Factors Influencing Breast and Cervical Cancer Control in Ethnically Diverse Groups of Women

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STATEMENT OF CANDIDATE

I certify that the work on my thesis titled “Factors influencing Breast and Cervical Cancer Control in Ethnically Diverse Groups of Women” has not been submitted for any other degree nor has it been submitted as part of the requirements for a degree to any other university or institution other than Macquarie University.

I certify that this thesis is my own work and it has been written by myself. Any help and assistance that I have received has been properly acknowledged within my thesis.

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Abstract

Utilization of breast and cervical cancer control behaviours in Australia is less than optimal, particularly amongst Eastern European and Arabic populations. Psychosocial factors have generally been found to predict cancer control uptake, yet little is known of the role of these factors amongst these ethnic populations. Guided by comprehensive health behavior theories, this research assessed the associations of cognitive and affective psychosocial variables to the utilization of breast and cervical cancer control behaviours among Croatian-, Lebanese-, Macedonian- and Australian-born women. In the absence of appropriate measures, the Revised Illness Perception Questionnaire for healthy people (IPQ-RH) was empirically validated in the Arabic, Croatian and English languages for breast and cervical cancer contexts. Across several studies (total N = 904) women representing each of the four ethnic groups completed self-report measures relating to cognitive (e.g., attitudes towards the efficacy of mammography to detect cancer) and affective (e.g., breast cancer worry) factors and cancer control behaviour use (i.e., self-examination of the breasts (BSE), clinical breast examination (CBE), mammography, Pap smear and human papillomavirus (HPV) vaccine uptake). Overall, Lebanese women were significantly lower users of BSE and mammography than Australian and Croatian women, and Macedonian women were less likely to have accepted the HPV vaccine than Australian women. Multiple regression analyses showed that across the studies a number of psychosocial and behavioural factors were associated with breast cancer screening (i.e., breast cancer worry, general risk factors and negative emotional representations) and cervical cancer control use (i.e., identity (symptoms), cyclical timelines for cervical cancer, perceived efficacy of cervical cancer control and general risk factors). The modifiable psychosocial factors that were identified in this research can provide the basis for future tailored health promotion initiatives targeting these ethnic groups to enhance their utilization of the cancer control strategies.

Chapter One: Literature Review on Cancer Rates, Cancer Control Measures and Health Behaviour Theories

The current chapter provides an overview on incidence and mortality rates for breast and cervical cancer worldwide and commonly used breast and cervical cancer control measures. The use of these cancer control measures in the general population is discussed and a rationale is provided for the choice of the health behaviour theories that will guide the current research.

Cancer Incidence and Mortality Rates

Breast cancer

Breast cancer is the most common cancer among women worldwide with an estimated 1.38 million newly diagnosed cases in 2008 (Ferlay et al., 2010). This illness accounts for 23% of new cancer cases in females. Breast cancer is ranked as the second most common cancer globally, comprising 10.9% of all diagnosed cancers (Ferlay et al., 2010). Incidence rates differ from region to region, ranging from 19.3 per 100,000 women in Eastern Africa to 89.9 per 100,000 women in Western Europe diagnosed with this disease. In developed regions incidence rates are high (more than 80 per 100,000 people excluding Japan), with much lower rates occurring in developing regions (less than 40 per 100,000 people) for the most part (Ferlay et al., 2010). In Australia, a woman's risk of being diagnosed with breast cancer is one in 8 up to the age of 85 (Cancer Council Australia, 2012a), with 12,567 Australian women diagnosed with this disease in 2007 (Australian Institute of Health and Welfare, 2012a).

Breast cancer is among the most common causes of death from cancer among women in both developed (189,000 deaths) and developing (269,000 deaths) countries (Ferlay et al., 2010). In Australia, the most recent available data suggests that the mortality

rate for breast cancer was 22.1 deaths per 100,000 women in 2007 (Australian Institute of Health and Welfare & National Breast and Ovarian Cancer Centre, 2009; Australian Institute of Health and Welfare, 2012b).

Cervical cancer

Cervical cancer is ranked as the third most common cancer among women globally with approximately 529,000 women diagnosed with this illness in 2008 (Ferlay et al., 2010). Overall, this illness is responsible for 13% of newly diagnosed cancers in women worldwide. Most (85%) diagnoses occur in developing countries and cervical cancer remains the most frequently diagnosed cancer among women in Eastern Africa (34.5 per 100,000 women), Melanesia (23.7 per 100,000 women) and South-Central Asia (24.6 per 100,000 women). In comparison, the risk of developing this disease is lower among Western Asian (4.5 per 100,000) and Northern American (5.7 per 100,000) women (Ferlay et al., 2010). The risk of an Australian woman being diagnosed with this disease before the age of 75 is one in 204 (Tracey, Kerr, Dobrovic, & Currow, 2010; Australian Institute of Health and Welfare, 2012b), with 6.8 per 100 000 Australian women diagnosed with this disease in 2007 (Australian Institute of Health and Welfare, 2012a).

Worldwide there were 275,000 deaths due to cervical cancer in 2008 (Ferlay et al., 2010). The highest number of deaths occurred in Eastern Africa (25.3 per 100,000 women), followed by Western Africa (24 per 100,000 women) and Melanesia (16.6 per 100,000 women). In Australia, 1.9 per 100 000 women died from cervical cancer in 2007 (Australian Institute of Health and Welfare, 2010a; Australian Institute of Health and Welfare, 2012b). Hence, it is vital that ongoing research is undertaken in the breast and cervical cancer contexts in order to address the high incidence and high mortality associated with these diseases. Early detection through screening procedures is regarded as one of the most effective ways to minimise the morbidity and mortality rates of these cancers.

Breast and Cervical Cancer Control Measures

Self-examination

Breast self-examination (BSE), a routine self-examination of the breasts following a specific procedure, was adopted as a means of early detection of breast lumps. There are numerous BSE techniques available that have been recommended to women worldwide since the early 1950s; however, in recent times the efficacy of this cancer control measure has come under some scrutiny (Cancer Council Australia, 2009a). Studies undertaken in Britain (UK Trial of Early Detection of Breast Cancer Group, 1999), China (Thomas et al., 2002) and Russia (Semiglazov et al., 1999) have demonstrated that use of the BSE technique does not lead specifically to a reduction in the number of deaths from breast cancer. Some countries, such as the United States (US), continue to recommend the regular BSE for women from their early 20s, however, the caveat is that women need to be aware of the advantages and limitations of this cancer control measure. It is further recommended that if women choose to carry out a BSE, they need to receive instruction on the BSE technique used and have that technique reviewed regularly by a health professional (American Cancer Society, 2012a).

In some Western countries (e.g., Australia and England) the more informal *breast awareness* approach has been widely adopted (National Breast and Ovarian Cancer Centre, 2009a; Cancer Council Australia, 2009a; NHS Breast Screening Programme, 2012a) to replace the previously recommended routine BSE. This cancer control measure was designed to encourage women of all ages to familiarize themselves with the look and feel of their breasts in order to detect any unusual breast changes (National Breast and Ovarian Cancer Centre, 2009a). Since mid- (Cancer Council Australia, 2009a) and late-2009 (National Breast and Ovarian Cancer Centre, 2009a), the *breast awareness* approach has consistently been recommended to Australian women. If a woman detects any abnormal breast changes, she is

urged to consult with her doctor immediately. No particular self-examination method is recommended over another (National Breast and Ovarian Cancer Centre, 2009a). However, as a practical guide it has been suggested that Australian women examine their breasts in front of the mirror intermittently, and with the flat of their fingers feel the entire breast tissue, under their armpit and from their collarbone to underneath their bra line (Cancer Council Australia, 2009a).

It should be noted that in the context of the current research, study participants were recruited from 2007 to 2011. This means data collection coincided with changes in Australian guidelines from recommending the use of a specific BSE technique to the *breast awareness* approach. Researchers have queried whether there is a difference between performing a BSE and being *breast aware* (Epstein, 2003), as *breast awareness* entails being familiar with one's breasts which most women understand as performing a BSE (Mason & White, 2008). Accordingly, and in line with prior research (Mason & White, 2008), the current research assessed women's *breast awareness* behaviour by asking them about the more well-known concept of BSE.

Clinical breast examination (CBE)

A CBE is an examination of the breasts of asymptomatic women by a health professional (National Breast and Ovarian Cancer Centre, 2009a). However, in more recent times, the effectiveness of this cancer control measure has been questioned as several studies have shown that there is no direct evidence that regular CBE can reduce the number of deaths from breast cancer (Barton, Harris, & Fletcher, 1999; Humphrey, Helfand, & Chan, 2002). However, the routine CBE is still recommended in certain countries. For example, in the US, women in their 20s and 30s are encouraged to have a CBE every three years and for women in their 40s, it is recommended that they have one every year (American Cancer Society, 2012a).

In the Australian context, there is some variation in guidelines pertaining to CBE use. The National Breast and Ovarian Cancer Centre (2009a) suggest that regular CBE may be beneficial for women who are not participating in mammography screening. However, the Cancer Council Australia (2009a) advises that CBE is not recommended as a cancer control measure for breast cancer. They further report that as there is no direct proof that CBE should be discouraged, a woman may approach her doctor to discuss her own individual requirements relating to breast cancer control (Cancer Council Australia, 2009a).

In the present research, participants were asked whether they had ever had a CBE. Given the recommendation that routine CBE may be useful for Australian women who do not have mammograms (National Breast and Ovarian Cancer Centre, 2009a), all participants were asked this question as even those who are eligible for mammography screening may not be enacting that cancer control behaviour or may be undertaking regular CBE instead of a mammogram.

Mammography

A mammogram is an x-ray of the breast that can identify breast lumps or lesions of cancer approximately one centimetre or larger. A trained radiographer will normally take the x-ray with the breast positioned between two flat plates for approximately 10 to 15 seconds while the x-ray picture is being taken (Australian Government Department of Health and Ageing, 2011).

Recommendations regarding mammography use vary from country to country. In England, the NHS Breast Screening Programme offers a free mammogram every three years to women 50 years and over (NHS Breast Screening Programme, 2012b). Since 2010, this programme has progressively been phasing in an extended age range of free breast cancer screening to eligible women 47 to 73 years of age. This is expected to be completed by 2016

(NHS Breast Screening Programme, 2012b). In contrast, an annual mammogram is recommended for US women 40 years of age and over (American Cancer Society, 2012a).

In Australia, all women 50 to 69 years of age are encouraged to have a mammogram every two years through the BreastScreen Australia Program (Cancer Council Australia, 2009a). BreastScreen Australia is the national program set up to provide free biennial mammograms to women in this target age group, with mammography services available in each Australian state and territory (e.g., BreastScreen NSW). Asymptomatic women aged 40 to 49 and 70 years of age and over can also have a free biennial mammogram through this program; however, these women are not the targeted group for mammography screening (Australian Government Department of Health and Ageing, 2011). Moreover, regular mammography use is not encouraged for women less than 40 years of age as the breast tissue is generally much denser, making breast cancer difficult to detect with this cancer control measure (Australian Government Department of Health and Ageing, 2011).

For women deemed to be at risk of developing breast cancer (i.e., previous breast cancer diagnosis and/or a strong family history of this disease), current guidelines strongly recommend that they consult with their doctor to discuss their cancer control options. The cancer control measures utilized by these women may include regular mammograms, ultrasound, magnetic resonance imaging (MRI) and routine CBE (Cancer Council Australia, 2009a).

Papanicolaou (Pap) smear

A Pap smear is a test designed to check for any abnormalities in the cervix that could potentially develop into cervical cancer. During this procedure, a health professional collects cells from the cervix and smears these cells onto a slide for testing. If any abnormalities are detected, further tests are organized. A Pap smear is not used as a diagnostic tool for cervical

cancer *per se* but detects early changes in the cervix that could potentially become cervical cancer (Australian Government Department of Health and Ageing, 2012).

National guidelines pertaining to Pap smear adherence vary throughout the world. In England, the NHS Cervical Screening Programme recommends that women 25 to 49 years of age have a Pap smear every three years, and women 50 to 64 years of age have a Pap smear every five years. Screening is not encouraged in women under 25 years of age as changes frequently occur in the cervix at this age (NHS Cervical Screening Programme, 2012). In the US, women 21 to 29 years of age are encouraged to have a Pap smear every three years. Likewise, women 30 to 65 years of age can continue to have a Pap smear every three years or they can choose to have a Pap smear and HPV test concurrently every five years (American Cancer Society, 2012a).

In Australia, it is recommended that women aged 18 to 70 years have a Pap smear every two years. Free biennial Pap smears are provided through the National Cervical Screening Program. Screening generally starts between the ages of 18 to 20, or one to two years after the commencement of sexual intercourse (whichever occurred last) (Cancer Council Australia, 2009b). Pap test registries are set up in each Australian state and territory as a measure of quality control (e.g., keeping a record of women's screening histories and any prior abnormal smears) and to send reminder letters to women overdue for screening on behalf of the National Cervical Screening Program (Australian Government Department of Health and Ageing, 2011).

Human papillomavirus (HPV) vaccine

The Gardasil® and Cervarix® HPV vaccines are used to immunize females against HPV types 16 and 18 that cause about 70% of cervical cancers. Gardasil® is a quadrivalent HPV vaccine as it provides additional protection against HPV types 6 and 11 that cause approximately 90% of genital warts (Cancer Council Australia, 2009b). These vaccines are

generally administered as a series of three doses over a six month period (May, 2007; Stanley, Lowy, & Frazer, 2006).

HPV vaccines are utilized as a preventative measure for cervical cancer in a number of countries. In the United Kingdom (UK), it is recommended that girls aged 12 to 13 are vaccinated with the HPV vaccine and girls aged 13 to under 18 years of age can receive 'catch up' vaccinations (Joint Committee on Vaccination and Immunization, 2008). Gardasil® will have replaced Cervarix® as the vaccine of choice in the UK's HPV vaccine programme by September 2012, as it provides protection against four HPV (16, 18, 6 and 11) types (Department of Health, 2011). In the US, the American Cancer Society (2012b) recommends that girls aged 11 to 12 routinely receive the full three doses of Gardasil® or Cervarix®. Females from the age of 9 can receive the HPV vaccine and girls up to the age of 18 can have catch-up vaccinations. Women 19 to 26 years of age can speak to a health professional about the benefit of being vaccinated before making the decision to receive a HPV vaccine (American Cancer Society, 2012b). For Australian females, the National HPV Vaccination Program recommends that all girls 12 to 13 years of age are vaccinated against HPV types 16 and 18. Since 2007, Australian girls in their first year of high school have been receiving the Gardasil® vaccine for free under the National HPV Vaccination Program. From 2007 to 2009, a catch-up group of females aged 13 to 26 years were also eligible to receive this vaccine for free under this program (Cancer Council Australia, 2009b). Gardasil® and Cervarix® can be administered to females aged 9 to 45 and 12 to 45 years of age, respectively (Cancer Council Australia, 2009b). Females who are not eligible to receive the HPV vaccine for free can receive Gardasil® or Cervarix® injections from their doctor at their own cost (Cancer Council Australia, 2009b). The present research examined the acceptance rate of this cancer control measure among females 45 years of age and younger as this is the age range for HPV vaccine uptake in the Australian context.

