skin integrity (Farage, Miller, Berardesca, & Maibach, 2009).Like chronic pain, persistent and severe pruritus can dominate daily life and cause debilitating impacts on quality of life (Bathe, Weisshaar, & Matterne, 2013). The victims may feel hopeless due to recurrent symptoms and negative effects over time (Berger et al., 2013; Farage et al., 2009). At present, there is no universally accepted therapy for itchiness. The symptoms cannot be managed until the causes or incentives of the symptoms are removed (Kini et al., 2011). Under these circumstances, the severity of chronic pruritus is usually underestimated by caregivers or older adults per se. It is indispensable for caregivers to use a valid assessment tool to determine the pruritic symptoms.

Over the past several decadesa variety of tools have been used to assess individuals with pruritus especially uremic pruritus, but there is no specific tool which is applied only for older adults. These assessment tools includeVisual Analogue Scale (VAS) (Aitken,1969),Eppendorf Itch Questionnaire (EIQ)(Darsow, Mautner, Bromm, Scharein, & Ring, 1997), Yosipovitchet al.'s pruritus questionnaire (2001), andItch Severity Scale (ISS) (Majeski, Johnson, Davison, & Lauzon, 2007).However, some limitations minimize the use of these tools to assess pruritus because most of them are unidimensional tools which cannot be applied to assess the changes of pruritic symptoms over time, and the tools are lengthy and time-consuming to be completed (Shin, 2003). For these reasons, Elman and colleagues developed 5D itch scale, a quantified and easy scoring tool, to measure pruritic symptoms from five dimensions in 2010(Elman, Hynan, Gabriel, & Mayo, 2010). This scale was originally developed for English-speaking patients with pruritus. Nowadays many researchers has mostly used 5D itch scale to assess pruritus of the patients with hemodialysis and end stage kidney diseases (Khan, Al-Haider, Syed Sulaiman, & Hassali, 2013; Lai et al., 2017; Wu, 2015)and to test the effects of interventions on pruritus (Elsaie, Mohsen, Ibrahim, Mohey-Eddin, & Elsaie, 2016).

Because the prevalence of chronic pruritus is high in older adults, andmost of published pruritus assessment tools are not easily administered to uneducated and/or cognition impaired older adults, it is necessary to develop a user-friendly tool for them to use.The purpose of this study was to determine if the 5D itch scale is a valid tool that can be easily used for older adults. Chinese older adults were selected as samples for this study due to the fact that Chinese represent such a large percentage of the world's population. The researchers of this study initially obtained the permission from the authors of the original 5D itch scale, developed its Chinese version based on the translation guidelines (Guillemin, Bombardier, & Beaton, 1993; Wild, Grove, & Martin, 2005),and vigorously conducted its psychometric evaluation.

## *2.Pruritus assessment scales and relevant research*

Since 1969, many scholars have developed a number of assessment tools with different focuses for a diverse group of ethnic patients with pruritus, especially those who have hemodialysis and end stage of renal diseases. There are similarities and differences between these tools. The comparisons between these tools based on their development background, assessment contents, scoring methods, and application scenarios are described as follows (Table 1).

### 2.1 **Visual Analogue Scale (VAS)**

In 1969, Aitken first used VAS to measure a patient's dyspnea degrees. Later on, this tool has been broadly applied to assess different health problems, including the severity of pruritus (Okitsu, Sawamura, Nishimura, Sato, & Ishigooka, 2014). The respondents of this scale are asked to select a point on a continuous line between 0 mm to 100 mm to represent their pruritus, and then the distance from 0 to the selected point is measured to assess the degree of pruritus. The longer the distance, the more severe the degree of pruritus (Wu, 2015). In the studies of Shi (2003) and Chen (2006) which tested pruritus of patients with end stage of renal diseases and the effects of far-infrared acupoints on uremic pruritus, the Cronbach's alphas of the VAS were 0.75 and 0.84 respectively.

### **2.2 Eppendorf itch questionnaire (**EIQ)

A group of German dermatologists and neurophysiologists developed the EIQ(Darsow et al., 1997),based on the McGill Pain Rating Scale (Melzack & Katz, 1994).The EIQ is used to evaluate the quality and quantity of pruritic sensations. It consists of two forms of scoring: (1) sensory and affective descriptors; (2) VAS for assessing the severity. Each item is scored from '0' (not true) to '4' (exactly true) (Weissenbacher et al., 2005). Recently, Welz-Kubiak, Reich, and Szepietowski (2016) utilized this questionnaire to understand pruritic symptoms of the patients with lichen planus and to test the effects of antipruritic treatments on improving the quality of life. Nonetheless, the use of this questionnaire may be limited because its text is in German.

