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## **Abstract**

**Background and Purpose:** Translating, adapting and piloting Champion's Health Belief Model Scale for Mammography Screening (CHBMS-MS) and Revised Illness Perception Questionnaire (IPQ-R) among Maltese women. **Methods:** The Maltese questionnaire (MBSQ) was developed through nine steps. Bilingual women ( $n=15$ ) completed MBSQ at two time points. **Results:** During forward-back translations (steps 1-4), four English controversial terms were raised. Twelve experts agreed on terminologies during adaptation process (step 5). Following face validity ( $n=6$ ) (step 6), 3 items were deleted. Following reconciliation (step 7) and proof reading (step 8), MBSQ consisted of 121 items. Pilot testing (step 9) showed: positive correlation (CHBMS-MS:0.87, IPQ-R:0.85,  $p<0.001$ ); high Cronbach's alpha (CHBMS-MS:0.93, IPQ-R:0.92); overall acceptable internal consistency (CHBMS-MS:0.69-0.83, IPQ-R:0.75-0.93); acceptable test-retest reliability correlations: CHBMS-MS (Maltese:0.62-0.76, English:0.61-0.84); IPQ-R (Maltese:0.63-0.82, English:0.61-0.91,  $p<0.001$ ). **Conclusions:** Maltese and English scale items demonstrated high reliability and validity preliminary values.

**Keywords:** Breast Cancer Screening; Champion's Health Belief Model Scale; the Revised Illness Perception Questionnaire; reliability; validity

## INTRODUCTION

Breast cancer is the primary site of cancer in Maltese women (Malta National Cancer Registry, 2016). Over the last decade, an average of 280 women were diagnosed yearly with breast cancer in Malta (ibid). Breast screening by mammography has shown to decrease breast cancer mortality rates in women aged 50-69 by 25–30% (Greif, 2010). By the end of Malta's first breast screening round, the rates of participation were below EU benchmarks (i.e. acceptable participation (>70%) or higher desirable level (>75%) specified in European Guidelines) (Eurostat, 2014), such that less than 60% of women aged 50-60 had accepted their invitation (Marmarà, Curtis & Marmarà, 2015).

Breast screening uptake is influenced by a multitude of factors (Mamdouh et al., 2014). In particular, studies have demonstrated that beliefs about breast cancer and screening (Huaman, Kamimura-Nishimura, Kanamori, Siu & Lescano, 2011) as well as illness perceptions (Anagnostopoulos et al., 2012) are important predictors of mammography compliance (ibid). However, little is known why Maltese women are less likely to have a screening mammogram than their European counterparts. This is because a gap exists in our understanding of factors impacting Maltese women's decisions to undergo breast screening (BS), partly due to the lack of instruments locally validated for this aim. The instruments chosen for translation and adaptation were selected from the extent literature, which shows that health beliefs and illness perceptions are key determinants of BS behaviour (Anagnostopoulos et al., 2012; Champion et al., 2008; Moss-Morris et al., 2002).

The aims of our study were threefold: (i) to translate and adapt existing scales i.e. Champion's Health Belief Model Scale for Mammography Screening (CHBMS-MS) and the Illness Perception Questionnaire (IPQ-R) from English to Maltese (CHBMS-MS-M + IPQ-R-M =

MBSQ) so that these could subsequently be used to examine why women in Malta attend/do not attend breast screening when invited; (ii) to determine whether Maltese women interpret consistently the meaning of questions in Maltese and English; (iii) to pilot test the reliability and validity of the Maltese and English versions of CHBMS-MS and IPQ-R. Since the English language is an official language but not our national and sole mother-tongue language, we aimed to pre-test not only the Maltese version but also the English version, since some Maltese women may opt to respond in the language they prefer.

## **BACKGROUND AND CONCEPTUAL FRAMEWORK**

### **History and development of the Champion's Health Belief Model Scale (CHBMS)**

The Health Belief Model (HBM), developed in the early 1950s, is a behaviour prediction model, comprising six fundamental constructs: perceived susceptibility, perceived seriousness, perceived benefits, perceived barriers, cues to action, and self-efficacy (Jahanlou, Lotfizade & Karami, 2013). Champion developed and validated a scale in 1984 (Champion's Health Belief Model Scale - CHBMS), consisting of 36 items to measure perceived susceptibility to breast cancer, as well as perceived benefits and barriers to BS (Champion, 1984). In 1999, Champion revised CHBMS for Mammography Screening (CHBMS-MS), excluding the breast self-examination used in the original studies, showing significant correlation between mammography compliance and high scores in the susceptibility and benefit subscales, whereas perceived barriers were associated with lower screening compliance (Huaman, Kamimura-Nishimura, Kanamori, Siu & Lescano, 2011).