Use of cancer control measures in the general population

The utilization rates for breast and cervical cancer control measures vary in the general population. Approximately 18% to 50% of women perform regular self-examinations of their breasts (Ashton, Karnilowicz, & Fooks, 2001; Millar & Millar, 1992; Scanlon & Wood, 2005; Wyper, 1990). In relation to CBE, annual rates for use of this screening method range from 42% to 87% among women 20 years of age and older living in the US (Centers for Disease Control and Prevention, 2011; Ruffin, Gorenarrflo, & Woodman, 2000; Vincent, Bradham, Hoercherl, & McTague, 1995) and 54% for women living in Australia (Barratt et al., 1997). Population based data has been provided for mammography, Pap smear and HPV vaccine uptake in the general population. Approximately 59% of women living in the US aged 40 to 64 years (Centers for Disease Control and Prevention, 2011) and 55% of women living in Australia aged 50 to 65 years (Australian Institute of Health and Welfare, 2011a) receive an annual and biennial mammogram, respectively. In relation to Pap smear use, 87% of US women aged 21 to 64 have a Pap smear every three years (Centers for Disease Control and Prevention, 2011), while 59% of Australian women 18 to 70 years of age receive a biennial Pap smear (Australian Institute of Health and Welfare, 2011b). Lastly, HPV vaccine uptake has been assessed among women 18 to 26 years of age, with acceptance ranging from 52% to 64% for one dose and 32% to 38% for the full three doses among Australian women (Gertig, Brotherton, & Saville, 2011). In comparison, only 12% of US women in this age group have received one dose of a HPV vaccine (Price, Tiro, Saraiva, Meissner, & Breen, 2011).

Among specific ethnic groups, one study in the UK demonstrated that White women were more likely to obtain a mammogram than Black women (Renshaw, Jack, Dixon, Møller, & Davies, 2004); however, two studies comparing White women with an ethnically diverse (e.g., Asian and Black women) sample revealed that only Pap smear (Moser, Patnick, &

Beral, 2009; Marlow, Waller, & Wardle, 2008) not mammography (Moser, Patnick, & Beral, 2009) use was associated with being White. In Canada and compared to White women, ethnic minority (Filipino, Arab and Japanese) has been related to a reduced likelihood in undertaking a mammogram and Pap smear (Quan et al., 2006).

Given that the level of enactment of these cancer control measures varies in the general population, it is imperative to explore the likely reasons for these variations in health behaviour use. All of these cancer control measures involve women needing to initiate and enact specific health-protective behaviours. Thus, understanding the human and individual difference factors (e.g., age, education and worry) underlying these actions is a critical step in delineating why participation and uptake rates differ within specific ethnic populations. The present program of research addresses this research question, specifically focusing on psychosocial factors associated with enactment of the recommended cancer screening and cancer control strategies for breast and cervical cancer. Psychosocial factors encompass a broad range of variables, including demographics, ethnicity, cognitive (beliefs) and affective (emotions) variables. The following section outlines current theories of health behaviour that entail these psychosocial factors and their relevance to this research question.

Explanatory Models of Health Behaviour

Health behaviour models have been utilized to explain the adoption of health behaviours, design interventions for the implementation of these behaviours, explain maladaptive behaviours and promote health behaviours across a wide array of illnesses and populations (Salovey & Rothman, 2003). These models can be classified into three groups: stage, subjective utility and self-regulation models (Cameron & Leventhal, 2003). The following section provides an outline of the key theories in each category and the strengths and weaknesses each theory offers in support of the present research goals.

Stage theories

Several stage theories (i.e., Precaution Adoption Process Model; Weinstein, 1988 and Health Action Process Approach; Schwarzer & Fuchs, 1996) have been developed to explain health behaviour change. The predominant stage theory in health psychology is the Transtheoretical Model (TTM) of Health Behaviour Change (Prochaska & DiClemente, 1982). In relation to cancer screening, the stage of change and decisional balance components of the TTM seem to have been successfully applied to explain mammography enactment only (Spencer, Pagell, & Adams, 2005). Overall, these theories contain several stages that generally start with planning and contemplating the health behaviour and conclude with implementing and maintaining the behaviour. Predictions are made at each stage about an individual's readiness to change or to undertake the health behaviour. Stage theories are frequently used for the development of health interventions that are tailored to the stage of change that an individual is at (e.g., contemplation stage- no prior mammogram or no mammogram within the last two years, but plan to have a mammogram within the next two years). However, there is limited support for the efficacy of stage models as a foundation of behaviour change or for enabling the progression from one stage to the next to enact the specific health behaviour (Bridle et al., 2007), and these theories provide no detailed information on the beliefs or any other constructs that should be considered in the change process (de Wit & Stroebe, 2004; Armitage & Conner, 2000). As a result, stage models are not suitable for the objectives of the current research.

Subjective utility models

Common theories that are classified as subjective utility models include the Theory of Planned Behaviour (TPB) (Ajzen, 1991) and the Health Belief Model (HBM) (Becker, 1974). With regards to the TPB, there is a gap between intentions (the primary outcome in the model) and behaviour, as a considerably larger percentage of the variance in intention is

explained than the variance in behaviour. In general, all of these models suggest that when people adopt a particular health behaviour they are rational decision makers who consider their own values and attitudes when evaluating the efficacy of that behaviour (Cameron & Leventhal, 2003). Although such models have been extensively utilized to explain the use of health behaviours, their ability to predict health behaviour usage has resulted in mixed findings, explaining between 19% and 51% of the variance (Armitage & Conner, 2000; Bish, Sutton, & Golombok, 2000). When compared to affective processing models, another key criticism is that they tend to overlook emotional variables (Norman & Brain, 2005; Marton & Choo, 2012), including cancer worry when considering cancer-related behaviours (Norman & Brain, 2005). Hence, models such as these with an overriding focus on cognitive aspects of health-related behaviours are not sufficiently comprehensive to guide the current research. Consequently, a framework adopting a broader perspective encompassing both the cognitive and affective factors associated with health protective behaviours is needed. For the present research, the psychosocial factors proposed in the Extended Health Belief model (Norman & Brain, 2005), the Cognitive Social Health Information Processing (C-SHIP) model (Miller, Shoda, & Hurley, 1996b) and the Common Sense Model of Illness Self-Regulation (Leventhal, Brissette, & Leventhal, 2003; Leventhal, Nerenz, & Steele, 1984) will provide the underlying framework, as these models acknowledge both cognitive and affective constructs and their role in the use of health-protective behaviours. These theories will be discussed in more detail in the following sections.

Theories Employed in the Current Research

Extended Health Belief Model (EHBM)

Given the limited effectiveness of the HBM as an explanatory theory of health behaviours, the EHBM was recently devised to explain health behaviour usage.

(Norman & Brain, 2005). This model encompasses the four psychosocial variables entailed in the HBM with some revisions. First, perceived susceptibility is defined as an individual's assessment of their risk of developing a particular disease (Norman & Brain, 2005). In relation to cancer, the likelihood that an individual will carry out health-protective behaviours to prevent this illness can depend upon how at risk they believe they are in developing cancer. In many instances, there is a tendency for people to underestimate their perceived risk to particular health threats (Redding, Rossi, Rossi, Velicer, & Prochaska, 2000). Second, perceived severity relates to perceptions of the seriousness of the health condition and its potential consequences. For example, an individual is more likely to enact preventive measures for cancer if they consider the potential effects (i.e., physical, psychological and social) of having the illness lead to serious consequences (i.e., decreased physical and psychological well-being as well as altered relationships with friends and family). Third, perceived benefits (e.g., perceived efficacy of cancer control measures in detecting cancer) relate to the positive effects of carrying out health behaviours that can increase usage (Redding et al., 2000). Fourth, perceived barriers can deter the use of health behaviours (Redding et al., 2000). These barriers can be logistic (e.g., time) and emotional (e.g., embarrassment and pain beliefs) obstacles (Sheeran & Abraham, 1996). Self-efficacy was added to the perceived barriers component of the EHBM (Norman & Brain, 2005) and is defined as an individual's level of confidence in carrying out a health-protective behaviour (Rosenstock, Strecher, & Becker, 1988). In addition, mediating factors were originally incorporated in the HBM and include demographics (e.g., age, education and income) (Redding et al., 2000), cues to action (internal or external influences that promote the adoption of a health behaviour such as sending out reminder letters for cancer screening) (Gillibrand & Stevenson, 2006) and perceived control (Becker & Rosenstock, 1987) (e.g., beliefs in one's ability to exercise control over breast cancer). Mediating variables can

moderate the relationships between health behaviours and psychosocial factors, including susceptibility, severity, benefits and/or barriers perceptions (Redding et al., 2000). A further inclusion to the EHBM is the affective variable worry (Gillibrand & Stevenson, 2006; Norman & Brain, 2005), whereby it has been demonstrated that breast cancer worries are associated with excessive BSE use among women with a family history of breast cancer (Norman & Brain, 2005).

The EHBM has been applied to diverse health contexts, including adherence to diabetes self-care (Gillibrand & Stevenson, 2006) and stroke risk reduction (Sullivan et al., 2008) regimes, BSE (Norman & Brain, 2005) and to assess perceptions of hereditary risk of hemochromatosis (Bylund, Galvin, Dunet, & Reyes, 2011). In relation to BSE use, infrequent users with a family history of breast cancer were more likely to report a higher number of perceived barriers (i.e., emotional and self-efficacy) and fewer benefits (i.e., perceived efficacy- carrying out a BSE leads to early detection of breast cancer) than more frequent users with a family history of this disease (Norman & Brain, 2005). Hence, this model has been successfully applied to at least one dimension of cancer control that is to be examined in the present research.

Cognitive Social Health Information Processing (C-SHIP) Model

The C-SHIP model depicts how individuals process cognitive and emotional health information and how it, in turn, motivates health behaviours. This model was initially illustrated in the context of BSE use (Miller et al., 1996b), and then utilized to explain adherence to cervical cancer control (Miller, Mischel, O'Leary, & Mills, 1996a). There are five cognitive and affective factors that generate health-protective behaviours. Health-relevant encodings are strategies utilized by an individual to appraise their own health, health risks and vulnerabilities about potential health threats (Miller et al., 1996b). Miller et al. (1996a) advise that health beliefs and expectancies refer to particular beliefs and expected

outcomes (e.g., perceived efficacy of cervical cancer control, ability to change one's fate by participating in cervical cancer control and the expected outcomes of being diagnosed with cervical cancer) and self-efficacy expectations (e.g., confidence in adhering to routine Pap smears); these concepts are closely related to the perceived severity and self-efficacy components in the EHBM. In the C-SHIP model, affects (emotions) are regarded as being both generalized (i.e., stress, depression and anxiety) and disease-specific (i.e., breast cancer worry) emotional processes that are triggered in the processing of health information. Desired health goals and values are specific health outcomes and goals to be achieved (Miller et al., 1996b). For example, an individual adheres to Pap smear screening guidelines (health goal) as they want to avoid cervical cancer (health outcome). Miller et al. (1996b) propose that the final cognitive-affective factor comprises self-regulation strategies, entailing the use of knowledge and strategies to address barriers to health behaviour enactment and for the creation and maintenance of health behaviours (e.g., abilities required to capably undertake self-examination of one's breasts). The C-SHIP model illustrates how health threats, one's perceived risk of cancer, the emotions activated in the health threat processing, health goals and self-regulation strategies all influence the development of the desired health-protective behaviour (Miller et al. 1996b).

Miller et al. (1996b) also specify that an *inverted U-shaped* or *curvilinear* relationship exists between worry and health-protective behaviours that is contingent upon the intensity of emotionality, as both extremely low and extremely high levels of worry can hinder action. Moderate levels of worry are generally more likely to facilitate adherence to screening than low or high levels of worry. Yet, high levels of worry can also lead to excessive use of a self-protective behaviour (Miller et al., 1996b). For example, if an individual experiences intense worry about having breast cancer this can increase their use of self-exams to an unnecessary and excessive level, while moderate worry can lead to regular self-examinations. Curvilinear

relationships have been found between moderate levels of breast cancer worry and self-initiated breast cancer screening among at-risk (Andersen, Smith, Meischke, Bowen, & Urban, 2003; Zhang et al., 2012) and average risk women (Andersen et al., 2003; Bowen, Alfano, McGregor, & Andersen, 2004). However, the majority of studies negate the curvilinear hypothesis, supporting instead the linear positive relationship (Andersen, Smith, Meischke, Bowen, & Urban, 2003; Hay, McCaul, & Magnan, 2006; McCaul & Mullens, 2003; Zhang et al., 2012).

The C-SHIP model itself has generally been applied to cancer (Andrykowski et al., 2002; Miller et al., 1999; Roussi et al., 2011) and cancer screening (Andrykowski & Pavlik, 2011; Miller et al., 1996a; Miller et al., 1996b). In relation to ovarian cancer control, women with a family history of this disease who experience cancer worry, greater perceived risk of cancer, and greater perceived efficacy of preventive surgery to avert cancer have been found to be more likely to undergo such surgery (Miller et al., 1999). In relation to breast and cervical cancer control, cognitive factors (e.g., perceived risk), affective states (e.g., cancer worry) and health-relevant expectancies explain screening behaviours for both of these diseases (Miller et al., 1996b; Miller et al., 1996a).