### **2.3 Yosipovitch et al.'s pruritus questionnaire**

By 2001, the majority of scales could only exam the pruritic intensity rather than the nature (Wu, 2015), thus a pruritus questionnaire was constructed by Yosipovitch et al., based on the short form of the McGill Pain Questionnaire to test the pruritic symptoms of 145 uremic patients. This questionnaire assesses pruritic history, current antipruritic medications, effects of pruritus on sleep/daily activities, coping with pruritus, quality of life, verbal descriptors of pruritic sensation and affective dimension, severity of pruritus, and body parts involving pruritus(Yosipovitch, Geoffrey, Gafter, Shapira, & David, 2001). In a study of testing the effects of acupressure on pruritus in the patients with end-stage renal diseases, Shin (2003) reported that the internal consistency of Cronbach's alpha for this questionnaire was 0.92.

### **2.4 Itch Severity Scale (ISS)**

The ISS**,** a self-reported questionnaire, was developed to quantify pruritic severity based on the instrument constructed by Yosipovitch et al. (2001).

This questionnaire wastailored around the original 11 questions but reduced to seven questions, focusing on the frequency of pruritus, the description of pruritic sensation, affective descriptors, the body surface area involved, the intensity as measured by the five-point Likert scale and the VAS, and the effects of pruritus on sleep, mood, and sexual function(Majeski, Johnson, Davison, & Lauzon, 2007). The various component responses to each of the seven questions are summed up separately and divided by the highest possible total score for each respective question. The seven values are then added together and multiplied by 3 to get a total out of 21. Total ISS scores can range from 0 (no pruritus) to 21 (most severe pruritus)(Lin, 2010). The higher score indicates the increase in the intensity of pruritus. Shi (2003)translated the scale into Chinese and reported good internal consistency (Cronbach's alpha = 0.92). Daudén(2011) translated the original scale into Spanish to test pruritus in children and adults, the author also found the Cronbach's alpha of the ISS was greater than 0.8.

### 2.5 Original 5D itch scale (5D-IS)

In 2010 Elman and his colleagues developed the 5D itch scale to measure pruritus among patients with renal disorders, liver diseases, and burns. This tool assesses the multidimensional nature of pruritus and its influences on the daily activities of the patients. The 5D itch scale includes five domains that measure duration, degree, direction, disability, and distribution of pruritus (Elman et al., 2010)with a 2-week recall period.Of these five domains, the former three are single-item domains with scores ranging from 1 to 5. Nonetheless, the disability domain comprises of multiple-items which cover the effects of pruritus on daily activities, such as sleep, leisure/social activities, housework/errands, and work/school, and the score for this domain is calculated by taking the highest score on any of the four items(Khan et al., 2013). The last domain is the distribution, which focuses on the affected body parts by pruritus. For the distribution domain, respondents are asked to identify their body parts having pruritus from 16 body parts provided in the 5D itch scale(Lai, 2016). The number of affected body parts is tallied, and the sum is sorted, based on five scoring bins: sum of 0–2 = score of 1, sum of 3–5 = score of 2, sum of 6–10 = score of 3, sum of 11–13 = score of 4, and sum of 14–16 = score of 5 (Elman et al., 2010). The total scores of the 5D itch scale range from 5 (no pruritus) to 25 (most severe pruritus). Higher scores indicate a greater negative impact of pruritus (Wu, 2015). Internal consistency of the original 5D itch scale was 0.73 (Elman et al., 2010). The 5D itch scale has appropriate internal consistency with a Cronbach's alpha of 0.78-0.85 (Khan et al., 2013; Wu, 2015)and good concurrent validity with visual analogue scale ($p$ <0.001) (Lai, 2016) and numerical rating scale ($p$ <0.001)(Lai et al., 2017).The sensitivity and specificity were 75%-92% and 81%- 89% (Lai, et al., 2017; Moshen, 2013).

**Table 1: Merits and drawbacks of pruritus questionnaires**

| Questionnaire | Authors | Merits | Drawbacks |
|---|---|---|---|
| VAS | Aitken et al., 1969 | auser-friendly tool including a quantified and simple scoring process (Stander et al., 2016). | fails to assess the changes in pruritic severity and pruritic impact on the quality of lifeovertime; may cause a false positive or negative result (Stander et al., 2016). |
| EIQ(German) | Darsow et al., 1997 | a multidimensional tool that covers the detailed sensory and affective descriptors of pruritus(Elman et al., 2010). | is lengthy and time-consuming to completethe questionnaire(Zachariae, Lei, Haedersdal, & Zachariae, 2012). |
| Pruritic questionnaire | Yosipovitch, et al., 2001 | a multidimensional tool that assesses pruritic nature and effects (Shin, 2003). | the scoring is complex and not easy to be used(Shin, 2003). |
| ISS | Majeski et al., 2007 | can be used to compare the severity of pruritus among different patients and assess the treatment effects of pruritus (Lin, 2010). | some of the questionnaire items overlap, and the correlation between items is low (Lin, 2010)；the scoring process is complex and time-consuming. |
| 5D-IS | Elman et al., 2010 | a user-friendly and multidimensional questionnaire sensitive to the changes in pruritus over time；assesses the influences of pruritus on daily life activities (Zachariae et al., 2012) | lacks the descriptors about affective and psychological reactions to the suffering caused by pruritus (Zachariae et al., 2012) |