The scale was originally validated in Indiana, US by Champion (Champion, 1999) in a cohort of 804 women aged 50 and over in a population of Caucasians (68%) and African-Americans (30%), accounting for 54% of the variance and showing adequate construct validity

and reliability. Since then, Champion's HBM scale has been tested for reliability and validity around the globe and translated for Iranian (Hashemian, Shokravi, Lamyian, Hassanpour & Akaberi, 2013; Taymoori & Berry, 2009), Lithuanian (Zelviene & Bogusevicius, 2007), Malaysian (Parsa, Kandiah, Mohd Nasir, Hejar & Nor Afiah, 2008), Arabic (Mikhail & Petro-Nustas, 2001), Korean (Lee, Kim & Song, 2002), Chinese-Australian (Kwok, Fethney & White, 2010), Turkish (Norman & Brain, 2005; Lunt, Bowen & Lee, 2005), African-American (Champion et al., 2008), and Spanish-speaking American women (Medina-Shepherd & Kleier, 2010). Findings of these studies have provided support for the validity and reliability of these HBM-based scales, though poor construct validity was shown in a Peruvian-translated version (Champion et al., 2008) and in a Spanish version (Esteva et al., 2007).

Since HBM is widely cited (Noar and Zimmerman, 2005), we used Champion's revised HBM scale for Mammography Screening (CHBMS-MS) (Champion, 1999) to translate, adapt and test among Maltese women. HBM, however, only explains some of the variation in BS behaviour such that it does not consider the impact of emotions (such as fear) (Norman & Brain, 2005), nor does it accommodate social and environmental influences of past behavior (Lunt, Bowen & Lee, 2005) which is why other models have been incorporated in studies to understand breast screening uptake (Cameron, 2008). In response to HBM's limitations, an instrument associated with the Common-Sense Model of health and illness behavior (ibid) was also translated, adapted and tested.

### **History and development of the Revised Illness Perception Questionnaire (IPQ-R)**

In the late 1960s and early 1970s, Leventhal explored how fear messages in relatively acute situations might lead individuals to respond to the health threat communication by taking health-promoting actions (Broadbent et al., 2015), such as wearing seat belts or giving up smoking

(Leventhal, Hudson & Robitaille, 1997). Subsequent research by Leventhal and colleagues in 1980s led to the development of the Common-Sense Model (CSM) of self-regulation, which proposes that individuals develop two parallel, yet interrelated, representations of the stimulus (cognitive and emotional) in response to a perceived threat (ibid). Hence, CSM provides a framework for understanding how individual symptoms and emotions experienced during the health threat or diagnosis influence illness perceptions and guide subsequent coping behavior (Diefenbach & Leventhal, 1996). This model was later used to understand illness prevention and preventive behaviour intentions (Figueiras & Alves, 2007).

The Illness Perception Questionnaire (IPQ) (Weinman, Petrie, Moss-Morris & Horne, 1996) was developed in light of self-regulation theory to provide a quantitative assessment of the five components of illness representations - *identity, cause, timeline, consequences, and control/cure* in Leventhal's self-regulation model (Moss-Morris et al., 2002). These five dimensions have been studied in breast (Anagnostopoulos et al., 2012) and colorectal screening (Orbell et al., 2008).

Subsequent measures include the Brief Illness Perception Questionnaire (**B-IPQ**) (Broadbent et al., 2015), the Revised Illness Perception Questionnaire (**IPQ-R**) (Moss-Morris et al., 2002) which examines illness beliefs and behaviours within specific groups of patients, or groups at risk from an illness, and an adapted version of the Revised Illness Perception Questionnaire (IPQ-R) for "healthy" individuals (**IPQ-RH**) in recognition of the unique characteristics of asymptomatic populations (Figueiras & Alves, 2007). In order to remedy shortcomings in the original IPQ scale, the IPQ-R was developed by Moss-Morris et al. (2002) as a more comprehensive, psychometrically acceptable, quantitative measure to include measures of perceptions of illness duration ('acute/chronic timeline'), fluctuation in illness over time ('cyclical

timeline'), perceptions of 'treatment control' and 'personal control' over illness, 'illness coherence' (how clear and comprehensive an individual feels her illness to be) and 'emotional representations' (feelings of depression, upset, anger, worry, and anxiety). Subsequently, the IPQ-R has been validated for use in diverse diseases or healthy populations (Chen, Tsai & Lee, 2008), with language-specific validated IPQ measures, such as Italian (Giardini, Majani, Pierobon, Gremigni & Catapano, 2007), Swedish (Brink, Alsén & Cliffordson, 2011), Greek (Giannousi, Manaras, Georgoulas & Samonis, 2010), Croatian and Lebanese (Petрак, Sherman & Fitness, 2015) and Portuguese (Figueiras & Alves, 2007) versions. However, it has not yet been adapted and validated for Maltese asymptomatic and/or symptomatic women. Hence, we adapted the IPQ-R in this study to make it appropriate for both healthy women and those with cancer.