In summary, there has been considerable empirical evidence to date supporting the predictive utility of the factors proposed in the EHBM and C-SHIP models within a cancer context, particularly among individuals with a family history of cancer (e.g., Miller et al., 1999; Norman & Brain, 2005). However, most of the research assessing the full range of these constructs has been carried out in the general population, and has not distinguished between different ethnic groups. Although some of the prior research that has assessed the predictive utility of selected factors (e.g., perceived risk of cancer, cancer worry and pain associated with cancer screening) from these models has demonstrated that they account for up to 51% of the variance in samples of African American and White women (Katapodi, Lee,

Facione, & Dodd, 2004) and up to 26% of the variance among ethnically diverse samples (e.g., African American, Native American, immigrant Dominican and Eastern European) (Consedine, Magai, & Neugut, 2004a; Magai, Consedine, Conway, Neugut, & Culver, 2004) in cancer control use, this is a limitation of the current body of evidence, as there is strong support for the view that specific ethnic groups will develop unique cognitive and affective responses to health-related situations. For example, amongst US-born (African American and European) and immigrants (Eastern Europeans and English speaking Caribbeans, Haitians and Dominicans) to the US, frequency of BSE performance differs across these ethnic groups, as do the factors (e.g., BSE efficacy) related to this screening behaviour. Analyses across all of these ethnic groups found that being Dominican, and having higher cancer worry and BSE efficacy beliefs predicted frequent use of BSE (Kudadjie-Gyamfi, Consedine, Magai, Gillespie, & Pierre-Louis 2005). Therefore, the present research will extend the evidence base in this context by examining the cognitive and affective factors linked with breast and cervical cancer control behaviours amongst specific immigrant ethnic groups within Australia (refer to Chapter Two for a detailed overview).

Common Sense Model (CSM) of Self-Regulation

Consistent with the tenets of the C-SHIP model, the CSM of self-regulation suggests that individuals form schematic representations of illnesses and health-related conditions deemed to be threatening, in accordance with the tangible and abstract information available to them (Leventhal, Meyer, & Nerenz, 1980). The key construct within this model is the idea of illness representations or 'lay' beliefs about illness consisting of both cognitive and emotional processes that guide health-related decisions (Hagger & Orbell, 2003). Illness representations can develop in response to internal (existing knowledge of an illness and/or diagnosis or experience symptoms of an illness) (Cameron & Moss-Morris, 2004) and external (watching illness experiences of friends and family and/or information obtained from

medical professionals, friends, family and/or media) cues (Leventhal, Leventhal, & Contrada, 1998). Self-regulation theories are distinct from other health behaviour models as these cognitive and emotional processes are conceptualized within a parallel processing framework. One parallel processing arm relates to the cognitive processing of an internal or external stimulus and the other processing arm is involved in the processing of the emotional aspects of that stimulus. An important implication of this parallel processing framework is that health behaviours can be initiated due to cognitive as well as emotional processes (Leventhal, Diefenbach, & Leventhal, 1992). Within these models, feedback loops are utilized to evaluate an individual's efforts to achieve cognitive and emotional goals by recognising inconsistencies between the present outcome and set goals (Cameron & Leventhal, 2003). Although nearly all self-regulation models can be applied to health behaviours, only the CSM of self-regulation was developed to be applied to both illness and health behaviours (Cameron & Leventhal, 2003). Thus, it encapsulates the specific meaning of beliefs and emotions associated with the behaviour (Brownlee, Leventhal, & Leventhal, 2000).

Initially, open-ended semi-structured questionnaires were used to develop the cognitive components of the CSM (Leventhal et al., 1992). Leventhal and colleagues describe five cognitive components of illness representations. The *cause* dimension relates to beliefs that are responsible for triggering the illness or disease (e.g., mental attitude, hereditary and alcohol). *Identity* is the name given to the condition (e.g., breast cancer and cervical cancer) and the symptoms that go with it (e.g., fatigue, loss of strength and wheeziness). The *timeline* dimension refers to the individual's beliefs about the course of the illness (i.e., acute and chronic). The *consequences* of the illness to a person's life relates to beliefs regarding the impact of the illness on overall quality of life or how it may affect functional capacity (i.e., seriousness of the disease and financial consequences). Finally, the *cure/control* dimension

refers to the sensation of empowerment regarding performance of coping behaviours or the efficacy of treatment. These five cognitive components extend and elaborate the C-SHIP units of health beliefs and expectancies, and provide a more in-depth approach to understanding these specific components. Leventhal et al. (1984) postulated that if an individual perceives the illness as being sufficiently threatening, this will elicit a coping response. The coping response adopted may result in modifying and updating the cognitive representation in a dynamic process.

Semi-structured questionnaires were also originally employed (Leventhal et al., 1992) to assess illness representations and they provided rich sources of information. However, the use of these questionnaires led to considerable variations in responses (Weinman, Petrie, Moss-Morris, & Horne, 1996), calling for the need to develop a standardised measurement approach. As a result, the Illness Perception Questionnaire (IPQ) was developed to assess illness representations, in accordance with Leventhal's self-regulatory model. This measure provides a quantitative evaluation of the five elements of illness representation (Weinman et al., 1996) and has been used to assess illness representations among individuals suffering a diverse array of illnesses, including heart disease (Cooper, Lloyd, Weinman, & Jackson 1999; Petrie, Weinman, Sharpe, & Buckley, 1996), rheumatoid arthritis (Murphy, Dickens, Creed, & Bernstein 1999, Scharloo et al., 1999), cancer (Buick 1997), chronic fatigue syndrome (Heijmans, 1998, Moss-Morris, Petrie, & Weinman, 1996), diabetes (Griva, Myers, & Newman, 2000) and Addison's disease (Heijmans, 1999). The IPQ is also psychometrically sound across numerous chronic illnesses (Hagger & Orbell, 2003; Weinman et al., 1996). Since the development of this measure, the terms illness representation and illness perception have been used interchangeably to describe these components in the CSM (e.g., Moss-Morris et al., 2002).

The development of the Revised Illness Perception Questionnaire (IPQ-R) brought with it progress in theory and measurement of the constructs associated with self-regulation theory. Moss-Morris et al. (2002) identified components of the original IPQ that needed to be revised. Firstly, the illness coherence subscale was introduced to embody an individual's beliefs pertaining to the meaning of the illness to them. Secondly, the timeline construct was broken down into beliefs about the severity of the illness and beliefs regarding the variation in symptoms and time-based changes of the illness. These subscales were subsequently labelled as timeline acute/chronic and timeline cyclical. In addition, it was found that the content of the original cure/control construct from the IPQ contained two separate sets of beliefs- beliefs about one's capabilities in relation to controlling the illness and beliefs regarding the effectiveness of treatment to control or cure the illness (Horne, 1997). As a result, the personal control and treatment control subscales were introduced in the revised measure.

Possibly, the most important addition to the IPQ-R was the emotional representations subscale. Leventhal et al. (1984) proposed that emotional representations are the individual's affective understanding of stimuli and they are formed in response to health threats. Individuals develop analogous cognitive and emotional representations which will ultimately lead to problem-based and emotion-focused coping procedures when reacting to illness and health threatening situations (Leventhal, Leventhal, & Cameron, 2001). Specifically, as problem-based coping procedures are activated, both the stimuli and the threat representation trigger emotional reactions, including fear-oriented reactions such as anxiety and worry; however, other emotions such as anger and depression can also emerge (Leventhal, Leventhal, & Cameron, 2001). A key limitation of the IPQ was that it only explored the cognitive elements of responses to illness. As a result, six emotional representation items were included in the IPQ-R pertaining to different types of emotional responses (e.g.,

depressed, anxious and upset) that can be experienced in relation to an illness (Moss-Morris et al., 2002). The IPQ-R has been administered in various health contexts, including HIV (Horne, Cooper, Fisher, Buick, & Weinman, 2001), epilepsy (Kemp, Morley, & Anderson, 1999), breast cancer (Rees, Cull, Sutton, & Fry, 2004), cervical abnormalities (Hagger & Orbell, 2002), cervical cancer screening (Hagger & Orbell, 2005), muscular-skeletal injuries (Hagger & Chatzisarantis, 2002), irritable bowel syndrome (Boddington, Myers, & Newman, 2002) and hypertension (Theunissen, & de Ridder, 2001). It has demonstrated satisfactory reliability and validity across numerous illnesses (Moss-Morris et al., 2002). Further, a meta-analysis on the studies (most employed IPQ measures) that have utilized the CSM provided support for the construct and discriminant validity of this model and its revised components across a diverse range of diseases (Hagger & Orbell, 2003).

Acknowledging that similar illness representations exist among asymptomatic individuals, Figueiras and Alves (2007) developed the Revised Illness Perception Questionnaire- Healthy version (IPQ-RH). They modified the phrasing of certain questions in the IPQ-R from “my illness” to “this illness”, so that it could be administered to healthy people and participants were asked to respond in relation to their personal views regarding skin cancer, tuberculosis or AIDS. In order to validate the IPQ-RH, 12 items were removed in the pilot study so as to increase the reliability of the subscales. The test-retest reliability for this measure was satisfactory and the IPQ-RH subscales demonstrated reasonably good stability over a three week period. To examine the factor structure, this measure was administered to another group of participants across the same illness conditions. Principal Components Analyses (PCA) revealed a similar factor structure to the original IPQ-R, with the subscales labelled as timeline-acute/chronic, timeline cyclical, consequences, illness coherence, personal control, treatment control, emotional representation, and psychological attributions and general risk factors for the causal attributions subscales. The identity

subscale was not included in the factor analyses as it was scored dichotomously (Figueiras & Alves 2007).

Similar to the findings for the IPQ-R by Moss-Morris et al. (2002), there were strong positive and negative correlations among most of the IPQ-RH dimensions. The discriminant validity of these dimensions was assessed with the Negative Affectivity (NA) subscale of the Positive and Negative Affect Scale (PANAS), with several small correlations achieved, indicating good discriminant validity across the IPQ-RH constructs with this measure (Figueiras & Alves, 2007).

The CSM has not been utilized to predict cancer control use among ethnically diverse samples; however, for Greek women living in Greece, this model predicted 34% to 50% of the variance in mammography use (Anagnostopoulos et al., 2012). It has also been suggested as a directive for future research to apply this model to the cancer screening context among divergent ethnic groups (Cameron, 2008).

In relation to the goals of the current research, the aims of Study One were to examine EHBM (perceived susceptibility, benefits and barriers, worry and mediating factors) and C-SHIP model (health beliefs, affects and values) constructs and how they apply to the use of breast and cervical cancer control behaviours among Australian-born and immigrant (Croatian-, Lebanese- and Macedonian-born) women. Prior research has demonstrated that psychosocial factors (i.e., fear of cancer/screening and the belief that screening is painful and uncomfortable) are barriers to cancer control use among Middle-Eastern (Brushin, Gonzales, & Payne, 1997) and Chinese-born (Kwok, Sullivan & Cant, 2005) women living in Australia. However, Study One assessed a broader range of psychosocial factors, namely perceived susceptibility to cancer, perceived control over cancer, perceived efficacy of cancer control measures, pain associated with the use of cancer control measures, cancer-specific worry, cancer history (personal and family) and demographics (e.g., ethnicity). Breast and cervical

cancer control uptake varies among the ethnic groups assessed (refer to Chapter Two) and it is vital to determine whether these psychosocial and demographic variables are linked with cancer control use among these women. The extensive literature on these variables and their connection with breast and cervical cancer control use will be addressed in the following chapter.

The CSM provides a useful extension and elaboration of constructs that were examined in Study One of this research. Thus far, no studies have attempted to validate the IPQ-RH in any other health context than that which was used for the initial development of this measure (i.e., skin cancer, tuberculosis and AIDS). Therefore, there was a need to substantiate the use of this measure for a healthy, asymptomatic population within the breast and cervical cancer contexts. Furthermore, given the focus of the present research on investigating the cognitive and affective factors associated with cancer control amongst specific immigrant ethnic groups, there was a need to develop appropriately validated standardised measures in the languages of these ethnic populations. Accordingly, guided by the CSM, the aims of Study Two were to empirically validate IPQ-RH measures for breast and cervical cancer and further, to validate these measures in English Croatian and Arabic among Australian-, Croatian- and Lebanese-born women residing in Australia. The gold-standard confirmatory factor analytic (CFA) method was employed in this study to validate these measures. Following this, the aims of Study Three were to compare breast and cervical cancer illness perceptions (using the empirically validated IPQ-RH measures) among women with these ethnic backgrounds and to examine the relationships between their illness perceptions and use of breast and cervical cancer control behaviours. It was expected that this research would provide direction for future health interventions that target these ethnic groups in these cancer contexts.

Chapter Two: Literature Review on Ethnicity, Psychosocial Factors, Demographics/Cancer History and their Relationships with Cancer Control

The aims of this chapter are to investigate the role of ethnicity and cultural factors in the theories guiding the current research, as well as to describe the ethnic groups to be surveyed and their use of health behaviours. The literature on breast and cervical cancer-specific cognitive and affective factors, illness representations, demographics and cancer history, and their relationships with breast and cervical cancer control will also be examined. It has been suggested that the role of ethnicity, demographics and psychological factors needs to be assessed in order to understand health behaviour enactment (Magai, Consedine, Conway, Neugut, & Culver, 2004). Consequently, this was an underlying goal of the current research.

The role of Ethnicity and Cultural Factors in the chosen Health Behaviour Theories

Ethnicity refers to a common culture or nationality shared by an ethnic group that encompasses a wide range of cultural characteristics, including history, traditions, language, heritage and religion. Ethnic identity is constantly reinforced through these common characteristics which set one ethnic group apart from other ethnic groups (Camoroff & Camoroff, 2009). Ethnicity is a key element in the EHBM, one of several demographic factors that are linked with the enactment of health behaviours (Gillibrand & Stevenson, 2006; Redding et al., 2000; Sullivan et al., 2008). Such factors, including ethnicity are said to have links between health behaviours and psychosocial factors, namely barriers, benefits, susceptibility and severity perceptions (Redding et al., 2000). In the present research, ethnicity was treated as a predictor variable of cancer control behaviours. Preliminary analyses (i.e., chi-square and one-way ANOVA using the Bonferroni method) were conducted to assess the relationships between demographic characteristics (e.g., income, religion and education) and ethnicity and cancer control behaviours. These demographic

variables were treated as covariates in regression analyses, as a primary aim of this research was to assess the association between ethnicity and cancer control measures. The choice of statistical approach was appropriate and while a MANOVA was possible, the Bonferroni correction method was utilized. Different analytic approaches were discussed at the time with a statistical consultant and as these analyses were of an exploratory nature, it was decided that a greater number of covariates would be retained in the analyses. As these were cross-sectional data with a sample size insufficient to carry out structural equation modelling, it was not deemed appropriate to explore possible mediating relationships.