## *3. Methods*

### 3.1 Design and Sample

The data of this psychometric evaluation were extracted from our previous cross-sectional study which was approved by the human subjects institutional review board of the Changhua Christian Hospital (#160616) in Taiwan, and the ethical code for the participants was assured. In our previous study, the 5D itch scale (Elman et al., 2010) was translated into Chinese following a vigorous process, and then the C5D-ISwas used to investigate the status and effects of chronic pruritus on 1000 older adults. An adult who met the following criteria was recruited: (1) was 65 years old or older and not hospitalized; (2) had scores of Mini-Mental Status Examination > 27 and could express herself/himself well; (3) had no concomitant psychiatric diagnoses and hearing impairments; (4) did not regularly take antihistamines and steroids.The convenient sampling and snowball sampling were used to recruit the participants. The translation and study protocol is shown in figure 1. The participants with the C5D-IS scores > 5 were included in this psychometric evaluation of the C5D-IS. The total sample extracted for this evaluation was 257.

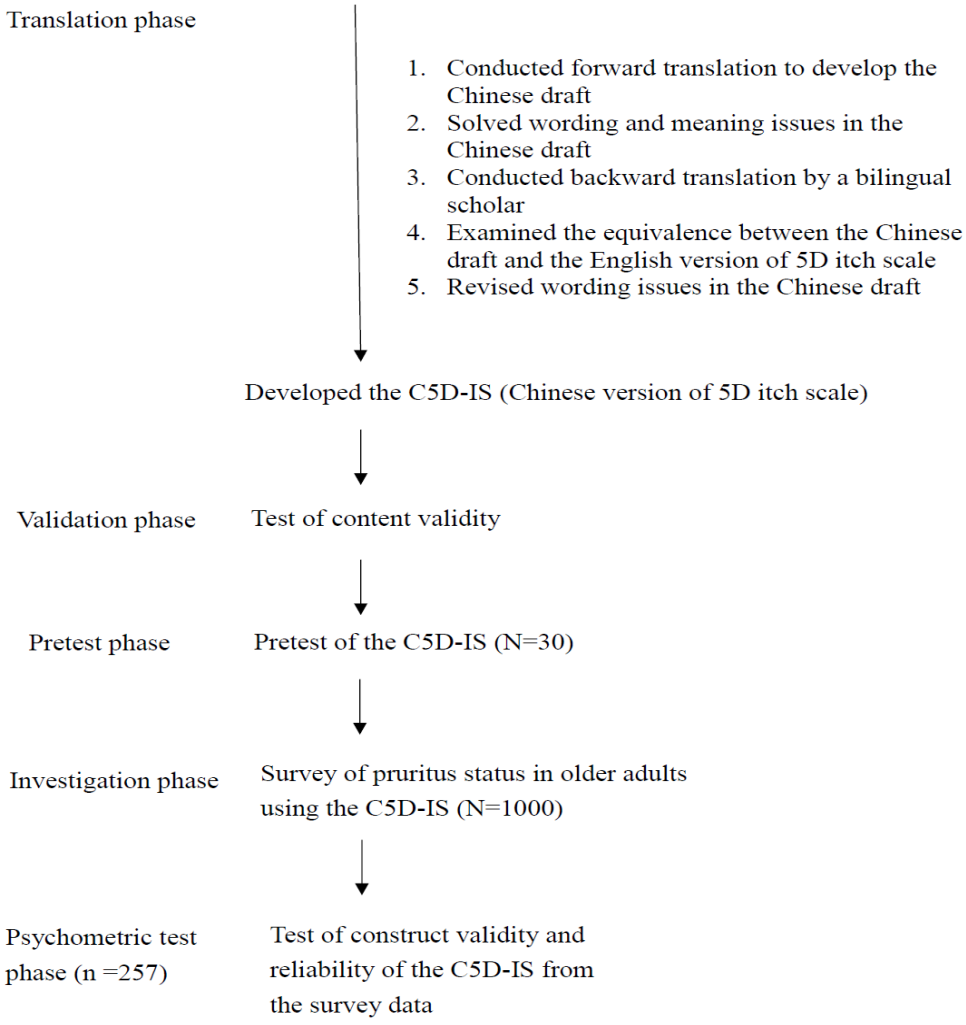


**Figure 1 Translation and study protocol**

### 3.2 Development of the Chinese version of 5D itch scale

Before starting the translation process, wecontacted with the original authors of the 5D itch scale for permission to use and translate the scale.The English version of the 5D itch scale was initially translated into Chinese by a bilingual nursing student of a university in Australia, according to the translation guidelines (Guillemin et al., 1993; Wild et al., 2005).

