

LS Siu 蕭麗嫦  
V Lopez 羅考思  
SK Yip 葉承楷

# Pelvic floor exercises for urinary stress incontinence: validation of the Chinese version of Symptom Severity Index, Symptom Impact Index, and Intrinsic Motivation Inventory

## Key Messages

1. The Symptom Severity Index (SSI), Symptom Impact Index (SII), and Intrinsic Motivation Inventory (IMI) although conceptually relevant, only achieved a fair to moderate test-retest reliability for assessing the severity of incontinence, impact of incontinence, and intrinsic motivation respectively.
2. The SSI, SII, and IMI require more work to increase their adequacy for use in Chinese populations.
3. More work is needed to test the utility of the recommended 17-item four-factor structure of the IMI.

## Introduction

In Hong Kong, it is estimated that about 22% of women suffer from stress urinary incontinence.<sup>1</sup> Women, in particular, are predisposed to stress incontinence. Urinary incontinence of any type affects women's quality of life and well-being in a number of ways including psychosocial, economic, and sexual. The Agency for Health Care Policy and Research<sup>2</sup> recommended that behavioural treatment including pelvic floor muscle exercise should be attempted before considering surgical management. The efficacy of treatment for stress urinary incontinence has been widely studied, cure rates of 25 to 56% can be anticipated.<sup>3</sup>

Pelvic floor muscle exercises are effective in the treatment of stress incontinence but can be hindered by the lack of motivation. While many studies have demonstrated their effectiveness, most entailed programmes are for western women, whereas their assessment in Chinese women was very limited.

A reliable and valid measure of intrinsic motivation for pelvic floor muscle exercise in women with urinary incontinence is needed to help identify those with low motivation and to monitor intervention outcomes with a view to further improve such women's exercise behaviour.

## Aims and objectives

The aim of this study was to describe the translation into Chinese and validation of the Symptom Severity Index (SSI), Symptom Impact Index (SII), and Intrinsic Motivation Inventory (IMI).

## Methods

This study was conducted from May 2002 to December 2002. A total of 214 women (150 with and 64 without urinary stress incontinence) were recruited from the Continence Clinic of a major teaching hospital in Kowloon for a face-to-face interview to test the cultural equivalence, internal consistency, criterion validity, and factor structure of the SSI, SII, and IMI. In the incontinent group, there were 75 (50%) premenopausal and 75 (50%) postmenopausal women, whereas in the continent group, there were 43 (67%) premenopausal and 21 (33%) postmenopausal women.

The instruments were double back-translated by a team of language specialists and health professionals. Cultural equivalence of the instruments was examined by four medical and six nurse experts in the field of incontinence. Internal consistency of the translated instruments was tested by Cronbach's alpha.<sup>4</sup> Test-retest reliability was assessed by administering the instruments at 2-week intervals. Criterion and construct validity were tested with Spearman's correlations.<sup>4</sup> The factor structure of the 21-item IMI was tested by factor analysis.<sup>5</sup>

*Hong Kong Med J* 2007;13(Suppl 2):S40-3

Department of Medicine and Geriatrics,  
Princess Margaret Hospital, Laichikok,  
Hong Kong  
LS Siu  
The Nethersole School of Nursing, The  
Chinese University of Hong Kong, Shatin,  
Hong Kong  
V Lopez  
Department of Obstetrics and  
Gynaecology, Prince of Wales Hospital,  
Shatin, Hong Kong  
SK Yip

HCPF project number: 215017

Principal applicant and corresponding author:  
Ms Katherine LS Siu  
Central Nursing Division, Princess Margaret  
Hospital, Laichikok, Kowloon, Hong Kong  
SAR, China  
Tel: (852) 7382 9538  
Fax: (852) 2990 3489  
E-mail: katherine\_siu@hotmail.com

**Table 1. Reliability of Symptom Severity Index (SSI), Symptom Impact Index (SII), and Intrinsic Motivation Inventory (IMI)**

Instrument	$\alpha$	2-week test-retest (ICC)
SSI	0.93	0.86
SII	0.82	0.68
IMI	0.85	0.66

\* ICC denotes intraclass correlation coefficient

**Table 2. Subscale and overall scores of the Intrinsic Motivation Inventory (n=214)**

Subscale <sup>a</sup>	Item	Mean (SD)	$\alpha$	Original
IE	7	31.5 (8.8)	0.84	0.92
EI	4	18.1 (4.6)	0.64	0.87
PC	3	13.9 (3.5)	0.67	0.83
PT	4	19.1 (4.9)	0.65	0.72
C	3	15.9 (3.2)	0.23	0.54
Total	21	98.5 (17.9)	0.85	0.89

\* IE denotes interest-enjoyment; EI effort-importance; PC perceived competence; PT perceived tension; and C choice