From the C-SHIP perspective, cultural factors and the cognitive-affective mediating units incorporated in this model are said to be collectively involved in the uptake and enactment of cancer control measures. Culturally-specific values and health beliefs (e.g., fatalism towards health outcomes), as well as demographic and logistic barriers (Miller et al., 1996a), such as low socioeconomic status and limited access to medical services can reduce cancer control usage, presumably by decreasing efficacy and outcome expectations for assistance (Miller et al., 1996a).

Further, the CSM incorporates cultural factors as the background for the creation of illness representations for illnesses (Leventhal et al., 1992) and health behaviour usage (Consedine, Magai, & Neugut, 2004a). Culture and the individual's experiences are fused in their illness representations due to the processing of information pertaining to external and internal (i.e., somatic experiences) environments (Baumann, 2003). While the CSM has been applied to study skin cancer related behaviours among healthy populations, this did not specifically address ethnic differences (Cameron, 2008). Moreover, the CSM is yet to be employed to assess and compare health behaviour usage for breast and cervical cancer among healthy ethnic populations. Hence, there is a need to examine the relationships between ethnicity and these health-protective behaviours in the context of cognitive and affective

constructs incorporated in this theory. The current research will focus on *ethnicity* rather than *culture* as cultural factors are key elements of ethnicity and encompass a broader range of characteristics (e.g., ancestry and language) relevant to a group (Camoroff & Camoroff, 2009) than culture. The specific ethnic groups included in this research encompass immigrant women originating from Croatia, Macedonia and Lebanon, as well as a comparison group of Australian-born non-immigrant women. The general context and characteristics of individuals from these ethnic backgrounds is detailed in the following section.

Ethnic Groups assessed in the Current Research

Characteristics of Croatian-born individuals living in Australia

Croatians represent 0.25% of the Australian population, with 36.2% (Australian Bureau of Statistics, 2006) residing in New South Wales (NSW), the state in which participants for this study were recruited. Croatian settlement in Australia began in the 19th century (Šutalo, 2004); however, it was immediately after the Second World War that the Croatian population in Australia increased considerably (approximately 5,000), as many migrated under the Displaced Persons Scheme (Drapac, 2009). In the 1960s, the Socialist Federal Republic of Yugoslavia allowed Croatian citizens to seek employment overseas. As a result, a third wave of Croatian immigrants came to Australia in the 1960s and 1970s. In order to escape the conflicts in Croatia during the 1990s, the most recent influx of Croatian immigrants arrived under Australia's Humanitarian Programme (Drapac, 2009). Of the total Croatian population resident in Australia, 48.6% are female and most are Australian citizens (Australian Bureau of Statistics, 2006). Their main religious affiliations are Catholic (77.1%) and Eastern Orthodox (13.8%); and a small percentage have no religious affiliation (3.4%). A little less than half (45.4%) of Croatians 15 years of age and over have post high school qualifications (11.7% obtained a diploma and/or degree), compared to 52.5% of the overall Australian population (Australian Bureau of Statistics, 2006). Croatians are mainly employed

in technical and trades roles, followed by labouring and professional vocations (Australian Bureau of Statistics, 2006). Further, church activities (as most are Catholic), family and community gatherings are key recreational activities for many Croatians (Diversicare, 2011).

There are significant health issues among Croatians living in Australia. These include obesity, diabetes, high blood pressure and cholesterol, heart disease and psychological disorders (depression, anxiety, post-traumatic stress disorder and schizophrenia) (South East Region Migrant Resource Centre, 2008). Amongst Croatian immigrants, there is a social stigma ascribed to psychological illnesses (South East Health, 2008) and some reluctance in accessing mental health services is evident. Indeed, some Croatian refugees do not pursue treatment for post-traumatic stress disorder (Mundic, 1997). In general, Croatians hold their own health in high regard and obtain necessary medical advice. Health professionals are revered and doctors are continually approached for referrals, medical advice and support (Diversicare, 2011). Although Croatians tend to comply with their doctor's advice regarding medical treatments, some older Croatians may initially rely on traditional healing (herbal medicine, massage and faith healers) approaches (Diversicare, 2011). Unfortunately, health-protective behaviours are not enacted by all eligible Croatians (South East Health, 2008), including breast cancer control measures (South East Health, 2006). This will be discussed in the next section.

Characteristics of Macedonian-born individuals living in Australia

The majority of those born in the Former Yugoslav Republic of Macedonia who emigrated to Australia live in Victoria (45.1%) and NSW (43.5%) (Australian Bureau of Statistics, 2006). Although their settlement in Australia commenced in the 19th century, many Macedonians living in the US immigrated to Australia in 1924, as the US Government introduced immigration quota restrictions. Similar to the Croatians, the largest wave of Macedonian immigrants (nearly 100,000) arrived during the 1960s and 1970s. However, this

was largely due to an earthquake in the Macedonian region of Skopje (Hill, 1989). In the 1990s, there were conflicts in the Former Yugoslavia and with the break-up of this country, a further wave of immigrants arrived (Thomas, 2001). Academically, only 32.9% of Macedonians aged 15 years and over hold post-secondary qualifications, with 10.4% attaining a diploma and/or degree. Their main religion is Eastern Orthodox (87.9%), followed by Islam (5.3%) and the minority (42.9%) are female. Most Macedonians are employed in unskilled occupations as labourers, machine operators and drivers, followed by technical and trades occupations. It should be highlighted that individuals who identify themselves as Macedonian are generally born in Aegean Macedonia (a state in Greece) or the Former Yugoslav Republic of Macedonia (Thomas, 2001). As such, the current research restricted participant recruitment to those born in the Former Yugoslav Republic of Macedonia.

In the health context, generally Macedonian women consider high blood pressure, cholesterol, cardiovascular problems, cancer and mental health issues, including stress as their most serious health concerns (South East Health, 2008), consistent with the views of women from the general Australian population. Traditional healers (generally without medical training) and home remedies, including teas, herbs and creams are often utilized to treat ailments and maintain overall health (St George Division of Mental Health, 2003). Of particular concern is that these traditional healing approaches are sometimes used instead of medical professionals (Tkalcevic, 1980) and to treat mental illnesses, generally in the early stages and prior to pursuing professional help (St George Division of Mental Health 2003). Drug and condom usage are generally not accepted practices within the Macedonian community. In fact, one study demonstrated that only 11% of young Macedonians used a condom with their partner and only 12% always used a condom with a casual partner (Watson et al., 1985).

Like their Croatian-born counterparts, there is a social stigma attached to certain illnesses (South East Health, 2008), such as mental health issues (St George Division of Mental Health 2003). A perceived lack of control over one's health also exists within the Macedonian community (Australian Institute of Health and Welfare, 2004). Indeed, one study found that Macedonian women perceived breast cancer to be caused by God and as a consequence, the efficacy of treatment would be limited (Australian Institute of Health and Welfare, 2004). Clearly, these views could affect their health in general and diminish their use of health-protective behaviours such as participating in cancer screening programs (South East Health, 2008).

Characteristics of Lebanese-born individuals living in Australia

Lebanese-born immigrants represent 0.4% of the Australian population (Australian Bureau of Statistics, 2001). Most reside in NSW (74.5%) and Victoria (20%) (Australian Bureau of Statistics, 2006). During the 1890s, numerous Lebanese Christian immigrants migrated to Australia making their population one of the older established ethnic minorities in the country (Monsour, 2005). In 1947, there were almost 2,000 mainly Christian Lebanese immigrants residing in Australia. Further migration led to a population increase to approximately 24,000 by 1971 and nearly 50,000 by 1981 (Humphrey, 2004). This next wave of immigrants comprised of both Lebanese-born Christians and Muslims, with many (approximately 20,000) escaping the 1975 Lebanese Civil War (Humphrey, 2004). In Australia, most Lebanese-born are of Islamic (40.5%) or Catholic (39%) religious faiths, with a smaller proportion Eastern Orthodox (10.1%). Similar to the Macedonian-born, only 32.2% of those 15 years of age and over have attained post high school qualifications (11.9% obtained diploma and/or degree level) and a minority (42.9%) are female. Across both sexes, their employment is predominantly within professional roles, followed by technical and trades then clerical and administrative positions (Australian Bureau of Statistics, 2006).

With regards to health, Arabic Australian women (including Lebanese-born) with limited English skills tend to hold mixed views associated with knowing a cancer diagnosis. Specifically, women with negative attitudes report that being aware of the illness would kill the patient or the psychological distress (fear and worry) patients experience as a result of this knowledge would decrease their quality of life (Russell, 1996). Those with more positive attitudes believe awareness is the key to receiving adequate treatment (Russell, 1996). Across other health contexts and compared to the general NSW population, a significantly lower percentage of Lebanese-born adults perform adequate physical activity (36.8%), consume the recommended daily intake of fruit and vegetables (1.7%) and received the influenza vaccination (32.4%) in the past year (Centre for Epidemiology and Research, 2010). Moreover, a significantly higher percentage were overweight (42.8%), smoke (34.4%) and currently experience (or had previously experienced) acute or very acute levels of psychological distress (20.3%) than the overall NSW population (Centre for Epidemiology and Research, 2010). Hence, there are prevalent health issues within this ethnic group that distinguish them from the majority population.

Characteristics of Australian-born individuals living in Australia

Demographically, the highest proportion of Australian-born individuals reside in NSW (32.1%), followed by Victoria (24.4%) and Queensland (20.9%). Their median age is 32.8 years, compared to 46.8 years for their overseas-born immigrant counterparts overall, and 50.7% are female. Their main religious affiliations are Catholic (27.2%), Anglican (21.4%) and no religion (20.5%). Among those 15 years of age and over, 46.8% have attained post high school qualifications (21.9% achieved diploma and/or degree level) and most are employed in professional vocations, followed by clerical and administration and technical and trades roles (Australian Bureau of Statistics, 2006).

In relation to health and service usage, comparisons have been made between Australian-born individuals and the general NSW population (Centre for Epidemiology and Research, 2010). Specifically, a significantly higher ratio of Australian-born adults living in NSW were overweight (34.3%), vaccinated against pneumonia in the past 5 years (33.2%), suffered high blood pressure (31.5%) and medically diagnosed asthma (12.1%), and faced difficulties obtaining necessary healthcare (17.1%). Additionally, a significantly lower percentage experienced or were experiencing heightened psychological distress (10.7%) and consumed the recommended daily fruit intake (54.6%) (Centre for Epidemiology and Research, 2010). Hence, although the Australian-born population have relatively higher levels of postgraduate education and professional employment than their Croatian, Macedonian and Lebanese counterparts, they nonetheless are also experiencing ongoing significant health problems.

This brief overview of the characteristics of the populations studied in the present research paints a picture of the situational and experiential factors that are likely to influence the attitudes and responses towards health-protective behaviours generally. These immigrant groups have all had unique past experiences that led them to immigrate to Australia, in many instances under dangerous and traumatic circumstances. All three groups are less educated than the general Australian-born population, potentially limiting their understanding of the causes of disease and the purpose of early detection programs. Indeed, beliefs in traditional healing practices are evident across the Croatian, Macedonian and Lebanese immigrant groups, presenting a potential barrier to participation in cancer control programs. Moreover, there is evidence for generally lower adherence to health living recommendations across all of these immigrant groups. Taken together, these characteristics of each ethnic group suggest that there are likely to be differences in both levels of adherence to cancer control

recommendations, as well as differences in cognitive and affective responses to these health-protective behaviours.

The following sections provide an overview on the relationships between cancer control and ethnicity, demographic and psychological factors. With regard to breast cancer screening, most of the research on self-examination of the breasts refers to usage of the BSE procedure (e.g., Erblich, Bovberg, & Valdimarsdottir, 2000; Kudadjie-Gyamfi et al., 2005; Madan et al., 2000) rather than the more general breast awareness approach. However, it remains important to address this literature, as the currently recommended *breast awareness* approach relates to familiarity and self-examination of the breasts which many women recognize as enacting a BSE (Mason & White, 2008).

Use of Breast and Cervical Cancer Control Measures

There is evidence suggesting that breast and cervical cancer control usage varies among certain ethnic groups. Among US ethnic groups, there is some evidence that African American women are more likely to be screened for breast and cervical cancer than White women (Bennett, Probst, & Bellinger, 2012), although the reverse has also been obtained for another study in the context of breast cancer screening (MacKay, Fingerhut, & Duran, 2000). Hispanics are generally less likely to report participating in breast (Breen, Waegner, Brown, Davis, & Ballard-Barbash, 2001; Mandelblatt et al., 1999; Pearlman, Rakowski, Ehrich, & Clark, 1996) and cervical (Behbakht, Lynch, Teal, Degeest, & Massad, 2004) cancer screening than White and/or African American women. More recent survey data in the US suggests Hispanic and Asian women obtained a recent mammogram and Pap smear less often than White, Indian/Alaska Native, and African American women (National Center for Health Statistics, 2011). Similarly, in the context of cervical cancer prevention, being Black (Chao, Velicer, Slezak, & Jacobsen, 2010), or African American and Asian is associated with being less likely to receive the HPV vaccine than White women (Licht et al., 2009). However, not

all studies consistently report these patterns in screening participation. For example, for breast cancer control measures, one study comparing Hispanic, White and African American women reports no significant differences amongst these groups (e.g., Frazier, Jiles, & Mayberry, 1996). It is possible that some of the ethnic differences across these studies may be attributable to participant recruitment occurring in different locales, as in urban and rural locations (e.g., Polasek et al., 2007; Stamenic, & Strnad, 2011). In the Australian context, Chinese immigrant women have been found to be low users of mammography, with only approximately 40% of Chinese women having ever undertaken a mammogram (Kwok & Sullivan, 2007a; Kwok & Sullivan, 2007b; Kwok & Sullivan, 2006a; Kwok & Sullivan, 2006b; Kwok, Sullivan & Cant, 2006).