The translated content was then edited by a professor who holds a PhD degree in nursing and advanced experience in elderly care. Upon the completion of the forward translation, backward translation was conducted by a bilingual Chinese American who is an experienced nursing professor in the U.S. Afterwards, a linguistic person examined its meaning and consistency with its original English version. Four experts from multidisciplinary fields (a nursing clinician, dermatologist, and two professors from different universities) were invited to review the translated content. The expert panel used a 4-point Likert scale to evaluate the content validity of the C5D-IS for relevance of content, comprehensiveness of measures, along with clarity of items and to see if the translation of each item met cultural context appropriateness. The translated content was revised according to the panel comments. The expert's content validity index (CVI) was 0.94. According to Davis (1992), a CVI above 0.80 is adequate for an instrument, therefore no further revision was needed.

### 3.3 Instruments

#### 3.3.1 Mini Mental Status Exam (MMSE)

MMSE (Folstein, Folstein, & McHugh, 1975), 30-item test, was administered at participants' homes or in private rooms selected by the participants at the beginning of this study. According to Folstein and colleagues (1975), the MMSE measures the degree of cognitive impairment using a short interview and yields a range of scores from 0 - 30, with a higher score indicating better cognitive functioning. A score at or below 24 is indicative of cognitive impairment. The scale has been found to have good reliability with internal consistency ranging from 0.73 to 0.85(Pruchno & Rose, 2000). Similar findings were found in a study, indicating that the Chinese version of the MMSE had an internal consistency of 0.86 and a test-retest reliability of 0.78 to healthy and demented older adults(Chiu, Lee, Chung, & Kwong, 1994). Internal consistency for the scale as measured by Cronbach's alpha in this study sample was 0.80.

#### 3.3.2 The Pittsburgh sleep quality index (PSQI)

The PSQI, a 19 item questionnaire, is used to assess subjective sleep quality and nighttime disturbances during the past one month. It consists of seven subscale components: sleep quality, sleep latency, sleep duration, habitual sleep efficiency, daytime dysfunction, sleep disturbances, and use of sleep medications(Buysse, Reynolds, Monk, Berman, & Kupfer, 1989).The score of the PSQI range from 0 to 21. A score at or above 5 indicates poor sleep quality. The Cronbach's alpha for the PSQI was reported to be 0.70- 0.78 in different studies (Buysse, et al., 1989; Chen et al., 2010). In a Taiwanese study that recruited 87 Taiwanese with primary insomnia and 157 healthy adults to evaluate psychometric components of the Chinese version of PSQI (CPSQI), Tsai et al. (2005) found that the Cronbach's alpha for the CPSQI was 0.83 - 0.82 in all participants and 0.72 - 0.71 in primary insomniacs, and the test–retest reliability over a 14 to 21-day interval had a coefficient of 0.85 for all participants and 0.77 for primary insomniacs.

### 3.4 Data collection and analysis

In our previous study, the participants were mainly recruited in the places where older adults gathered (e.g., city parks and temples) in Taichung, Changhua, and Taoyuanareas in Taiwan. The C5D-ID was administered to collect data along with the CPSQI. The participants could either fill out the questionnaires by themselves or obtain assistance from one of the investigators. The investigators would read the content of the questionnaires to the participants and then helped them complete the written questionnaires. The three investigators were trained nursing students. To ensure the internal consistency of raters, the principal investigator held meetings before the investigation began to discuss each item of the questionnaires and to resolve the difficulties experienced during the investigation. Then all of the investigators came to an agreement regarding how to use the questionnaires to collect the data.

The Chinese version of SPSS 22.0 was used to manage and compute the questionnaire data. Descriptive statistics including frequency, percentage, mean, and standard deviation (SD), were used to analyze demographic data, content validity, and pruritic characteristics. Internal consistency was measured using Cronbach's alpha.The concurrent validity ofthe C5D-IS was established by examining its association with the CPSQI. The reason for selecting the CPSQI as the unique instrument for testing the C5D-IS concurrent validity is that a subscale of the 5D itch scale is related to a sleep assessment.