## **METHODS**

### **Data Sources and Study Design**

The study was conducted during June 2015, as part of a larger cross-sectional study about breast screening in Malta. The parent study was approved by the School Research Ethics Committee at the School of Health Sciences, University of Stirling (SREC14/15-Paper No.18v4) and by the Maltese Health Ethics Committee (HEC 02/2015). Permission to use the scales (CHBMS-MS and IPQ-R) was sought from the respective authors (Prof. Victoria Champion in 2013 for CHBMS-MS use and Prof. Rona Moss-Morris in 2014 for IPQ-R use). Permissions were also received from the Chief Medical Officer, the Chief Executive Officer (Primary Health Care Department) and the Health data protection officers in primary and secondary care in Malta.

### **Sample and procedures**

Four translators were recruited for the translation pathway as follows: two translators (i.e. an EU translator working in Brussels who was also a bilingual native speaker of both Maltese and English languages, and a Maltese expert translator) translated the instrument from English to Maltese (steps 2-3) and two different bilingual translators (i.e. a bilingual expert from the Health Ministry and an expert interpreter at the University of Malta) back-translated the instrument from Maltese to English (step 4). An expert panel ( $n=12$ ) was set up to ascertain content validity and to verify that it is clinically meaningful to experts in the clinical area (Anagnostopoulos, Dimitrakaki, Niakas & Tountas, 2012). The twelve members comprised the lead researcher for this study, the four expert translators/interpreters, a statistician with ten years experience in statistical research and analysis, two mammographers (Maltese and Scottish radiographers), a breast screening client, a breast cancer survivor, a Consultant, and a Clinician.

A focus group was conducted with a convenience sample of asymptomatic women ( $n=6$ ) to pilot test the adapted Maltese version of the instrument. Three of the women were housewives (53, 55, 58 years respectively) who had attended BS, two were public employees (59, 60 years respectively) who had not attended BS and the other was a retired 62-year old midwife who had also not attended BS when invited.

A convenience sample of fifteen women ( $n=15$ ) participated in structured face-to-face interviews in order to assess comprehensibility and suitability of the research instrument and to ensure understanding of all scale items in both languages. Women were recruited from the breast screening centre and were breast screening attendees, aged 50-60 years. The convenience sample was recruited because it was felt that such women would be interested in engaging with such a

topic (Creswell & Plano Clark, 2011), thereby giving access to a range of women with different backgrounds (Kalsta, Holloway & Cox, 2013). Women with prior history of breast cancer or breast surgery, those who sought breast cancer treatment as well as non-bilingual women were excluded.

Participants were assured that they had no obligation to participate, that their participation was voluntary and that they could withdraw from the study at any time without the need to give any reason. The cover letter provided information to the women on how the researcher would protect their anonymity and confidentiality through coding. Following explanation on the nature of the research, informed consent was obtained from the participants.

### **Translation and adaptation**

**Figure 1** illustrates the pathway in which the translation and adaptation of the above scales was undertaken, based on published methods (Yilmaz & Sayin, 2014; Champion, 1999, 1984).

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### **Figure 1 Translation, adaptation, face and content validity (MBSQ pathway)**

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#### **Steps 1-2: Identification of scales and forward translation**

Following the identification of validated scales by the researcher, initial translation of the questionnaire from English (original) to Maltese (target) languages was performed by two expert translators. This bilingual team first prepared their own translated versions; they then gave their versions to each other to verify each other's work and finally came up with collaborative decisions about the translation.

#### **Step 3: Reconciliation session**

The two experts met up with the researcher in a 'reconciliation session' in Malta and reviewed the translation together for inconsistencies with the original English scale and to ensure that the

language was kept simple to be understood by Maltese women.

#### **Step 4: Back translation into English**

The adequacy of the Maltese translated instrument was evaluated using the back-translation technique. The Maltese version was back-translated into English (original language) by another team of experts (i.e. not the original translators in Steps 2-3).

#### **Step 5: Adaptation process**

Both language versions were examined for conceptual equivalence by the expert panel ( $n=12$ ) which included the lead researcher and statistician for this study, the four translators (steps 2-4), screening/medical professionals, and lay women. The back-translation and the original English instrument version were compared with attention given to grammar and the meaning conveyed by the words. In this 'adaptation' process, the cultural and social characteristics of the translation are protected as much as possible (Kulis, Arnott, Greimel, Bottomley & Koller, 2011).