Moreover, it has been suggested that the discrepancies in findings between studies reporting levels of cancer control behaviours may be a reflection of the way in which ethnic groups are categorised. For example, the broad category of "European" can reflect any number of the European countries spanning from the northern Scandinavian countries through to the Mediterranean and the Eastern European countries. Yet there is little dispute that this region of the world represents a high level of cultural and linguistic diversity. Therefore, a more fine-grained approach to identifying specific ethnic sub-groupings may be a more informative approach to understanding health-related behaviours (Consedine & Magai, 2002; Consedine, Magai, Spiller, Neugut, & Conway, 2004c; Magai et al., 2004). One study adopting this approach assessed BSE use among immigrant Haitian, Dominican, and English-speaking Caribbeans, as well as Eastern European women and US-born African Americans and Europeans. The findings of the study were that Dominican ethnicity was related to higher BSE frequency (Kudadjie-Gyamfi et al., 2005), in stark contrast to some of the earlier work indicating lower levels of participation among Hispanics. Another study comparing CBE and mammography screening rates among six ethnic groups (US-born

White, African American, English-speaking Dominican, Haitian, Caribbean and Eastern European) revealed the lowest screening rates for Eastern European and Haitian women, with US-born White and African American women reporting more mammograms than the other groups (Consedine et al., 2004a). A further study comparing African American and immigrant Caribbean (Jamaican, Virgin Islands, Trinidad and Tobago, and Haitian) women found that almost half of the Haitian but overall one-quarter of the Caribbean women had never had a Pap smear, compared to one-tenth of the African American women (Fruchter et al., 1985). Therefore, these findings suggest that a more fine-grained approach to understanding health-related behaviours provides a more accurate and informative picture of differences between specific ethnic groups.

Adopting this approach, the current research assessed breast and cervical cancer control use among Australian-born women, compared with specific ethnic subpopulations, namely Croatian-, Macedonian- and Lebanese-born women residing in Australia. Their uptake of these cancer control behaviours in the context of prior research will be examined in the next section.

Breast Cancer Screening among the Ethnic Groups under Investigation

There is limited data available on the breast cancer screening behaviours of Australian, Croatian, Macedonian and Lebanese women living in Australia. The only available information relating to comparative rates of BSE and CBE, is based on one study using data from the National Health Survey that assessed ethnic differences in breast cancer screening among immigrant women and Australian/New Zealand-born women (Siahpush & Singh, 2002). It was found that Middle Eastern-born women were least likely to have regularly examined their breasts, and that women born in Eastern Europe/former USSR and the Middle East were less likely to have received a CBE than Australian/New Zealand-born women. Specifically, 42% of Middle Eastern and 61.8% of Eastern European/former Union

of Soviet Socialist Republics (USSR) women frequently examined their breasts, compared to 66.9% of Australian/New Zealand women. Moreover, in comparison to 82.2% of Australian/New Zealand women, only 30.8% of Middle-Eastern women and 71.9% of Eastern European/former USSR women had ever received a CBE (Siahpush & Singh, 2002). Although immigrants from the non-English speaking backgrounds were found to utilize these cancer control measures to a lesser extent, there were no comparisons made between specific ethnic subgroups nor were there any details provided on the composition of ethnic subgroup categories (e.g., whether Croatian women were part of the Eastern European/Former USSR group and in which grouping Macedonian women were included).

In relation to mammography screening, participation rates vary for the groups examined in the present research, depending on the source of the information. Data from the National BreastScreen program in the state of Victoria indicate that among women in the target age group (50 to 69 years), only 53.8% of Lebanese, 8.2% of Croatian and 16.5% of Macedonian women have obtained a recent mammogram (BreastScreen Victoria, 2004), compared with 62.3% of Australian women (BreastScreen Victoria, 2006). However, these data may be misleading as Croatian and Macedonian women were only added to the BreastScreen database towards the end of the assessed two year period, which likely led to the very low recorded screening rates for these ethnic groups. A more accurate representation of screening participation for these groups may be taken from population-based data from BreastScreen in the state of NSW (as cited in South East Health, 2006) which suggest that Macedonian (40.3%) and Croatian (approximately 54%) women are infrequent users of mammograms. Conflicting evidence exists regarding the screening participation of Lebanese-born women with one qualitative study suggesting that generally Lebanese women were lapsed screeners or had never been screened (Australian Government Department of Health and Ageing, 2009), whereas data from the Centre for Epidemiology Research (2010)

indicates that more women born in Lebanon (89.7%) have had a recent mammogram than women born in Australia (78.6%) and Lebanese-born are more likely to have had a current mammogram than the general NSW population. In light of these inconsistencies, it should be highlighted that the BreastScreen data are far more comprehensive and representative than the data in the epidemiology study, as more than 50% of all eligible women in NSW (53.9% of the target age group) and throughout Australia (55.5% of the target age group) utilize BreastScreen services for mammography screening, and were therefore included in this audit of the screening service (Australian Institute of Health and Welfare, 2011a). Hence, it is likely that the BreastScreen data provides a more accurate picture on screening for these ethnic groups. Further, given that the available limited research suggests that Australian, Croatian, Macedonian and Lebanese women vary in their use of this measure, it is important that further research is undertaken to compare uptake rates between these groups and assess factors potentially involved in adhering to usage.

Cervical Cancer Control among the Ethnic Groups assessed

There is no population-based data available on Pap smear usage for the ethnic groups assessed; however, Cancer Australia aims to improve data collection through the systematic collection of cancer staging information and publication of national statistics (i.e., across all ethnic groups in Australia) in collaboration with the Australian Institute of Health & Welfare (Cancer Australia, 2012). Moreover, several studies have focussed on the Pap smear screening behaviours of the ethnic groups examined in the current research. In a study of recently-arrived immigrant women born in the former Yugoslavia (including 62.5% born in Croatia or Macedonia) aged 20 to 69 years of age, only 20.3% received a Pap smear in the last two years, and 34.4% never had a Pap smear (NSW Cervical Screening Program, 2000). Unfortunately, in this study the specific screening rate for each ethnic subgroup was not provided. In another study, almost half of the Macedonian women (44%) studied had not

received a Pap smear in the last two years, and whilst Croatian women were considered to be adequately screened (percentage not provided), only 18% reported the intent to re-screen (i.e., obtain another Pap smear) within the next two years (Fernbach, 2002). Moreover, a further limitation of this study is that 6% of the sample was Australian-born (non-immigrant) and participants' chosen cultural background rather than their country of birth distinguished the ethnic groups. Data on the cervical cancer screening rates for Lebanese-born women are inconclusive with one study reporting lower rates for Lebanese-born women (58.4%) compared with Australian-born (76.9%) women (Public Health Division, 2001), and a more recent study finding that Lebanese and Australian women report similar levels of adherence (78.8% and 75.5% respectively) (Centre for Epidemiology and Research, 2010). However, in the latter study participants were initially instructed that Pap screening is utilized regularly to detect changes in the cervix and recommended to all women. This information may have led to some over-reporting and prompted erroneous and socially desirable responses. Unfortunately there are currently no data available regarding HPV vaccine usage among these ethnic groups. Despite some inconsistencies, these findings suggest cervical cancer screening rates vary among Lebanese, Croatian and Macedonian women in comparison to Australian women, justifying the need for further research to assess screening uptake between the groups. Further investigations are also needed to document the rate of HPV vaccine uptake in these ethnic groups.

Demographics/Cancer History and Breast and Cervical Cancer Control Use

Demographics

Socio-demographic variables are often related to the uptake of breast and cervical cancer control measures (e.g., Achat, Close & Taylor, 2005; Fernández-Esquer, Espinoza, Ramirez, & McAlister, 2003; Hoque, Hoque, & Bibi Kader, 2008; Marlow et al., 2008; Sung et al., 1997); however, the findings are mixed across some studies (e.g., Hoque et al., 2008;

Sung et al., 1997). These variables are incorporated in the EHBM and the following section provides an overview on research assessing the relationships between demographics/medical history variables and cancer control in the general population and among specific ethnic groups.

Age

Some studies have demonstrated that age is positively associated with BSE (Persson, Svensson, & Ek, 1997) and mammography (Feldstein et al., 2011; Rutledge, Barsevick, Knobf, & Bookbinder, 2001) screening; however, age has also been linked with poorer mammography (Edwards & Jones, 2000) and Pap smear (Hsia et al., 2000) uptake. Among ethnic groups residing in the US, younger Hispanic American women are more likely to have received a recent CBE (Gorin & Heck, 2005), mammogram (Gorin & Heck, 2005) and Pap smear (Fernández-Esquer, Espinoza, Ramirez, & McAlister, 2003; Gorin & Heck, 2005; Randolph, Freeman, & Freeman, 2002) than older women. Regular CBE and Pap smear enactment have also been associated with younger age for African American women (Sung et al., 1997). Among White, Asian, African and Hispanic women residing in the US, age (31 years and over) was positively associated with ever having and having a recent Pap smear (De Alba, Ngo-Metzger, Sweningson, & Hubbell, 2005).

In other countries, older Turkish women were more likely to have a mammogram (Sadikoglu, Ozcakir, Dogan, Gokgoz, & Bilgel 2010); however, younger age was related to mammography adherence for South Korean women (Suh & Park, 2011) and in accepting the HPV vaccine for Greek women (Donadiki et al., 2012). Further, other studies have shown no age relationships with BSE (Kudadjie-Gyamfi et al., 2005) and CBE but older age has predicted mammography (Consedine et al., 2004a; Consedine, Magai, Horton, Neugut, & Gillespie, 2005) screening for ethnically diverse samples living in the US. In summary,

across most of these studies younger age is generally associated with uptake and older age is mostly related to poorer adherence to cancer control measures.

Education

Women with a higher level of education have been found to be more likely to undertake a BSE (Erblich, Bovberg, & Valdimarsdottir, 2000; Madan et al., 2000), mammogram (Augustson, Vadaparampil, Paltoo, Kidd, & O'Malley, 2003) and Pap smear (Marlow et al., 2008) than women with fewer years of education. Lower educational attainment has also been related to poorer mammography and Pap smear adherence (Hsia et al., 2000). Among specific ethnic populations this association with education is less clearly defined. In studies of Hispanic American women, higher educational attainment predicted CBE, mammography (Gorin & Heck, 2005) and Pap smear (Skaer, Robison, Sclar, & Harding, 1996) screening. In ethnically diverse samples in the US, a higher level of education was positively related to BSE (Kudadjie-Gyamfi et al., 2005), CBE and mammography (Consedine et al., 2004a; Consedine et al., 2005) adherence. Additionally, White, Asian, African and Hispanic women with higher educational attainment were more likely to have a recent Pap smear than women with less education (De Alba, Ngo-Metzger, Sweningson, & Hubbell, 2005). However, education has not been related to recent CBE, mammography and Pap smear uptake for African American women (Sung et al., 1997), mammography screening for Turkish (Sadikoglu et al., 2010) and South Korean (Suh & Park, 2011) samples and obtaining a recent Pap smear for South African (Hoque et al., 2008) women. In summary, despite some inconsistency most of these studies suggest that a higher level of education is related to the use of cancer control measures.

Marital status

Several studies have shown that although single women are more likely to undertake a BSE than married women (Madan et al., 2000), they are less likely to have obtained a current

mammogram than those who are married (Achat et al., 2005; Hsia et al., 2000; Marlow et al., 2008) or in a defacto relationship (Achat et al., 2005; Hsia et al., 2000). Widowed, separated, or divorced females are also less adherent to mammography screening guidelines than defacto and married women (Achat et al., 2005). Additionally, defacto and married women are more likely to have received a recent Pap smear than unmarried females (Marlow et al., 2008). One further study, however, demonstrated no relationship between marital status and BSE in the general population (Erblich et al., 2000).

Among specific ethnic groups, married Hispanic Americans were most likely to comply with Pap smear screening (Fernández-Esquer et al., 2003; Gorin & Heck, 2005; Skaer et al., 1996), but there were no relationships between CBE, mammogram and Pap smear screening for an African American sample (Sung et al., 1997). In addition, marital status was not related to BSE (Kudadjie-Gyamfi et al., 2005) and mammography (Consedine et al., 2005) enactment for ethnically diverse US-born and immigrant women, mammography uptake for Turkish women (Sadikoglu et al., 2010), and Pap smear use for a South African sample (Hoque et al., 2008). Hence, the findings in the overall population indicate a clear association between marital status and cancer control behaviours, but the evidence among specific ethnic populations is less conclusive.

Income

Income has been positively associated with CBE, mammography and Pap smear (Katz & Hofer, 1994) enactment in the general population, as well as in specific ethnic groups: CBE adherence for African American women (Sung et al., 1997); mammography uptake for Turkish women (Sadikoglu et al., 2010); and Pap smear use for Hispanic (Skaer et al., 1996; Randolph et al., 2002); African American (Sung et al., 1997); and, US White, Asian, African and Hispanic (De Alba et al., 2005) samples. Conversely, lower income has been associated with lower mammography and Pap smear screening utilisation (Hsia et al., 2000). However,

no relation was found in a population-based UK sample comprising of a small percentage (6%) of ethnic minorities (Marlow et al., 2008) and in two US-based studies investigating BSE (Kudadjie-Gyamfi et al., 2005) and mammography (Consedine et al., 2005) frequency for US-born and immigrant ethnic groups. On balance, most of these studies suggest that a higher level of income is related to greater cancer control usage.

Religion

Religiosity has also been associated with breast and cervical cancer control, with women attending religious services more likely to undertake a Pap smear, mammogram and examination of their breasts than non-religious females (Benjamins, 2005). Iranian Muslims believe undertaking a BSE or CBE is not against their religious beliefs (Montazeri, Haji-Mahmoodi, & Jarvandi, 2003), although it has been suggested that mammography screening may be perceived as contradictory to religious beliefs for Lebanese Muslim women living in Australia (Australian Government Department of Health and Ageing, 2009). Indeed, religious beliefs have been negatively associated with the enactment of breast cancer control measures for certain ethnic groups, including Israeli (Shmueli & Tamir, 2007) and African American (Banning, 2011; Kinney, Emery, Dudley, & Croyle, 2002) women. Further, religious reasons have been linked to lack of Pap smear use for Americans (Merrill & Madanat, 2002) and South Africans (Hoque et al., 2008). Thus, the majority of these studies indicate that there is a relationship between religion and the uptake of cancer control measures, although the specific direction of this association may differ between ethnic groups and religions under consideration.

Cancer History

Personal and family histories of breast and cervical cancer

Personal (Gorin & Heck, 2005) and family (Hicks & Stephan, 2008) histories of breast cancer have been associated with greater adherence to breast cancer screening.