**Table 3. Construct validity of the Symptom Severity Index (SSI) and Symptom Impact Index (SII)**

Group	SSI Mean (SD)	SII Mean (SD)	<i>t</i>	P value
Incontinent women (n=64)	9.13 (4.6)	1.58 (2.4)	7.00	<0.0001
Continent women (n=64)	2.80 (5.6)	0.22 (0.9)	4.21	<0.0001

**Table 4. Goodness-of-fit indices of the Intrinsic Motivation Inventory**

Indices <sup>a</sup>	Original	Eliminated	Re-arranged
NFI	0.71	0.89	0.87
NNFI	0.71	0.89	0.90
CFI	0.76	0.91	0.90
IFI	0.76	0.91	0.90
$\chi^2/df$	4.1	4.1	3.7

\* NFI denotes normed fit index, NNFI non-normed fit index, CFI comparative fit index, and IFI incremental fit index

## Results

The mean age of the incontinent women was 51 (standard deviation [SD], 11) years and 48 (SD, 8) years for continent women. The mean wetting episodes per month for the incontinent and continent women was 6.1 (SD, 10.5) and 0.2 (SD, 1.4) respectively.

### Internal consistency

Table 1 shows the alpha values of the SSI, SII, and IMI. Though the total scale alpha of the IMI for all the 21 items was high at 0.85, subscale alphas ranged from a low 0.23 to high 0.84. The overall and subscale alphas of the translated IMI were not as high as those of the original study (Table 2).

As for the stability of the SII and IMI, the results showed an intraclass correlation coefficient (ICC) of 0.68 and 0.66 respectively; several items in the SII and IMI obtained only a fair ICC (0.20 to 0.40) and one item in the IMI obtained a poor ICC (0.14). The results could be explained by the subjects having raised their awareness of the social impact caused by stress urinary incontinence and pressure aspects of pelvic floor exercise that had not been noted in the Chinese culture during the initial interview. The effect on the activities such as holidays, family life, interests, and sexual activity may have changed as a result of the women's attendance in the pelvic floor muscle exercise programme. Likewise, the women may have changed their intrinsic motivation with regard to interest-enjoyment, effort-importance, and perceived competence in being involved in the exercise programme. On the other hand, the women may also have felt pressured to do the exercise and may not have any other choice in the intervention as a result of the severity and impact of the stress urinary incontinence. These factors could have resulted in the decreased test-

retest reliability coefficients of the SII and IMI.

### Criterion validity

Seven of 13 items of the SSI were moderately correlated with the frequency and volume chart (FVC). The SII correlated significantly with all the items of the Medical Outcomes Study 36-item short-form health survey (SF-36).

### Known group construct validity

Table 3 shows the independent *t*-test was used to compare 64 incontinent and 64 continent women. The SSI and SII showed good discriminatory power to measure the severity and impact of urinary stress incontinence between the incontinent and continent women.

### Factor analysis

Factor analysis was performed with the IMI 21-items, where the forced five-factor solution accounts for 60.8% of the explained variance. Four items in each of the four factors achieved a low factor loading (<0.30). Elimination of these four items and re-arranging them to other factors was carried out to test the new factor structures. Goodness-of-fit using confirmatory factor analysis (Table 4) was conducted using different indices, including: normed fit index, comparative fit index, non-normed fit index, and incremental fit index.

## Discussion

The psychometric properties of the Chinese versions of the SSI, SII, and IMI were examined. This study provided support for the validity and reliability of the translated instruments for use in future research.

The reliability coefficient for SSI and IMI is high and acceptable for use in research, whereas SII was only at an acceptable level. During interpretation of the actual

reliability, the possibility that the beliefs or behaviours of the women may have changed during the time between testing should be considered. The women may have raised their awareness of the social impact caused by stress urinary incontinence and competence and motivation to perform pelvic floor muscle exercises may have also increased through regular practice.

Criterion validity of SSI with the FVC was high. The three items (incontinence frequency, amount of wetting, number of pads used) that were not significantly correlated with the FVC might be partly explained in that these wetting episodes may have happened outdoors. In which case some women may have forgotten to record the wetting episodes on the FVC. The non-significant correlation of another item (wet during intercourse) might be related to the Chinese culture, in that women are not psychologically open enough to talk about their sexual affairs.

The SII with SF-36 was significantly correlated with majority of the domains especially on social-functioning, role-emotional, and mental health domains. It was weakly correlated with vitality and general health domains. This indicates that the SII was a disease-specific instrument for measuring the impact of stress urinary incontinence, whereas SF-36 was a generic instrument for measuring multidimensional health concepts.

The construct validity of SSI and SII were determined by known group methods and showed good discriminatory power to measure their severity and impact with respect to incontinent and continent women. Although face and content validity of the IMI scale were high, four items had low factor loading. Goodness-of-fit of the scale was conducted using different indices, including: normed fit index, comparative fit index, non-normed fit index, and incremental fit index. However, there is no consensus as to which indices are the best for assessing a good fit. Experts generally recommend a variety of indices so that weakness of one index can be offset by another. By using these indices to evaluate the factor structure fit, it appears that the re-arranged factor structure is a more appropriate scale to use. The items that have low factor loadings were removed from the original subscale and added to the subscale that best fit the factor.