## *3.Results*

### 4.1 Demographic characteristics

As shown in Table 2, the sample of this psychometric evaluation included 125 men (48.6%) and 132 women (51.4%), with a mean age of 73.83 (±7.34) years. The most two prevalent educational levels were elementary school (37.1%) and illiterate (35.5%). The majority of the participants were married (69.8%) and 27.5% were widowed. The average number of chronic diseases suffered by the participants was 1.25 (± 0.97). Hypertension and diabetes mellitus were the

most two common co-morbid conditions. About 87% of the participants were either Taoists or Buddhists. More than 50% of them either lived with their spouses or children. Thirty percent of them lived in a household with three generations or more.

**Table 2 Demographic characteristics of study participants**

| Variables | mean (SD) | n (%) | range |
|---|---|---|---|
| **Age** | 73.83(7.34) | | 65-94 |
| **Sex** | | | |
| Male | | 125 (48.6) | |
| Female | | 132 (51.4) | |
| **Level of education** | | | |
| Illiterate | | 91 (35.5) | |
| elementary school | | 95 (37.1) | |
| junior high school | | 30 (11.7) | |
| high school | | 24 (9.4) | |
| ≥ college | | 16 (6.3) | |
| **Marital status** | | | |
| Married | | 178 (69.8) | |
| Single | | 1 (0.4) | |
| Widow | | 70 (27.5) | |
| Divorced/separate | | 6 (2.3) | |
| **Religious** | | | |
| Buddhism/Taoism | | 224 (87.2) | |
| Christian/ Catholicism | | 10 (3.9) | |
| Other | | 1 (0.4) | |
| None | | 22 (8.6) | |
| **Chronic diseases#** | 1.25(0.97) | | 0-4 |

### 4.2 Concurrent Validity

As the Kolmogorov-Smirnov test indicated that the C5D-IS and CPSQI were not normally distributed ($p < 0.001$), a nonparametric correlation was computed to test their relationship. Spearman's rho correlations between the C5D-IS and CPSQI in this psychometric evaluation was 0.30 ($p < 0.001$),revealing a significant but mild correlation (Munro, 2005).

### 4.3 Reliability and homogeneity

The C5D-IS scores ranged from 6-22 (M± SD = 10.09 ± 3.20). Most participants had 3-5 body parts having pruritus and reported mild to moderate pruritus lasting 6-12 hours per day and felt "a little bit better but itching still present" comparedto the previous month.They also described that pruritus only occasionally delayed falling asleep.Spearman's rho correlations between items ranged from 0.28 to 0.56 (all $p < 0.001$) within the C5D-IS. Item 3 (direction) had the lowest but item 2 (degree) had the highest correlation to other items. TheCronbach's alpha test of internal consistency was 0.71 for the five domains of the C5D-IS.

## *4.Discussion*

The mean score of the C5D-IS, 10.09 (± 3.20) in this psychometric evaluation, is lower than the previous reports by American scholars (Elman et al., 2010) (16.5 ±4.75) and Arabic researchers (Khan et al., 2013) (12.7±5.3). The reason may be attributed to the fact that the participants included in those previous studies suffered from pruritus due tospecific diseases, such as liver diseases, dermatological disorders, burn injuries, and end stage of kidney diseasesand so on. Our participants were older adults who lived in the community and had pruritus caused mostly by xerosis that could be affected by the weather. Our investigation mainly occurred during the summer when the weather was humid and hot. In addition, xerosis could occur on a daily basis, and thus the older adults viewed it as an acceptable problem and adapted to live with the condition.

The content validity in our psychometric evaluation can be considered as legitimate because a rigorous process was used to translate the original 5D itch scale into the Chinese version, and the translated text was evaluated by an expert panel. It has been recommended that at least three experts should be recruited for each group including professionals and lay experts (Rubio, Berg-Weger, Tebb, Lee, & Rauch, 2003). In our psychometric evaluation four experts from multidisciplinary fields employed a 4-point Likert scale to evaluate the content validity of the C5D-IS.

The obtained CVI of 0.94 was quite high, based on Davis' (1992) standard of a CVI of 0.80 or more, implying that the C5D-IS retained its content structure after translation. The concurrent validity between the C5D-IS and CPSQI was statistically significant ($p < 0.001$), but the strength of the correlation ($r = 0.30$) was deemed low based upon Munro's (2005) and Rubio et al.'s (2003) standards which classify a correlation (r) between 0.26 and 0.49 as low. This finding is much lower than the previous psychometric evaluation studies that tested the correlation between the 5D itch scale with VAS(Elman et al., 2010; Khan et al., 2013). It is possible that the CPSQI is a self- reported questionnaire that requires the respondents to recall their quality of sleep over the past 6 weeks, and older adults might have a hard time to recall it due to aging-related cognitive impairments. Lin and Wang (2008)found that cognitive impairments might affect the results of a self-reported questionnaire, which is attributed to a marked decrease in internal consistency of a psychometric evaluation. Moreover, the mean age of our participants was about 74, ranging from 65 to 94, which was much greater than the mean age in the studies of Elman et al.(2010)( 48 ± 13.8) and Khan et al.(2013)(52 ±17.5). Unlike the VAS, a unidimensional and user-friendly tool, the CPSQI includes multidimensional assessments that might not be used as easily as the VAS. Such differences may explain why the Spearman's correlation coefficient between the C5D-IS and the CPSQI was not strongly correlated in our psychometric evaluation. Thus, future research should test the concurrent validity of the C5D-IS along with VAS or Numerical Rating Scale. Moreover, cautions need to be raised about the accuracy of scores if older participants fill in the C5D-IS on their own.