Specifically, a family history of breast cancer has been linked with BSE (Hicks & Stephan, 2008) and mammography enactment (Murabito et al., 2001), and a review on breast cancer risk and breast cancer screening revealed that women with a personal history of breast health issues (i.e., personal history of breast cancer or symptoms needing a biopsy) and a family history of breast cancer were more likely to participate in mammography screening (McCaul, Bransetter, Schoeder, & Glasgow, 1996a). However, there is also evidence of no association between family history and BSE in a US-based study (Erblich et al., 2000) and with mammography screening in a Turkish-based study (Sadikoglu et al., 2010). Of particular concern is a misapprehension of some Lebanese Australian women who believe that in the absence of a family history of breast cancer that mammography screening is not necessary (Australian Government Department of Health and Ageing, 2009).

Little research has examined the relationships between cervical cancer history and cervical cancer control use (e.g., Kahn, Goodman, Huang, Slap, & Emans, 2003), which may be due to the fact that it is largely a sexually transmitted disease (Bosch & de Sanjosé, 2003). Nonetheless, a family history of cervical cancer has been negatively related to obtaining a follow-up Pap smear in an ethnically diverse US (Hispanic, White and African American) sample (Kahn et al., 2003).

To summarise, this overview of the role of demographic and medical history variables has highlighted associations between age, marital status, income, religious affiliation and personal and family history of cancer with cancer control behaviours. Given that these variables have been extensively assessed in the cancer control context, it was deemed appropriate to include them in the current research. While these particular factors are not regarded as central to the current research question, they are nonetheless variables that should be considered as potential covariates when examining other factors such as cognitive and affective variables in this context. The remaining sections provide a summary and critique on

these psychosocial factors. Worry (affect), perceived susceptibility/risk, control and efficacy of cancer control (cognitive) are part of the C-SHIP and EHBM theories, beliefs about pain and discomfort (cognitive) are incorporated in the EHBM and illness perceptions (cognitive and affective) are encompassed in the CSM.

Cognitions, Affects and their Relationships with Breast and Cervical Cancer Control

Perceived susceptibility/risk of breast cancer

Perceived susceptibility is defined as an individual's perception of their risk of being diagnosed with an illness (Janz, Champion, & Strecher, 2002), including perceived risk of a breast cancer diagnosis. In general, perceived susceptibility of breast cancer has typically been associated with BSE (Brain, Norman, Gray, & Mansel, 1999), CBE (Parsa & Kandiah, 2010; Royak-Schaler et al., 1995) and mammography (Consedine et al., 2005; Lostao, Joiner, Pettit, Chorot, & Sandin, 2001) adherence. In the Australian context, a positive association between perceived risk and mammography has been noted (Cockburn, Sutherland, Cappiello, & Hevern, 1997), and among women with a familial history of breast cancer, underscreeners of mammography are more likely to report lower perceived risk than screening adherent women (Price et al, 2010). However, there is also evidence that increased perceived risk may be related to poorer BSE (Lindberg & Wellisch, 2001) and mammography (Andrykowski et al., 2001) utilization. Lack of association between perceived risk and mammography screening has also been noted in a multi-ethnic study in the US (Asian, White, Latina and African American), although in this study White women were more likely to report higher perceived risk to breast cancer than Asian women (Kim et al., 2008).

Several systematic reviews and meta-analyses have been undertaken to clarify this apparent inconsistency in findings regarding the role of perceived risk and cancer control behaviours (Jepson et al., 2000; Katapodi, Lee, Facione, & Dodd, 2004; McCaul et al., 1996a; Schueler, Chu, & Smith-Bindman, 2008). One review found that most studies (eight

were examined) did not demonstrate an association between perceived susceptibility and mammography screening (Jepson et al., 2000). However, a meta-analysis of these studies could not be completed as the studies lacked adequate information to calculate effect sizes (Jepson et al., 2000). Whereas meta-analyses which have typically included a larger number of studies have tended to conclude that there is a positive relationship between perceived breast cancer risk and mammography screening (Katapodi, Lee, Facione, & Dodd, 2004; McCaul et al., 1996a), although the overall effect sizes are relatively small (Katapodi, Lee, Facione, & Dodd, 2004; Magai, Consedine, Neugut, & Hershman 2007; McCaul et al., 1996a). In relation to BSE, it is not known whether perceived risk is related to the enactment of this measure as the findings are mixed (i.e., positive, negative or no relation) across the limited research undertaken (Katapodi et al., 2004). Further, another meta-analysis found that *lower* perceived risk did not have a statistically significant impact on the uptake of mammograms (Schueler et al., 2008).

With regards to ethnic differences in perceived risk, Katapodi et al. (2004) included women from various ethnic backgrounds in their meta-analysis. They found that five studies comprising of up to almost 50% of minority women examined the association between ethnicity and perceived risk. In all of these studies, White women were more likely to endorse a higher level of perceived susceptibility of breast cancer than minority (e.g., African American) women. Only two studies with a higher percentage of minority women did not find any differences between White and minority women across this construct, although there was not enough information to calculate effect sizes for both of these studies (Katapodi et al., 2004). Taken together, the findings from this review suggest that White women report a higher level of perceived risk to breast cancer; and across most of these studies, perceived risk is positively related to mammography screening.

Perceived susceptibility/risk of cervical cancer

Although perceived risk of cervical cancer has received much less attention, the perception of being at low or no risk of this disease has been cited as a reason for not obtaining a Pap smear (Basu et al, 2006; Mutyaba, Mmiro, & Weiderpass, 2006; Wong, Wong, Low, Khoo, & Shuib, 2008). In the Vernon (1999) review, three studies assessing the relationship between perceived risk and Pap smear use were evaluated. Once other variables (e.g., demographics) were controlled for, one study demonstrated a positive relationship and the remaining two studies found no relation with Pap smear uptake. However, given that the available literature was limited, no definitive recommendations could be drawn regarding the role of perceived risk in Pap smear screening (Vernon, 1999).

More recent research of ethnically diverse samples (i.e., White, Hispanic and African American) also supports the view that low personal susceptibility to cervical cancer is linked with lower usage of Pap smears (Behbakht, Lynch, Teal, Degeest, & Massad, 2004). In this study a significantly higher proportion of Hispanic women and those living in the US for under five years had never had a Pap smear (Behbakht et al., 2004). Although, another study examining perceived risk among White and minority women found that Asian women were less likely and Latina women were *more* likely to report a higher perceived risk of cervical cancer than White women, and that risk perception was not related to recent Pap smear usage (Kim et al., 2008). These inconsistencies may be at least in part attributed to differences in sample characteristics. Unlike the Behbakht et al. (2004) study, the Kim et al. (2008) study had close to half of the participants with a personal or family history of cancer (Kim et al., 2008). It is likely that family or personal history may be a more potent motivator to engage in Pap screening than perceived risk, hence the differences in these study outcomes. There is also evidence that among minority populations that there are misconceptions about the role of cervical cancer screening, as one literature review reported the widespread belief held by

Hispanic, Native American and Asian populations that a Pap smear is not required unless feeling unwell (Johnson, Mues, Mayne, & Kiblawi, 2008).

Fewer researchers have examined the association between perceived risk and the HPV vaccine. Nonetheless, higher perceived susceptibility to cervical cancer has been related to intent to receive the HPV vaccine (Boehner, Howe, Bernstein, & Rosenthal, 2003; Gerend, Lee, & Shepherd, 2007; Giuseppe, Abbate, Liguori, Albano, & Angelillo, 2008; Hsu et al., 2009). Overall, the research on perceived cervical cancer risk and screening suggests that lower perceived risk is generally associated with reduced cervical cancer control use or vice versa.

Perceived control and perceived efficacy of breast cancer screening

Perceived control relates to the level of control a person believes they have over their health (Wallston, 1997). Generally, if an individual feels more in control over their health (e.g., able to detect breast cancer early by participating in screening), then the greater the likelihood they will undertake the relevant health-protective behaviour (e.g., perform a BSE) (Wallston, 1997). Indeed, a higher level of perceived control over health has been linked to the uptake of BSE (Bundek, Marks, & Richardson, 1993; Cohen, 2002; Kurtz, Given, Given, & Kurtz, 1993), CBE (Kurtz, Given, Given, & Kurtz, 1993), and intent (Champion, 1992) or uptake (Crane, Kaplan, Bastani, & Scrimshaw, 1996; Kurtz, Given, Given, & Kurtz, 1993) of mammography screening. Despite the strong evidence favouring the role of perceived control over health and cancer control behaviours, two studies comprising African American women report the reverse association with higher levels of perceived control over breast cancer related to reduced mammography uptake (Miller & Champion, 1997), and *lower* beliefs of control over detecting health issues were associated with increased mammography (Russell, Perkins, Zollinger, & Champion, 2006). In summary, while there is strong evidence that

perceived control enhances health-protective behaviours, the specific effect of perceived control may differ for specific ethnic groups.

Perceived efficacy of breast cancer screening, or response efficacy, refers to the level of confidence one has in these behaviours to detect cancer. In relation to BSE, a greater belief in the efficacy of this technique to readily identify breast cancer symptoms has been associated with the enactment of this measure (Kudadjie-Gyamfi et al., 2005; Kurtz, Given, Given, & Kurtz, 1993; Mason & White, 2008). This association has also been demonstrated in studies using ethnically diverse samples, (Kudadjie-Gyamfi et al., 2005). Likewise, perceived efficacy has predicted CBE (Kurtz, Given, Given, & Kurtz, 1993) and mammography (Kurtz, Given, Given, & Kurtz, 1993) usage. Hence, the belief that breast cancer screening tools are effective in detecting cancer has been positively associated with screening.

Perceived control and perceived efficacy of cervical cancer control

The relationship between perceived control over health and Pap smear usage has been assessed in the cervical cancer context (Agurto, Bishop, Sa´nchez, Betancourt, & Robles, 2004; Barnoy, 2003; Bundek et al., 1993; Leung & Leung, 2010). Several studies, however, have found no relation (Borrayo & Reyes, 2002; Morales, 2010), citing that external locus of control (i.e., doctor's recommendation) was more likely to lead to usage (Morales, 2010; Borrayo & Reyes, 2002). Nonetheless, in research among specific ethnic groups (i.e., Hong Kong Chinese) (Leung & Leung, 2010) and qualitative reports in non-White populations (Latin American women from Peru and El Salvador) (Agurto, Bishop, Sa´nchez, Betancourt, & Robles, 2004), the belief of feeling in control over one's health has been associated with increased Pap smear adherence.

In relation to perceived efficacy, women holding stronger beliefs regarding the effectiveness of Pap smears hold greater intentions to enact (Boyer, Williams, Callister, &

Marshall, 2001) and are more likely to enact (Kahn et al., 2003) this measure. In one study, Kahn et al. (2003) found that trust in the Pap smear as a screening measure increased the likelihood of a sample comprising mostly of Hispanic and African women returning for a follow-up smear. Further, in the Australian context, women believing in the ability of cervical cancer screening to detect changes in the cervix are regular users of Pap smears (Pitts, Dyson, Rosenthal, & Garland, 2005); however, reporting concerns about the precision of the test does not deter some women from screening in the general population either (Smith, French, & Barry, 2003). In contrast, limited faith in the efficacy of a Pap smear is associated with being overdue for the test (Waller, Bartoszek, Marlow, & Wardle, 2009). With regards to the HPV vaccine, perceived effectiveness has been associated with intentions to receive the vaccine among women in Italy (Giuseppe et al., 2008) and minority women in the US (Gerend et al., 2007). Similar to perceived control, most of these findings indicate that perceived efficacy of cancer control tools are linked with the use of these cervical cancer control behaviours among certain ethnic groups.

Beliefs about pain and discomfort regarding breast cancer screening

Discomfort and pain relating to breast cancer screening are often cited as barriers to BSE (Parajuli, 2010), CBE (Samuel, Pringle, James, Fielding, & Fairfield, 2009) and mammography (*Aro, de Koning, Absetz, & Schreck, 1999;* Kurtz, Given, Given, & Kurtz, 1993) uptake. Among certain ethnic groups, pain has been associated with the decision not to have a mammogram for Asian (Tsai et al., 2011) and Italian (Aro et al., 1999) women. Moreover, pain concerns are important to Hispanic and African American women, as they are less likely to attend mammography screening due to fear of pain than White women (Schueler et al., 2008). However, in one study, Magai et al. (2004) found that higher pain or discomfort was positively associated with screening among US-born European and African American women, and immigrant Caribbean, Haitian and Dominican women. They report

that although this finding may be contrary to what is expected, these women were well acquainted with the mammography screening process, which may explain why pain or discomfort was related to screening.

Similarly, in Australia, pain has been a commonly endorsed barrier for not having a mammogram among Australian women (Kaye, King, Ryan, & Sadler, 1996; *Maggs, 2002*). Among Australian ethnic groups, Middle-Eastern women report that mammography screening is painful and uncomfortable, and as a result, it is their least preferred breast cancer screening method (Brushin, Gonzales, & Pain, 1997), while Lebanese women believe this measure causes discomfort and intrusive touching of their breasts (Australian Government Department of Health and Ageing, 2009). Hence, anticipated pain and discomfort may be a particularly salient barrier to the uptake of breast cancer screening services among these ethnic women. Overall, most of these studies suggest that there is a negative relationship between pain or discomfort and breast cancer screening.

Beliefs about pain and discomfort regarding cervical cancer control

Beliefs and expectancies relating to pain and discomfort have generally been related to the use of Pap smears (Hislop et al., 2003; Hoyo et al., 2005; Kahn et al., 2003). Pain (Fylan, 1998; Moreira et al., 2006; Ogedegbe, 2005; Waller et al., 2009) and/or discomfort (Kahn et al., 1999; Taylor et al., 2004) are also commonly cited barriers to obtaining a Pap smear. Moreover, pain has been negatively associated with the use of this measure across various ethnic groups, including African American (Hoyo et al., 2005), Asian American (Yoo, Le, Vong, Lagman, & Lam, 2011) Hispanic American (Byrd, Peterson, Chavez, & Heckert, 2004), and Turkish (Esin, Bulduk, & Ardic, 2011) women. Further, in a systematic review of the literature pertaining to pain and Pap smear adherence, Johnson et al. (2008) found that in general pain was a barrier to Pap smear use for Hispanic and African American

migrant women living in the US. Hence, there is a consistent finding that the experience of pain and discomfort is a barrier to obtaining a Pap smear.