#### **Step 6: Face validity testing**

A focus group was conducted with a convenience sample of asymptomatic women ( $n=6$ ) to pilot test the adapted Maltese instrument version. This cognitive debriefing procedure (Wild et al., 2005) was followed to ascertain face validity of the instrument, to ensure clarity and comprehensibility of the items, to highlight inappropriate items or response options, and to identify and test translation alternatives and modifications. This ensures that conceptual equivalence and cultural appropriateness are achieved (Anagnostopoulos, Dimitrakaki, Niakas & Tountas, 2012). This group of screened/non-screened women tested the instrument's face validity and determined its cultural appropriateness and the accuracy of the translation, similar to the undertaken Turkish process (Yilmaz & Sayin, 2014). The researcher read the translated text aloud to the participants, following which each item was scored on a five-point scale.

### **Step 7: Reconciliation session**

The scales were modified in a 'reconciliation session' so that they could be administered by an interviewer, where two translators met up with the researcher in Malta to review the final version.

### **Step 8: Proof reading**

Following proof reading, the final Maltese version was produced and entitled the 'Maltese Breast Screening Questionnaire' (MBSQ). The following procedures were used to test the MBSQ:

### **Test-retest reliability**

The final version (MBSQ) from step 8 was then tested for reliability (step 9). An estimation of *stability* is commonly assessed by a *test-retest reliability analysis*, where the questionnaire is given to the same person or set of respondents, in the same way, on two different occasions, usually with an interval of two to six weeks (Yilmaz & Sayin, 2014). In this study, a convenience sample of 15 bilingual women, aged 50-60 years, were recruited by the researcher from the breast screening centre to assess test-retest reliability of the Maltese and English subscales respectively. Participants responded to the questionnaire through face-to-face interviews on two occasions separated by a two-week interval, a test-retest period considered appropriate (Streiner, Norman & Cairney, 2008). These women were contacted by a research assistant and two convenient times were arranged with each participant. The interviews were conducted in the participants' homes. Participants were informed that they were free to choose only one language. However, all participants were willing to complete the survey in both languages and opted to complete the survey first in Maltese followed by the English language at both time points (Day 1, Day 14) to test and re-test for stability and reliability of responses in the same language. The scores were then correlated.

### **Instrument scoring**

Items were answered on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), similarly used in other studies (Yilmaz & Sayin, 2014; Anagnostopoulos, Dimitrakaki, Niakas & Tountas, 2012; Huaman, Kamimura-Nishimura, Kanamori, Siu & Lescano, 2011). Possible scores ranges include: 3-15 for susceptibility, personal control, treatment control and emotional representations respectively; 6-30 for benefits; 13-65 for barriers; 7-35 for cues to action and self-efficacy; 8-40 for breast cancer identity and consequences; 18-90 for the causal scale, 2-10 for acute/chronic timeline and illness coherence, and 1-5 for cyclical timeline. Higher scores indicated stronger agreement.

### **Approaches to Reliability and Validity Assessments**

Reliability was evaluated by *Cronbach's alpha* ( $\alpha$ ) for internal consistency (reliability) and *test-retest correlation*. In terms of reliability, lower values indicate no internal consistency of the tool ( $0.00 \leq \alpha < 0.40$  not reliable,  $0.40 \leq \alpha < 0.60$  low reliability,  $0.60 \leq \alpha < 0.80$  high reliability,  $0.80 \leq \alpha < 1$  very high reliability) (Yilmaz & Sayin, 2014; Buyukozturk, 2012; Tekindal, 2009). If Cronbach's alpha score is low, then the corrected item-total correlations for values of  $<0.30$  are considered (minimum acceptable item-total correlation is 0.30) (Yilmaz & Sayin, 2014). Such low values might be considered satisfactory if item deletion does not improve the overall alpha value (Buyukozturk, 2012). Test-retest scores for each dimension were computed for the Maltese and English measures respectively using *Pearson's correlations* at both time points (T1, T2) for an estimation of reliability over time. Test-retest reliability refers to the correlation coefficient which should be at least 0.6 (Buyukozturk, 2012; Balci, 2011; Huaman, Kamimura-Nishimura, Kanamori, Siu & Lescano, 2011; Tekindal, 2009). Construct validity, a measure that confirms the

extent to which inferences can be made from scale scores in relation to the latent, theoretical construct of interest (Pruitt et al., 2010), was supported through Pearson's correlations to test the associations between subscales for each measure. Quantitative data analysis was performed using the Statistical Package for Social Sciences (SPSS software) Version 21.