The Cronbach's alpha test of internal consistency was 0.71 for the five domains of the C5D-IS in our psychometric evaluation. This value is similar with that of the original version (Cronbach's alpha = 0.73)(Elman et al., 2010) but lower than the Arabic version of the 5D-IS (Khan et al., 2013)(Cronbach's alpha = 0.85). Internal consistency was analyzed by Cronbach's alpha as suggested to be > 0.70 for a new reliable scale (Streiner & Norman, 2003). This indicates that the C5D-IS is a reliable tool for assessing pruritus of older adults.

Spearman's rho correlations between the items of the C5D-IS ranged from 0.28 to 0.56 (all $p < 0.001$). The item-total correlation coefficients were lower than those of the Arabic version of the 5D itch scale (0.41 - 0.85)(Khan et al., 2015). Spearman's rho correlations of item 3 (direction) was lower than 0.30, other four items were higher than 0.30. Streiner and Norman (2003) declared that correlation coefficients between subscales are required to be higher than 0.30 so as to demonstrate a modest association as the evidence of good homogeneity of the subscales within a scale. This reveals that the C5D-IS can be considered to have acceptable homogeneity of the subscales.Unlike the previous study (Khan et al., 2013)that tested an Arabic version of the 5D itch scale in a sample of hemodialysis patients with significant pruritus, our study evaluated the properties of the C5D-IS using a sample of older adults with chronic pruritus. Bathe et al. (2013) described that chronic pruritus often recurs in the daily life of elderly victims; thus those victims may adapt to the pruritic symptoms and review it as an acceptable problem. Under these circumstances, our participants might have hard time to answer the question in item 3 to determine the significant changes in pruritic features over the past 2 weeks, compared to the previous month. This may explain why the Spearman's correlation coefficient of item 3 was low and not strongly correlated with other four items and why the item to total correlation coefficient was lower than the finding of Khan et al. (Khan et al., 2013). To validate the C5D-IS, future research should evaluate the properties of the scale using different populations.

## *5. Conclusion*

The overall results of this psychometric evaluation indicate the efficacy and stability of the C5D-IS and its potential for future implementation in the research and clinical realms. The C5D-IS is also a user-friendly tool that captures the essential dimensions and reserves the theoretical meanings of the original 5D itch scale. The C5D-IS is a self-reported questionnaire, and scores may be affected by the severity of cognitive impairments. Future research should include participants from different regions and populations to test reliability and validity of the C5D-IS. Criterion-related validity should also be further evaluated. It remains necessary to evaluate the association between the C5D-IS and clinical pruritic diagnosis.

## *6. References*

Aitken, R.C.B. (1969). Measurement of feelings using visual analogue scales, *Proc. roy. Soc. Med. 6*2, 989-993.

Bathe, A., Weisshaar, E., & Matterne, U. (2013). Chronic pruritus - more than a symptom: a qualitative investigation into patients' subjective illness perceptions. *Journal of Advanced Nursing, 69*(2), 316-326. doi:10.1111/j.1365-2648.2012

Berger, T. G., Shive, M., & Harper, G. M. (2013). Pruritus in the older patient:aclinical review. *Clinical Review & Education, 310*(22), 2443-2450.

Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh sleep quality index: a new instrument for psychiatric practice and research. *Psychiatry Research, 28*(2), 193-213. doi: 10.1016/ 1781(89)90047-4

Chen, H. W. (2006). The effects of far-infrared rays on acupoint for uremic pruritus in hemodialysis patients(Master thesis, National Taipei Nursing College). Retrieved fromhttps://ndltd.ncl.edu.tw/cgi-bin/gs32/gsweb.cgi/ccd=K8sMB./record?r1=1&h1=2

Chen, K. M., Chen, M. H., Lin, M. H., Fan, J. T., Lin, H. S., & Li, C. H. (2010). Effects of yoga on sleep quality and depression in elders in assisted living facilities. *Journal of Nursing Research, 18*(1), 53-61. doi: 10.1097/JNR.0b013e3181ce5189

Chen, K. S., & Yesudian, P. D. (2013). Pruritus in older people. *Reviews in Clinical Gerontology, 23*, 1-14.