Breast cancer worry

Cancer worry is defined as a negative affective response to the threat of cancer (Bowen et al., 2003). There are positive relationships between cancer worry and the use of BSE (Bowen, Alfano, McGregor, & Andersen, 2004; Brain et al., 1999; McCaul, Schroeder, Reid, 1996b; Wilcox, Ainsworth, LaMonte, & DuBose, 2002), CBE (Consedine et al., 2004a) and mammography (Consedine et al., 2004a; Williams-Piehota, Schneider, Pizarro, Mowad, & Salovey, 2003) screening measures. In Australia, a fear of the test results was correlated with lower previous BSE use (Hill, Gardner, & Rassaby, 1985), while survey data suggests that this fear was a major barrier to breast cancer screening for Arabic-Australian women (Brushin, Gonzales, & Pain, 1997). However, cancer worry and fear of the test results have been found to inhibit prior mammography use (Plon, Peterson, Friedman, & Richards, 2000), or have shown no relation at all (Bowen et al., 2004; Graves et al., 2008).

Given the extensive literature and complex relationships between breast cancer worry and breast cancer screening, several reviews have been published to reconcile these findings. One meta-analysis assessing six studies demonstrated that cancer worry facilitates the use of mammograms among asymptomatic and at-risk women (McCaul et al., 1996b). Similarly, a meta-analysis of prospective studies found that cancer worry was mostly positively associated with BSE and mammography (Hay, McCaul, & Magnan, 2006). However, in another review, it was observed that the relationship between fear (also referred to as anxiety and worry) and breast cancer screening was unclear (Consedine, Magai, Krivoshekova, Ryzewicz, & Neugut, 2004b), partly due to the numerous ways in which fear had been operationalized. Following a review of the available literature, Consedine et al. (2004b) subsequently proposed that fear of the screening mechanisms (e.g., fear of radiation and fear

of positive test findings) are likely to be barriers to screening, while a generic fear of getting cancer is likely to increase uptake of these measures. Likewise, Hay et al. (2005) concurred with this model and further suggested that the experience of cancer worry is usually low among average and at-risk populations (Hay, Buckley & Ostroff, 2005). Moreover, Magai et al. (2007) advised that studies published since the Consedine et al. (2004b) review are not incongruent with their proposed model.

In relation to ethnic differences in cancer worry, African American women were more likely to report higher cancer-related anxiety than the mainstream US population (Miller & Hailey, 1994). Among US-born and immigrant ethnic groups, US-born European Americans had the highest cancer worry, with immigrant Haitians and Dominicans reporting the lowest cancer worry (Consedine et al., 2004a). Similar findings were also obtained in another study comprising of these ethnic groups (Kudadjie-Gyamfi et al., 2005).

Moreover, it has been suggested that the relationship between cancer worry and cancer control may differ among diverse ethnic groups (Hay, Buckley, & Ostroff, 2005). Consistent with findings from the mainstream populations, in the US, studies of diverse ethnic populations (e.g., African American, Native American, immigrant Dominican and Eastern European) report that higher cancer worry is associated with increased enactment of BSE (Kudadjie-Gyamfi et al., 2005; Wilcox et al., 2002), CBE (Consedine et al., 2004a) and mammography (Consedine et al., 2004a; Magai et al., 2004). Although one study found an inverse relation between cancer worry and BSE use for Hispanic American women (Lobell, Bay, Rhoades, & Keske, 1998), suggesting that specific ethnic groups may respond to cancer worry uniquely.

Cervical cancer worry

Fewer studies have examined the relationship between cervical cancer worry and cancer control. Fear or worry about the test results is regarded as a barrier to Pap smear use

across several studies (Abdullahi, Copping, Kessel, Luck, & Bonell, 2009; Basu et al., 2006; Mutyaba, Mmiro, & Weiderpass, 2006; Waller et al., 2009; Were, 2011), and has been negatively correlated with cervical cancer screening (Wilson & Fazey, 1995). Similarly, in the Australian context, a fear of the test results was negatively correlated with the utilization of Pap smears by women in the general Australian population (Hill et al., 1985); however, it remains unknown as to whether these relationships are evident among ethnic populations in Australia, while other researchers have found no relationship between cervical cancer worry and future intentions to undergo cancer screening in the general population (Orbell, 1996), and Pap smear use among an ethnically diverse sample (Wilcox et al., 2002). However, differences in findings between studies may be a reflection of the diversity of measures being employed in research, prompting a call for psychometric improvements in how cancer worry is measured (Hay et al., 2005; Hay et al., 2006). In relation to the HPV vaccine, greater worry about having an infection has also been associated with intentions to accept the vaccine (de Visser, Waites, Parikh, & Lawrie, 2011).

As seen in the preceding literature review, there is little research on the cognitive and affective profiles of the ethnic groups assessed in the current project. Moreover, the psychosocial variables self-efficacy (confidence in performing a BSE), self-regulation, fatalism and the affects embarrassment, generalized depression, stress and anxiety were initially examined in the current research but were subsequently excluded (Refer to Chapter Eight for a rationale).

CSM Illness Representations and their Relationship with Health Behaviours

The CSM has generally been employed to assess the cognitive-affective illness representations related to illness and treatment in disease-affected populations (Cameron & Leventhal, 2003; Cameron, 2008; refer to Chapter One). Only a small body of research has examined the illness perceptions of asymptomatic individuals and its association with health-

protective behaviours (Adams, 2010; Anagnostopoulos et al., 2012; Cameron, 2008; Figueiras & Alves, 2007; Moore, 2008; Savage & Clarke, 2001). Overall, these studies suggest that certain illness representations are predictive of intent or enactment of these measures. Prior to examining this research, the illness perceptions of healthy individuals in the cancer context will be discussed.

Illness representations among asymptomatic individuals in the cancer context

The CSM proposes that the way in which an individual perceives an illness takes into account their own unique exposure to that illness (Leventhal et al., 1980). As previously noted, illness perceptions can be derived from a number of sources, including internal (e.g., existing understanding of an illness) (Cameron & Moss-Morris, 2004) and external (e.g., information obtained from friends, family and/or media) cues (Leventhal, Leventhal, & Contrada, 1998). Healthy people can develop illness perceptions much in the same way as disease-affected individuals through these cues.

Although illness perceptions in cancer-affected populations have been well examined (Giannousi, Manaras, Georgoulias, & Samonis, 2010; Lykins et al., 2008; Pertl, Hevey, Donohoe, & Collier, 2012; Rozema, Völlink, & Lechner, 2009; Sahebghalam, Robubiat, & Bolurian, 2011; Thune-Boyle, Myers, & Newman, 2006), some studies have shown that cancer illness representations also exist among healthy individuals (Buick & Petrie, 2002; Del Castillo, Godoy-Izquierdo, Vázquez, & Godoy, 2011; Grunfeld, Hunter, Ramirez, & Richards, 2003; Hunter, Grunfeld, & Ramirez, 2003). In fact, healthy people who have lived with someone diagnosed with cancer endorse more symptoms (e.g., fatigue, weight loss, fatigue and pain) and hold stronger negative emotional representations (e.g., depressed, upset and afraid) about cancer than healthy individuals without an affected relative (Del Castillo et al., 2011). In relation to breast cancer, healthy women have stronger beliefs about the consequences (Buick & Petrie, 2002), role of chance and the effects and duration of treatment

(Buick, 1997) than breast cancer patients. One study assessing asymptomatic women only found that older women perceived more negative consequences (physical disfigurement due to breast cancer) and identified fewer risk factors (causal attributions) and symptoms (identity) of breast cancer (Grunfeld, Ramirez, Hunter, & Richards, 2002). Moreover, the capacity to identify breast cancer symptoms has been related to intent to seek (Hunter, Grunfeld, & Ramirez, 2003) and postpone (Grunfeld, Hunter, Ramirez, & Richards, 2003) medical assistance.

CSM illness representations and the use of health behaviours

Illness representations among asymptomatic individuals have been associated with health-protective behaviours for several illnesses, including skin cancer (Cameron, 2008; Figueiras & Alves 2007), AIDS and tuberculosis (Figueiras & Alves, 2007). Using the IPQ-RH, Figuerias and Alves (2007) assessed whether specific CSM illness perception constructs were related to attitudes towards health behaviours for these three illnesses and intentions to adopt these health behaviours. They found that individuals who endorsed more acute/chronic timelines, fewer psychological causes (causal attributions), more severe consequences, and had a better understanding of the illnesses (illness coherence) exhibited more positive attitudes towards the health behaviours. In addition, more negative emotional representations, higher illness coherence and a lower endorsement of psychological causes were associated with intentions to carry out these behaviours (Figueiras & Alves, 2007).

Illness perceptions do exist among healthy individuals in the breast and cervical cancer control contexts. A comparative study assessed the illness perceptions of breast cancer patients and asymptomatic women who were voluntarily attending breast cancer screening. When compared to those diagnosed with breast cancer, healthy women specified that breast cancer is less curable and controllable, caused by environmental factors and had more negative consequences (Anagnostopoulos & Spanea, 2005). Given that the healthy women

attended screening on their own accord, these factors may play a role in adherence to breast screening, although the authors did not specifically assess this aspect. Unfortunately, in administering the IPQ-R measure to women, Anagnostopoulos and Spanea (2005) did not assess the emotional representations scale. Further, a comparison between women with no personal, family or friends history of breast cancer and women at increased risk (attending yearly CBE and mammography screening) demonstrated that at-risk women perceived fewer severe consequences of breast cancer and had a poorer understanding of this illness (Rees, Fry, Cull, & Sutton, 2004). A qualitative study (Savage & Clarke 1998) using the broad CSM framework further demonstrated that infrequent screeners were more likely to be afraid of cancer and to cite the need for symptoms to be present before enacting breast and cervical cancer screening than did active screeners (Savage & Clarke, 1998). Moreover, under screeners also advised they would not undergo the majority of treatments available, should they be diagnosed with these respective illnesses (Savage & Clarke 1998). While informative, these data on Australian women's breast and cervical cancer illness representations are not based on standardised quantitative measures (e.g., IPQ), nor do they consider these dimensions within the specific ethnic populations of interest to the present research.

In the cervical cancer control context, the illness representations of women with a positive smear result attending a subsequent appointment (Hagger & Orbell, 2005; Hagger & Orbell, 2006) have also been assessed. One study provided confirmatory factor analytic support for the IPQ-R in this context demonstrating that the IPQ-R constructs exhibit good discriminant validity and satisfactory reliability (Hagger & Orbell, 2005). Another study showed that consequences, causal attributions, identity and emotional representations were associated with emotional responses (e.g., anger, embarrassment and guilt) regarding the experience (Hagger & Orbell, 2006). Thus, attending a follow-up appointment after receipt of an abnormal Pap smear was an emotionally salient experience for these women and their

illness representations are likely to be different from those held by women without any prior known cervical abnormalities.

Unfortunately, none of the aforementioned studies assessed the relationships between illness perceptions and the use of cancer control measures. In order to test these associations in the mammography and Pap smear screening contexts, Savage and Clarke (2001) developed and administered an illness perception measure to a sample comprising mostly (78%) of Australian-born women. The illness perceptions assessed (i.e., identity, cause, treatment and emotional representations) were found to be related to reduced mammography and Pap smear adherence (Savage & Clarke, 2001). However, factor analysis revealed that the items in this measure loaded onto one factor, rather than numerous factors, as is seen with the IPQ and IPQ-R measures. Given that this measure is not multi-dimensional nor an IPQ measure, it is unlikely that it tapped into all of the dimensions encompassed within the CSM. Anagnostopoulos et al. (2012) in their study concerning breast screening did employ the validated IPQ-R measure and adapted it for use with healthy individuals, finding that more negative emotional representations were related to greater mammography uptake among Greek women. However, a key limitation of this study is that the causal (obtained low reliability) and identity subscales were excluded. In a further study, illness perceptions related to HPV vaccine uptake were examined in a sample of university students and medical centre attendees. Lower treatment control beliefs, higher illness coherence and a higher endorsement of breast cancer symptoms (identity) were associated with accepting the HPV vaccine (Moore, 2008). Across all of these studies, illness representations and their relationships with cancer control were assessed among women in the general population but potential ethnic differences were not investigated.

Summary and Present Research

In conclusion, the preceding review of the literature has identified known associations between a range of psychosocial factors pertaining to the EHBM, C-SHIP and CSM frameworks and cancer control behaviours in the general population. There is also evidence of both similarities and differences in these findings when directly comparing across different ethnic groups, suggesting that the relationship between these variables and cancer control behaviours may be ethnicity-specific. As previously noted, the relationships between ethnicity and psychological factors need to be evaluated to fully understand factors influencing specific health-related behaviours (Magai et al., 2004). Further to this, despite relatively low levels of participation in breast and cervical screening programs, very little is known of the factors influencing this low uptake among Croatian, Macedonian and Lebanese immigrant women in Australia. In particular, little or no published studies are available regarding the beliefs, attitudes and affective responses of these immigrant women in this cancer control context. Moreover, no prior research in this context has been undertaken utilising the EHBM, C-SHIP or CSM frameworks, nor has the IPQ-RH measure been utilised or validated for use in these contexts.

Thus, the aims of this body of research were threefold. Study One aimed to assess and compare cognitive and affective factors entailed in the EHBM and C-SHIP models among Croatian-, Macedonian-, Lebanese- and Australian-born women residing in Australia, and to examine whether these psychosocial factors were associated with the use of breast and cervical cancer control measures. The aims of Study Two were to empirically validate the IPQ-RH measures for breast and cervical cancer in English (Australian-born), Croatian (Croatian-born) and Arabic (Lebanese-born) for use among these populations. Finally, the aims of Study Three were to examine and compare CSM illness perceptions (using the IPQ-

RH measures validated in Study Two) among these ethnic groups and to assess whether these constructs are related to the enactment of these cancer control measures. Specific hypotheses pertaining to Studies One (Chapters Three and Four), Two (Chapters Five and Six) and Three (Chapter Seven) are presented in the following chapters.

Chapter Three: Cognitions, Affects and Breast Cancer Screening among Ethnically Diverse Australian Women

The initial aim of this chapter is to assess whether cognitive (beliefs) and affective (emotions) factors entailed in the Extended Health Belief Model (EHBM) and the Cognitive Social Health Information Processing (C-SHIP) model vary among Croatian, Lebanese, Macedonian and Australian-born women residing in Australia. A further goal is to examine whether these psychosocial factors are associated with the use of breast cancer screening measures among these ethnic groups. As previously noted, utilization rates for breast cancer control measures vary among Croatian, Lebanese, Macedonian and Australian women (e.g., BreastScreen NSW, 2003, as cited in South East Health, 2006; BreastScreen Victoria, 2006; BreastScreen Victoria, 2004), so it is vital to determine the likely reasons underlying their enactment of cancer control.