Previous studies have shown that the IMI has a very stable factor structure, the modification of individual items, the use of three items per subscale, the use of the subscales with 18-items, and the exclusion of whole subscales has not shown adverse effects on its reliability.<sup>6</sup> The notable differences in the present factor structure compared to the original one may reflect cultural differences. For example, "This exercise does not hold my attention at all", "I feel like I have to participate in this exercise", and "I feel pressured to participate in this exercise" may indicate that Chinese people do not want to be forced to do things that do not interest them and also reflect the people's preference for outdoor activities.

These results may also indicate that a full test of cultural equivalence of the translated IMI requires more in-depth research as the tool did not show full equivalence to the original one. It is also recommended that the factor structures of the 17-item IMI (four items deleted from the original one) and the re-arranged factor structure (assigning one item to another factor) be tested. It may be that a three- or four-factor IMI will enable a more accurate assessment of women's motivation for pelvic floor muscle exercises.

### **Limitations**

Valid, reliable, and acceptable instruments are needed to evaluate nursing practice and patient outcomes. The only attribute that has not been examined in this study was the responsiveness of the indices and the inventory that requires a longitudinal outcome data. The test-retest reliability measurements was also conducted 2 weeks after the women attended the pelvic floor muscle exercise programme, which could have affected the results of the test-retest reliability. In addition, the external validity of the study was limited by the use of convenience sampling.

### **Implications for practice**

Incontinence is a health problem and affects both men and women. The psychological effects of incontinence can be devastating that leads to reduction in daily activities including travel. Nurses in the practice setting could promote continence through early assessment, toileting programmes, bladder-retraining programmes, and pelvic floor muscle exercise programmes. However, motivation is a crucial prerequisite for the ultimate success of a pelvic floor muscle exercise regimen. Women having more frequent urinary incontinence were more likely to adhere to pelvic floor muscle exercise than those with less severe incontinence.

A valid and reliable measure of outcome and intrinsic motivation for pelvic floor exercises relevant for urinary incontinent people has important clinical implications. They can be used to help identify people with low motivation related to pelvic floor exercises and to monitor intervention outcomes as well as to improve exercise behaviour of these people. Translation and validation of the Chinese versions of the SSI, SII, and IMI will provide objective measures for determining the changes in women's continence state and motivation of Chinese incontinent women to adhere to the pelvic floor muscle exercise. These are essential in accounting for possible differences in treatment adherence.

### **Implications for future research**

The IMI can also be used to assess intrinsic motivation in other patient groups such as the post-myocardial infarction patients who are required to attend the cardiac rehabilitation programme, and for patients undergoing stroke rehabilitation and pulmonary rehabilitation programmes or other health promotion activities. The SII and SSI could be used to assess

the severity of stress incontinence and its impact on women's lives on presentation to the clinic. It may also be necessary to ask the women to undertake regular self-evaluation of their intrinsic motivation for continued participation or adherence in the pelvic floor muscle exercises in the clinic or at home.

It is recommended to design a clinical trial comparing behavioural and pharmacological interventions with regard to SSI, SII, and IMI as specific outcomes not only in women but also on incontinent men. It is also recommended to conduct research to convince providers and policymakers that continence care provided by nurses is cost-effective. As there is a dearth of research on intrinsic motivation in the exercise domain, IMI appears to present a promising advance for measuring this important construct.

As an interim measure of motivation, the 21-item IMI can be used as it has high reliability and an acceptable level of validity.

## Acknowledgements

This project was supported by the Health Care and Promotion Fund (#215017). The authors wish to thank the women who participated in this study.

## References

1. Brieger GM, Yip SK, Hin LY, Chung TK. The prevalence of urinary dysfunction in Hong Kong Chinese women. *Obstet Gynecol* 1996;88:1041-4.
2. Agency for Health Care Policy and Research. Urinary incontinence in adults: acute and chronic management. Rockville, MD: US Department of Health and Social Services. AHCPR Publication No. 96-0682; 1996.
3. Mouritsen L, Frimodt-Moller C, Moller M. Long-term effect of pelvic floor exercises on female urinary incontinence. *Br J Urol* 1991;68:32-7.
4. Nunnally JC. *Psychometric theory*. New York: McGraw-Hill; 1994.
5. Kelloway EK. *Using LISREL for structural equation modeling*. Thousand Oaks, CA: Sage Publication; 1998.
6. Chervak MC, Knapik JJ, Hauret KG, Arnold S, Hoedebecke EL, Lee RB. Application of the Intrinsic Motivation Inventory in U.S. army basic training. *Med Sci Sports Exerc* 2003;35(Suppl 1):149S.