Chiu, H. F. K., Lee, H. C., Chung, W. S., & Kwong, P. K. (1994). Reliability and validity of the Cantonese version of Mini-Mental State Examination - a preliminary study. *Journal of Hong Kong College of Psychiatry, 4*, 25-28.

Cohen, K. R., Frank, J., Salbu, R. L., & Israel, I. (2012). Clinical approaches to the improvement of quality of life. *Pruritus in the Elderly, 37*(4), 227-239.

Cowdell, F. (2009). Care and management of patients with pruritus. *Nursing Older People, 21*(7), 35-41.

Darsow, U., Mautner, V. F., Bromm, B., Scharein, E., & Ring, J. (1997). Der Eppendorfer Juckreizfragebogen. *Der Hautarzt, 48*(10), 730-733. doi:10.1007/s001050050651

Daudén E, S.-P. J., Prieto M, Roset M. (2011). Validation of the Spanish Version of the Itch Severity Scale: the PSEDA study. *Actas Dermosifiliogr., 102*(7), 527-536. doi: 10.1016/j.ad.2011.03.011

Davidson, S., & Giesler, G. J. (2010). The multiple pathways for itch and their interactions with pain. *Trends in Neurosciences, 33*(12), 550-558. doi:http://dx.doi.org/10.1016/j.tins.2010.09.002

Davis, L. (1992). Instrument review: getting the most from a panel of experts. *Applied Nursing Research, 5*(4), 194-197.

Elman, S., Hynan, L. S., Gabriel, V., & Mayo, M. J. (2010). The 5-D itch scale: a new measure of pruritus. *The British journal of dermatology, 162*(3), 587-593. doi:10.1111/j.1365-2133.2009.09586.x

Elsaie, L. T.,Mohsen, A. M., Ibrahim, I. M., Mohey-Eddin, M. H., & Elsaie, M. L. (2016). Effectiveness of topical peppermint oil on symptomatic treatment of chronic pruritus. *Clin Cosmet Investig Dermatol, 9*, 333-338. doi:10.2147/CCID.S116995

Farage, M. A., Miller, K. W., Berardesca, E., & Maibach, H. I. (2009). Clinical implications of aging skin cutaneous disorders in the elderly. *American Journal of Clinical Dermatology, 10*(2), 73-86.

Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). "Mini-mental state": A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research, 12*(3), 189-198. doi:http://dx.doi.org/10.1016/0022-3956(75)90026-6

Guillemin, F., Bombardier, C., & Beaton, D. (1993). Cross-cultural adaptation of health-related quality of life measures: literature review and proposed guidelines. *Journal of Clinical Epidemiology, 46*(12), 1417-1432.

Khan, T.M., Al-Haider, I., Syed Sulaiman, S.A., & Hassali, M.A. (2013). Linguistic validation of the 5D itching scale to Arabic in patients with end-stage kidney disease. *Journal of Renal Care, 39*(4), 222–227.

Kini, S. P., DeLong, L. K., Veledar, E., McKenzie-Brown, A. M., Schaufele, M., & Chen, S. C. (2011). The impact of pruritus on quality of life. *Arch Dermatol, 147*(10), 1153-1156. doi:10.1001/archdermatol.2011.178

Lai, J. W. (2016). Validation of 5-D Itch Scale in Chronic Hemodialysis Patients.

Lai, J. W., Chen, H. C., Chou, C. Y., Yen, H. R., Li, T. C., Sun, M. F., . . . Chang, C. T. (2017). Transformation of 5-D itch scale and numerical rating scale in chronic hemodialysis patients. *BMC Nephrol, 18*(1), 56. doi:10.1186/s12882-017-0475-z

Lin, J. N., & Wang, J. J. (2008). Psychometric evaluation ofthe Chinese Version ofthe Cornell Scale for depression in dementia. *Journal of Nursing Research, 16*(3), 202-210.

Lin, T. C. (2010). The effects of cold therapy with baby oil on pruritus, sleep of quality, and depression in end stage renal disease patients undergoing hemodialysis(Master thesis, Kaohsiung Medical University). Retrieved from https://ndltd.ncl.edu.tw/cgi-bin/gs32/gsweb.cgi/ccd=K8sMB./record?r1=1&h1=0.

Majeski, C. J., Johnson, J. A., Davison, S. N., & Lauzon, C. J. (2007). Itch Severity Scale: a self-report instrument for the measurement of pruritus severity. *Br J Dermatol, 156*(4), 667-673. doi:10.1111/j.1365-2133.2006.07736.x

Melzack, R., & Katz, J. (1994). Pain measuremen t in persons in pain. In:Wall PD, Melzack R, eds. Textbook of pain. Edinburgh:Edinburgh: Churchill Livingstone. 339-347.