## RESULTS

### Translation and adaptation

Four queries of subcultural word comprehension were raised by the bilingual translators, which required consensus. The term 'breast lumps' in the original instrument was translated to 'boċċ f'sidrek'. The second controversial term was 'mammogram', for which two panel members argued that some women in the target population may not be aware of early diagnostic breast tests. Although 'mammografija' in the translated instrument was acceptable, the general known term was 'mammogram'. Following this debate, the panel decided that both words were suitable and could be used interchangeably (i.e. mammogram, mammografija). A third controversial term was 'thickening of the breast'. Following discussion, the panel decided on the phrase 'ħxuna tat-tessuti tas-sider'. Another word discussed by all group members was 'nipple'. Several controversies arose on whether to use the word 'nipple' as is, 'nippla' or the pure technical phrase 'ras il-bizla'. Most members argued that some women in the target population are not aware of the technical phrase but are familiar with the English term. This was then literally translated to 'nipil'.

Since most women perceive breast cancer as a serious threat (Lagerlund, Sparen, Thurffjell, Ekbom & Lambe, 2000), it was decided that the construct 'perceived severity' would not be measured using HBM (Anagnostopoulos et al., 2012). Further removal of the item in the HBM-related scale would also avoid duplication since the seriousness of breast cancer was addressed in

the IPQ-R scale. Moreover, since the use of both HBM and CSM often fails to address contextual constraints such as low income and education level that may influence women's screening behaviour, socio-demographic and socio-economic factors, as well as lifetime mammography use were added because of the acknowledgement of their contributions as breast screening determinants (Anagnostopoulos et al., 2012; Jepson et al., 2000; Lagerlund, Sparen, Thurffjell, Ekblom & Lambe, 2000). The panel further added cues to action (such as physician recommendations and family history) which are often omitted from empirical studies through HBM use (Anagnostopoulos et al., 2012). Finally, based on these conclusions, the original version of the instrument consisted of 124 items and was presented to the focus group ( $n=6$ ) for testing.

### **Face Validity**

From the original 50-item IPQ-R, two-items were removed from the cancer timeline domain ('Breast cancer will last for a long time'; 'I expect to have breast cancer for the rest of my life') as they were found to confuse the women and cause consistent heightened anxiety in responders, resulting in a 48-item Maltese (M) version (entitled IPQ-R-M). Participants were asked to report their personal views about breast cancer rather than their perceptions of an illness personally affecting them. For example: 'My illness has serious economic and financial consequences' was replaced with 'Breast cancer has serious economic and financial consequences'; 'My illness will last for a long time' was replaced with 'Breast cancer will last for a long time' following which reverse scoring was eliminated for this item to read 'Breast cancer will last for a short time' due to the misunderstanding, confusion and anxiety experienced by all women. The IPQ-R risk factors domain title were also amended to read 'risk/lifestyle factors', while the sections 'personal' and 'treatment' control were categorized under the heading 'Curability/Controllability'. For the

lifetime mammography use domain, 1 item was deleted to avoid overlap ('a mammogram prior to breast screening' yes/no). Hence, the final Maltese instrument (MBSQ), comprising the Maltese (M) scales CHBMS-MS-M and IPQ-R-M, consisted of 121 items that were clustered into 11 subscales for socio-demographic and health status (20 items), 4 subscales for lifetime mammography use (17 items), 5 subscales for health beliefs (36 items), and 7 subscales for illness perceptions (48 items).

The above method found the instrument to be acceptable and ready for use in psychometric testing among the target population. Of the convenience sample of fifteen women ( $n=15$ ), the mean age was 54.5 years  $\pm$  3.2 years (SD); 6 women were from below average income families (lower than €16,113), 11 women were housewives and 12 women had up to a secondary education level.

### **Instrument Scoring**

For the scope of preliminary mean instrument scoring, the mean values at Time point 1 in Maltese were analysed (refer to mean Maltese T1 in Table 2). Subscale scores were retrieved as the mean of items (following reverse scoring (r) for only one item 'There is no possibility of getting breast cancer' in the perceived susceptibility subscale). Higher scores for health belief subscales, for instance, indicate more susceptibility, benefits, barriers, cues to action and self-efficacy (Champion, 1999). Maltese women scored highest for perceived benefits and lowest for perceived barriers, and highest for cyclical timeline and lowest for acute/chronic timeline.