Metz, M., Grundmann, S., & Stander, S. (2011). Pruritus: an overview of current concepts. *Vet Dermatol, 22*(2), 121-131. doi:10.1111/j.1365-3164.2010.00945.x

Mohsen, A. M. (2013). Specificity and sensitivity of 5D itch scale versus visual analogue scale as a measure of pruritus. *AAMJ, 3*(suppl. 85), 85-96.

Munro, B. H. (2005). *Statistical methods for health care research*(5th ed.), Philadelphia: Lippincott Williams & Wilkins.

Okitsu, H., Sawamura, J., Nishimura, K., Sato, Y., & Ishigooka, J. (2014). A comparison of a patient-rated visual analogue scale with the Liebowitz Social Anxiety Scale for social anxiety disorder: A cross-sectional study. *Open Journal of Psychiatry, 04*(01), 68-74. doi:10.4236/ojpsych.2014.41010

Patel, T., &Yosipovitch, G. (2010). The management of chronic pruritus in the elderly. *Skin Therapy Letter, 15*(8), 5-9.

Pruchno, R. A., & Rose, M. S. (2000). The effect of long-term care environments on health outcomes. *The Gerontologist, 40*(4), 422-428.

Rothenbuhler, H. (2015). Self-management of chronic pruritus in older people: A concept analysis. *Dermatological Nursing, 14*(2), 37-42.

Rubio, D. M., Berg-Weger, M., Tebb, S. S., Lee, E. S., & Rauch, S. (2003). Objectifying content validity: conducting a content validity study in social work research.*Social Work Research, 27*(2),94-104.

Shin, Y.Y. (2003). Effects of acupressure on pruritus, sleep quality, depression and quality of life among patients with end-stage renal disease(Master thesis, National Taipei Nursing College). Retrieved fromhttps://ndltd.ncl.edu.tw/cgi-bin/gs32/gsweb.cgi/ccd=K8sMB./record?r1=1&h1=3

Shive, M., Linos, E., Berger, T., Wehner, M., & Chren, M. (2013). Itch as a patient-reported symptom in ambulatory care visits in the US. *Journal of the American Academy of Dermatology, 69*(4), 550-556.

Stander, S., Blome, C., Anastasiadou, Z., Zeidler, C., Jung, K. A., Tsianakas, A., . . . Augustin, M. (2016). Dynamic pruritus score: evaluation of the validity and reliability of a new instrument to assess the course of pruritus. *Acta Derm Venereol*. doi:10.2340/00015555-2494

Streiner, D. L., & Norman, G. R. (2003). *Health measurement scale*(3rd ed.pp. 61–193). New York, NY: Oxford University Press.

Tsai, P. S., Wang, S. Y., Wang, M. Y., Su, C. T., Yang, T. T., Huang, C. J., & Fang, S. C. (2005). Psychometric evaluation of the Chinese version of the Pittsburgh Sleep Quality Index (CPSQI) in primary insomnia and control subjects. *Quality of Life Research, 14*(8), 1943-1952. doi: 10.1007/s11136-005-4346-x

Weissenbacher, S., Bacon, T., Targett, D., Behrendt, H., Ring, J., & Darsow, U. (2005). Atopy patch test--reproducibility and elicitation of itch in different application sites. *Acta Derm Venereol, 85*(2), 147-151. doi:10.1080/00015550410024418

Welz-Kubiak, K., Reich, A., & Szepietowski, J. C. (2016). Clinical aspects of itch in lichen planus. *Acta Derm Venereol*. doi:10.2340/00015555-2563

Wild, D., Grove, A., & Martin, M. (2005). Principles of good practice for the translation and cultural adaptation process for patient reported outcomes (PRO) measures: report of the ISPOR task force for translation and cultural adaptation. *Value Health, 8*(2), 94-104.

Wu, C. F. (2015). Exploring the Correlation Between Uremic Pruritus and Quality of Life on Hemodialysis patients.

Yosipovitch, G., Geoffrey, B., G., Gafter, U., Shapira, Y., & David, M. (2001). A Questionnaire for the Assessment of Pruritus in uremic patients. *Acta Derm Venereol*, 108-111.

Zachariae, R., Lei, U., Haedersdal, M., & Zachariae, C. (2012). Itch severity and quality of life in patients with pruritus: preliminary validity of a Danish adaptation of the itch severity scale. *Acta Derm Venereol, 92*(5), 508-514. doi:10.2340/00015555-1221

Zucker, I., Yosipovitch, G., David, M., Gafter, U., & Boner, G. (2003). Prevalence and characterization of uremic pruritus in patients undergoing hemodialysis: uremic pruritus is still a major problem for patients with end-stage renal disease. *Journal of the American Academy of Dermatology, 49*(5), 842-846.