### **Internal consistency and correlation analysis: psychometric estimates of reliability**

Table 1 presents measures of central tendency (mean), variability (standard deviation) and alpha

coefficients for the scales. In terms of reliability, Cronbach's alpha value was 0.93 for CHBMS-MS and 0.92 for IPQ-R (Table 1). Such a result in excess of 0.80 shows high internal consistency (reliability) (Huaman, Kamimura-Nishimura, Kanamori, Siu & Lescano, 2011). Cronbach's alpha estimations of each subscale were as follows: health beliefs - susceptibility ( $\alpha=0.91$ ), benefits ( $\alpha=0.75$ ), barriers ( $\alpha = 0.88$ ), cues to action ( $\alpha=0.86$ ), self-efficacy ( $\alpha=0.90$ ), while for illness perceptions - breast cancer identity ( $\alpha=0.92$ ), causes of breast cancer ( $\alpha=0.90$ ), timeline acute/chronic ( $\alpha=0.88$ ), timeline cyclical ( $\alpha=0.86$ ), consequences ( $\alpha=0.93$ ), personal control ( $\alpha=0.90$ ), treatment control ( $\alpha=0.90$ ), illness coherence ( $\alpha=0.86$ ), emotional representations ( $\alpha=0.96$ ). These values showed that the scale items measured similar features with high reliability since each dimension was expected to have an alpha of at least 0.7 (ibid). Hence, preliminary high Cronbach's alpha values indicated that the Maltese instrument had internal consistency.

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**Table 1. Internal consistency of the subscales for the CHBMS-MS and IPQ-R scales**

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### **Reliability over time**

The CHBMS-MS and IPQ-R subscales demonstrated acceptable stability over a 2-week period for all measures. Responses were compared between time 1 (T1) and time 2 (T2) after two weeks for both Maltese and English versions respectively. Test-retest scores for all dimensions showed Pearson correlation coefficients higher than 0.6 for both languages. For test-retest reliability (Maltese) (Table 2), Pearson's correlation coefficients for CHBMS-MS-M and IPQ-R-M were 0.79 and 0.75 respectively. For test-retest reliability (English), Pearson's correlation coefficients for CHBMS-MS and IPQ-R were 0.83 and 0.74 respectively (Table 3). Hence, all of the subscale items met the criteria of reliability and were retained.

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**Table 2. Test-retest correlations of the theoretical variables (Maltese)**

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**Table 3. Test-retest correlations of the theoretical variables (English)**

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**Construct Validity**

When applying Correlation analysis between the English and the Maltese versions (Table 1), the Pearson correlation values for CHBMS-MS and IPQ-R were 0.87 and 0.89 respectively. All correlation values exceeded 0.6, and showed a significant correlation between the items of both versions ( $p < 0.001$ ). The Pearson correlation values were tested at the 0.05 level of significance.

When applying a Pearson Correlation between the two time points, the Pearson Correlation value was 0.778, showing a strong positive correlation between the two time points. Such an association was found to be significantly different ( $p < 0.001$ ).

**DISCUSSION**

The current study focused on translating, adapting and pilot testing the validity and reliability of two existing scales for use among Maltese women. We found that it was feasible to translate and adapt these scales, and that the translated instrument shows promise of acceptable validity and reliability. The high correlation values obtained are suggestive of strong validity of scale items. Moreover, completeness was high (100% of participants answered all the questions), thereby indicating that the instrument was easy and simple to administer.

Results of the translation and adaptation pathway and focus group analysis provided useful information on the understanding of items. Evidence suggests that although measures may be valid

and reliable across diverse cultures, researchers are encouraged to modify and reword subscale items, taking into account cultural settings and any linguistic origins of their populations under exploration (Abubakari et al., 2012). This led to some items being omitted from the original scales because they either duplicated other items or failed to convey a clear expression of the intended objectives.

Overall positive and high correlation of the total inter-item correlation (Pearson) was obtained in our study for health beliefs (0.87) and illness perceptions (0.85), and high Cronbach's alpha (CHBMS-MS: 0.93, IPQ-R: 0.92) denoting overall acceptable internal consistency. In our study, internal consistency ranged from 0.69 to 0.83 for health beliefs. Similarly, internal consistency reliability ranged from 0.69 to 0.83 in Gozum and Aydin's study (Gozum & Aydin, 2004), from 0.64 to 0.79 in Hashemian and colleagues' study (Hashemian, Shokravi, Lamyian, Hassanpour & Akaberi, 2013), and was above 0.73 for all scales in Champion's study (Champion et al., 2008) among African-American women. A high consistency was observed in our study between the three perceived susceptibility scale items. Champion similarly reported high internal consistency of items for this subscale and observed a proper fit (0.82) using confirmatory factor analysis (Champion, 1999). However, we could not confirm our subscales through confirmatory factor analysis as our reported findings were limited to our small sample in comparison, though our aim was not to elicit the most important factors that explain health beliefs and illness perceptions. Therefore, our findings can only be considered as preliminary values for the instrument's internal consistency.

In our study, test-retest reliability correlations were from 0.62 to 0.76 for CHBMS-MS-M (Maltese) and ranged from 0.61 to 0.84 for CHBMS-MS (English). In Hashemian and colleagues' study (Hashemian, Shokravi, Lamyian, Hassanpour & Akaberi, 2013), test-retest reliability

correlation ranged from 0.67 to 0.92 for health belief subscales, and ranged from 0.67 to 0.92 for the Persian scale version among Iranian women (ibid). Our test-retest data for the health beliefs dimensions shows that perceived susceptibility and perceived benefits appear to remain the most consistent over the two-week time period. This may suggest that women will take action to screen for, or control illness if they believe they are susceptible to it, especially if the illness is viewed to potentially have serious personal consequences, and if they believe that the benefits of screening outweigh the barriers for doing so.

In Medina-Shepherd and Kleier's study (Medina-Shepherd & Kleier, 2010), test-retest correlations for control group women ( $n=20$ ) were perceived susceptibility (Spearman's rho:  $r=0.57$ ), perceived benefits ( $r=0.63$ ) and perceived barriers ( $r=0.83$ ). In Champion's original validation study in an American city (Champion, 1999), test-retest scores were 0.62 (susceptibility), 0.61 (benefits) and 0.71 (barriers). Our findings were similarly significant for test-retest correlation (0.76, 0.62, 0.67 respectively for Maltese version; 0.75, 0.71, 0.70 respectively for English version), while all five CHBMS-MS subscales in our study show similar psychometric properties to more recent findings (Yilmaz & Sayin, 2014; Medina-Shepherd & Kleier, 2010). A test-retest score  $<0.80$  indicates that women did not reply in the same way at the second time point (Yilmaz & Sayin, 2014), which could mean that women did not read the scale items in the same way at both time points. However, according to the test-retest results, women answered the scale items similarly in both sessions, indicating that the scale has strong stability over time. Our test-retest results were generally higher than those reported in the Medina-Shepherd and Kleier's study (Medina-Shepherd & Kleier, 2010) and Champion's study (Champion, 1999). This difference may be attributed to the small sample in our study.

Our preliminary findings for Cronbach's alpha coefficients were 0.91 (susceptibility), 0.88 (barriers), 0.75 (benefits), 0.86 (cues to action) and 0.90 (self-efficacy). Similarly, Cronbach's alpha coefficient for Champion's subscales were also reported between 0.77 to 0.90 among Chinese American women (Wu & Yu, 2003), and were found to be equal to 0.88 (barriers) and 0.93 (benefits) in a Malaysian study (Parsa, Kandiah, Mohd Nasir, Hejar & Nor Afiah, 2008), 0.89 and 0.73 respectively among African-American women (Champion et al., 2008) but lower (0.63 for benefits) in Medina-Shepherd and Kleier's study (Medina-Shepherd & Kleier, 2010). Among Iranian women with family history of breast cancer, Cronbach's alpha coefficients were 0.72 (susceptibility), 0.75 (seriousness), 0.82 (benefits) and 0.76 (barriers), though a limitation in the Iranian study is that all participants had a family history of breast cancer which can be considered to guide further prevention and increase women's susceptibility for this disease (Hashemian, Shokravi, Lamyian, Hassanpour & Akaberi, 2013). A controversial HBM subscale is perceived barriers (ibid) because of the diverse individual and environmental barriers present in different communities (Park et al., 2011). However, none of the items of this subscale in the original version of the questionnaire were omitted because women considered all items to be equally important.

The original IPQ-R demonstrates higher internal consistency (Cronbach's alpha range from 0.75 to 0.89) than the original IPQ and good test-retest reliability ranging from 0.46 to 0.88 over three weeks (Moss-Morris et al., 2002). In our study, the IPQ-R scale similarly demonstrated a relatively high degree of internal consistency (Cronbach's alpha = 0.75–0.93), with overall Cronbach's alpha >0.70 ( $\alpha = 0.86$  {Maltese} and 0.85 {English}). Our test–retest data of the IPQ-R dimensions is homogeneous with the original IPQ and IPQ-R versions (Moss-Morris et al., 2002; Weinman, Petrie, Moss-Morris & Horne, 1996) and show that the IPQ-R has acceptable levels of stability over two weeks. Test-retest reliability (Pearson's) correlations were computed between

the IPQ-R completed at the two time points with correlations above 0.6 i.e. 0.63-0.82 (Maltese) and 0.61-0.91 (English). Breast cancer identity, causes and emotional representations appear to remain the most consistent over this time period for the Maltese language. This suggests that patients possibly attribute a relatively high or low number of symptoms to their illness and experience a wide range of emotional issues. As for the English version, treatment control and emotional representations remain most consistent. These findings provide evidence towards the validity and reliability of the IPQ-R as a suitable measure of illness perceptions in the context of breast screening. IPQ-R dimensions prove to be useful measures on how the illness 'makes sense' holistically to symptomatic or asymptomatic women and may play an important role in longer term adjustment and symptom response. The IPQ-R also allows researchers to investigate how emotional representations affect coping behaviours and illness outcomes (Moss-Morris et al., 2002). Moreover, cognitive beliefs that the illness has severe consequences, is cyclical in nature and out of one's personal control, seem to strongly affect women's emotional responses.

### **Implications**

The Maltese and English versions of the CHBMS-MS and IPQ-R can be used by nurses and other health care professionals as measures to assess Maltese women's health beliefs and illness perceptions concerning breast cancer and screening. Nurses have frequent patient contact in a variety of health care settings and are known to be valuable change agents and patient advocates (Arabi, Rafii, Cheraghi & Ghiyasvandian, 2014). An important breast health promotion opportunity for public health nurses is raising public awareness on breast cancer by educating women about the importance of practicing screening. Likewise, nurses and health care professionals can structure patient education and counselling sessions guided by the conceptual

theoretical framework proposed in this study to ensure comprehensiveness of approach and content. For instance, information on breast cancer risks, susceptibility to breast cancer, signs and symptoms of breast cancer and its consequences, as operationalised by different HBM and CSM constructs, can increase patients' knowledge to improve screening use (Noar & Zimmerman, 2005). Moreover, health care providers can use the HBM and CSM to understand patients' needs, employing constructs of the models to guide patient interviewing. For instance, a breast screening invitation may be based on factors that influence BS behaviour such as existing perceptions of benefits and barriers and on psychological and social factors (Kalsta, Holloway & Cox, 2013). Nurses can therefore assess women's level of perceived risk and target their teaching about health-promoting behaviours to reduce risk perception by educating women about the risk factors for breast cancer. If women are aware they may be at risk of developing breast cancer, they may perceive themselves at risk and participate in screening. Counseling may be required to increase the likelihood that a woman attends for screening by increasing women's confidence. Particular focus on the appointment related to screening could provide an opportunity for targeted interventions to increase BS uptake, such as assisting women with scheduling an appointment, ensuring that guidelines and information is provided about the recommended intervals between mammograms and addressing the importance of regular screening. This will ultimately affect the quality of an individual's life and reduce the allocation of resources needed to treat those who develop breast cancer.

Since individuals possess multifaceted cognitive representations of various diseases (Lykins et al., 2008), nurses can support patients to explore beliefs and perceptions by helping them to relate personal accounts about their families, culture and their illness perceptions, including causal attributions for the disease (Richer & Ezer, 2000). Achieving this may be more

attainable if nurses and health care providers are knowledgeable, competent and feel supported in providing education and counselling in the clinical setting. This presents a challenge for all health care disciplines considering that health implications span the entire health care continuum. Furthermore, the gap in competency includes lack of recognition of the relevancy of screening to nursing practice which may impact the uptake of continuing education in this area. To overcome these challenges, robust interventions are needed with reliable measures that can adequately assess the outcomes of these strategies. Validated instruments for nursing and patient assessment should be made available in clinical settings as a priority. With reliable measures to inform the required interventions and outcomes associated with their implementation, nurse-led interventions make it possible to design cost-effective strategies focused upon reducing disparities across diverse populations and increasing quality within health care systems.

### **Limitations**

Although our preliminary internal consistency and test-retest reliability correlation scores were relatively similar or higher to those reported in prior validation studies of the CHBMS and IPQ-R research, we recognize this study's limitations. Firstly, the reported findings cannot be generalized as these are limited to a convenience sample. Our goal was not to obtain a representative sample, but rather to obtain an indication of the instrument's reliability and validity among women with varied backgrounds and diverse perspectives. For greater applicability, it is recommended that this instrument be tested among a larger sample. Secondly, recruitment of these women may have led to a biased sample of women with no socio-economic inequalities. We acknowledge that those who participated may have been more interested in and knowledgeable about screening as compared with those who would not attend for screening. Thirdly, for those who participated in this study, the formal consent to participate sets them apart from those who would refuse such an

invitation. Moreover, although women were asked to express their true feelings, they may have responded in a way that is considered socially acceptable. Despite these limitations, our rigorous approach to translating and adapting the instrument gives us confidence in the instrument's acceptability and readiness for use to collect data from the target population.

## **CONCLUSION**

The translation, adaptation and preliminary evidence of the psychometric properties assessment of the MBSQ shows promise of being a valid and reliable instrument that can be used among Maltese women to assess their health beliefs and illness perceptions towards breast cancer and screening practices, and provides insights for the planning of effective interventions. As these are preliminary findings, further psychometric testing of these scales is recommended to include diverse socioeconomic strata, educational levels and geographic location. Future studies should include factor analyses on the current scale items using a larger sample size. Further research to measure women's health beliefs and illness perceptions on breast cancer and screening is also warranted.

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