Abstract

Introduction: The use of breast cancer screening measures varies among women born in Lebanon, Croatia and the Former Yugoslav Republic of Macedonia, in comparison to Australian-born women. This study examined whether specific cognitions and affective responses are associated with breast cancer screening among these women, compared to Australian-born women.

Method: Women born in Lebanon, Croatia, Macedonia and Australia (N = 302) participated in the study. Cognitions, affects, demographics, and breast cancer screening measures, including mammography, clinical breast examination (CBE), and self-examination of the breasts (BSE) were assessed.

Results: Lebanese women were less likely to have undertaken a BSE and recent mammogram than Croatian and Australian women in the preliminary analyses. CBE use did not differ between the ethnic groups. Macedonian women reported significantly higher perceived risk of breast cancer and breast cancer worry than Croatian women and higher BSE and CBE painful/uncomfortable beliefs than Croatian and Lebanese women. Regression analyses revealed lower breast cancer worry was associated with an increased likelihood of BSE and CBE use, and years resident in Australia was positively associated with mammography. Ethnicity was associated with BSE use in the regression analyses, with Lebanese women less likely to perform a BSE than Australian women.

Conclusion: There were ethnic differences in reported usage of most cancer screening measures and only breast cancer worry was associated with increased usage, with no cognitions associated with cancer screening. This raises the possibility that the affective response to breast cancer screening is the most salient response associated with the enactment of these screening measures. The association of years resident in Australia with mammography uptake suggests that the public health messages about the importance of

mammograms may be picked up by these women who have been living in Australia for a longer period of time.

Keywords: Breast cancer screening; cognitions; breast cancer worry; ethnicity

Understanding the health status of immigrant populations is vital due to their increasing numbers, and the fact that these populations typically have low uptake rates of certain health-protective behaviours, such as breast cancer screening services (Murray & Skull, 2002). Economic barriers (Haas, Phillips, Sonneborn, McCulloch, & Liang, 2002; Otero-Sabogal, Stewart, Sabogal, Brown, & Pérez-Stable, 2003) and limited English skills (Jacobs, Karavolos, Rathouz, Ferris, & Powell, 2005) are significant barriers to the uptake of these screening services among ethnic groups.

Rates of breast cancer screening among immigrant populations in Australia, a country with high levels of immigration, are indicative of these worldwide trends. In Australia, it is recommended that women aged 50 to 69 years of age receive a mammogram every two years, and women of all ages need to be familiar with the look and feel of their breasts through self-examinations. Systematic clinical breast examinations (CBE) are recommended for women who are not eligible for a mammogram (National Breast and Ovarian Cancer Centre, 2009a). However, service utilisation differs across certain ethnic groups. Specifically, Lebanese (BreastScreen Victoria, 2004), Croatian and Macedonian (BreastScreen NSW, 2003, as cited in South East Health, 2006) women utilize mammography less, when compared with Australian-born women (BreastScreen Victoria, 2006), and even when compared with other minority groups, such as Greek and Egyptian women (BreastScreen Victoria, 2004). Although one study demonstrated that more Lebanese women had a mammogram in the last two years than Australian women (Centre for Epidemiology and Research, 2010), BreastScreen figures are based on a far larger proportion of women in the Australian population and are therefore likely to be more accurate (refer to Chapter Two). Moreover, Middle Eastern-born women are less likely to engage in regular BSE than their Australian/New Zealand-born counterparts, and Eastern European/Former Union of Soviet Socialist Republics (USSR) and Middle Eastern-born women are less likely to undertake a

CBE than Australian/New Zealand-born women (Siahpush and Singh, 2002; refer to Chapter Two).

With breast cancer screening generally freely available in Australia, economic factors (Haas et al., 2002; Otero-Sabogal et al., 2003) are unlikely to be a barrier for uptake, pointing to the likely role of intrinsic factors such as health-related beliefs and affects. Theories of health behaviour, such as the Extended Health Belief Model (Norman & Brain, 2005) and the Cognitive Social Health Information Processing (C-SHIP) model (Miller, Shoda, & Hurley, 1996b), regard health-related beliefs (cognitions) as central determinants of health-protective behaviours, such as cancer screening. In addition, more recent theorizing highlights the additional role of concomitant affective responses to health threats as important determinants of health behaviours (Miller et al., 1996b; Norman & Brain, 2005). However, it is not known whether these cognitive and affective responses are associated with the use of breast cancer screening measures among ethnically diverse women living in Australia. The aim of this research was to address this issue by assessing the specific cognitive and affective responses of Lebanese-, Croatian-, Macedonian- and Australian-born women related to cancer control enactment.

Cognitive and Affective Factors associated with Breast Cancer Screening

The following psychosocial factors are derived from the EHBM and C-SHIP model. Specifically, beliefs about pain and discomfort regarding breast cancer screening is part of the EHBM and breast cancer worry, perceived susceptibility/risk, control and efficacy of breast cancer screening are incorporated in both the EHBM and C-SHIP theories.

Perceived susceptibility/risk of breast cancer. Perceived risk of cancer, that is, an individual's belief in the likelihood of future disease, has been positively associated with mammography screening in several meta-analytic reviews (Katapodi, Lee, Facione, & Dodd, 2004; McCaul, Bransetter, Schoeder, & Glasgow, 1996a). Perceived risk is also positively associated with the uptake of CBE (Parsa & Kandiah, 2010; Royak-Schaler et al., 1995); however, the relationship between perceived risk and BSE use is not clear as the results vary across the limited research (Katapodi et al., 2004). Within Australia, a similar positive association between perceived risk and mammography have been noted (Cockburn, Sutherland, Cappiello, & Hevern, 1997). Moreover, in relation to the experience of perceived risk among ethnic groups, White women generally endorse a higher level of perceived risk of breast cancer than other ethnic groups (e.g., African American women) (Katapodi et al., 2004). In general, perceived risk is positively associated with mammography use and White women report a higher level of perceived risk than other minority women (refer to Chapter Two for a more detailed rationale).

Perceived control and perceived efficacy of breast cancer screening. There are positive relationships between perceived control over health and BSE (Bundek, Marks, & Richardson, 1993; Cohen, 2002; Kurtz, Given, Given, & Kurtz, 1993), CBE (Kurtz, Given, Given, & Kurtz, 1993), and mammography (Kurtz, Given, Given, & Kurtz, 1993) use. However, White (Miller & Champion, 1997) and African American (Miller & Champion, 1997; Russell, Perkins, Zollinger, & Champion, 2006) women with a higher level of perceived control over their health are less likely to participate in mammography screening. These studies suggest that there are relationships between perceived control and breast cancer screening and variations in findings across studies may be ethnicity-specific (refer to Chapter Two for a more detailed rationale).

In relation to perceived efficacy (belief in the effectiveness of breast cancer screening measures to detect cancer), there are positive relationships between this construct and BSE (Kurtz, Given, Given, & Kurtz, 1993; Mason & White, 2008), CBE (Kurtz, Given, Given, & Kurtz, 1993) and mammography (Kurtz, Given, Given, & Kurtz, 1993) screening. Among specific ethnic groups, immigrant Dominican women residing in the United States (US) have reported a higher level of perceived efficacy for BSE than other minority groups (e.g., immigrant Haitian and Caribbean women) (Kudadjie-Gyamfi, Consedine, Magai, Gillespie, & Pierre-Louis, 2005) and perceived efficacy has been positively associated with BSE enactment among these ethnically diverse women (Kudadjie-Gyamfi et al., 2005) (refer to Chapter Two for a more detailed rationale).

Beliefs about pain and discomfort regarding breast cancer screening. Expectancies regarding painful and/or uncomfortable experiences relating to cancer screening are often endorsed as obstacles to the enactment of BSE (Parajuli, 2010), CBE (Samuel, Pringle, James, Fielding, & Fairfield, 2009) and mammography (*Aro, de Koning, Absetz, & Schreck, 1999*) screening. In relation to particular ethnic groups, pain was negatively associated with having a mammogram for Asian (Tsai et al., 2011) and Italian (Aro et al., 1999) women; however, one study found a positive association among ethnically diverse (e.g., immigrant Caribbean, Haitian and Dominican) women. In the Australian context, Middle Eastern-born women believe that receiving a mammogram is painful and uncomfortable (Brushin, Gonzales, & Payne, 1997). Hence, anticipated pain and discomfort may be a particularly salient barrier to the uptake of breast cancer screening services among women from this ethnic group; and across most of these studies, expectancies regarding painful and uncomfortable experiences are barriers to breast cancer screening (refer to Chapter Two for a more detailed rationale).

Breast cancer worry. Several literature reviews have been undertaken to assess the role of breast cancer worry in the enactment of breast cancer screening measures. Two meta-analyses have shown that there are positive relationships between breast cancer worry and BSE (Hay, McCaul, & Magnan, 2006) and mammography (Hay et al., 2006; McCaul, Schroeder, & Reid, 1996b) screening. Worry is also positively associated with CBE and mammography use (Consedine, Magai, & Neugut, 2004a). A further review examined the available literature on the relationship between worry and breast cancer screening and found that fear pertaining to screening processes (e.g., fear of medical professionals) and positive test results are generally likely to be obstacles to screening, while a fear of breast cancer in general is likely to be related to the enactment of screening measures (Consedine, Magai, Krivoshekova, Ryzewicz, & Neugut, 2004b). Moreover, cancer worry is generally low for both average and increased risk women (Hay, Buckley, & Ostroff, 2005). Magai, Consedine, Neugut and Hershman (2007) report that studies published since the Consedine et al. (2004b) review are not contradictory to this model.

Among specific US ethnic groups, cancer worry is higher for African American women, when compared to the majority US population (Miller & Hailey, 1994) and US-born European Americans have reported higher cancer worry than other ethnically diverse (e.g., immigrant Haitian and Dominican) women (Consedine et al., 2004a). Further, cancer worry has been positively associated with BSE (Kudadjie-Gyamfi et al., 2005), CBE and mammography (Consedine et al., 2004a) use among ethnically diverse samples. Overall, most of the aforementioned reviews and studies suggest there are positive relationships between cancer worry and screening (refer to Chapter Two for a more detailed rationale).

Prior research suggests that the variables predicting initiation versus maintenance of screening behaviours differ for both prostate (Lee, Consedine, & Spencer, 2007) and breast cancer screening (Consedine, 2012), and most likely across different screening tests

(Consedine et al., 2007). Hence, it is imperative to utilize appropriate breast cancer specific factors as predictors when assessing their relationships with breast cancer screening. Clearly, the aforementioned literature review suggests that these variables are crucial in predicting breast cancer screening.

Current Study

In light of the lack of available screening data and limited research examining the relationships between cognitive and affective factors and breast cancer screening behaviours in the Australian community context, the current study aimed to first compare self-reported breast cancer screening behaviours among ethnic immigrant groups with Australian-born women. Specifically, given that most of the limited data (BreastScreen NSW, 2003, as cited in South East Health, 2006; BreastScreen Victoria, 2006; BreastScreen Victoria, 2004) suggests lower levels of reported screening uptake for these immigrant groups within Australia, the screening behaviours of Croatian-, Macedonian- and Lebanese-born women were compared with Australian-born women. The second aim was to assess health-related beliefs and cancer-related worry and their associations with the use of breast cancer screening measures among these women. Specifically, we predicted that Australian-born women would utilize breast cancer screening measures significantly more than women born in Lebanon, Croatia and Macedonia. Based on the findings of prior research in relation to ethnic differences in perceived risk in the US (Katapodi et al., 2004), we hypothesized that Australian women would report a higher level of perceived risk than immigrant women. Moreover, there would be significant differences in perceived control, perceived efficacy of screening measures, pain and discomfort and breast cancer worry across all of the ethnic groups. In relation to psychosocial factors associated with cancer control use, we predicted that perceived risk, perceived efficacy and breast cancer worry would be positively associated with the use of breast cancer control and the experience of pain and discomfort would be

negatively associated with screening. Further, we anticipated that perceived control would be associated with screening.

Method

Sample and Procedure

One hundred and three Australian-born women, 72 Croatian-born women, 35 Former Yugoslav Republic of Macedonia-born women and 92 Middle Eastern-born women (born in Lebanon) participated in the current study. Participants were recruited via Australian and ethnic community organizations (n = 228) and community contacts (n = 74). A total of 348 women were approached via Australian and ethnic community organizations. Hence, there was a high refusal rate of 34%. Women recruited via these organizations were provided with study packages containing copies of the consent form, survey and addressed envelopes to invite people known to them to complete the survey. A total of 86 study packages were provided to these women, with 29 Croatian, 34 Lebanese and 11 Australian (n = 74) women participating in the study. Hence, the response rate was 86% for participants recruited via community contacts. Consent forms and surveys were translated into Croatian, Macedonian and Arabic by translators affiliated with the National Accreditation Authority for Translators and Interpreters (NAATI). To test equivalence, different NAATI accredited translators back-translated the translated versions into English to ensure that the meaning was retained, with six Croatian, four Macedonian and seven Lebanese women completing the translated surveys.

Measures

Demographics. Participants provided demographic information, including their country of birth, age, marital status, income, and the number of years they had resided in Australia.

Personal and family history of breast cancer. Participants were asked about their personal and family history of breast cancer (FHBC)/ breast disease. Participants answering

"yes" were then asked to indicate whether first degree relative/s (e.g., mother, daughter or sister), second degree relative/s (e.g., aunt or grandmother) and/or the participant herself had been diagnosed with these conditions. For the current study, a family history of breast cancer was regarded as a separate independent predictor of screening behaviours as it was included as a covariate in the analyses. Prior research investigating cancer screening behaviours has comprised of samples of women with and without personal and family histories of cancer (Andersen, Smith, Meischke, Bowen, & Urban, 2003; Kim et al., 2008).

Breast cancer screening measures. Participants were asked whether they had ever performed a BSE, had a CBE, and in accordance with screening guidelines (National Breast and Ovarian Cancer Centre, 2009a), whether they had received a mammogram in the past two years. Items were scored dichotomously, with respondents indicating yes or no to each question.

Perceived risk of developing breast cancer. Perceived risk was assessed via the following item "How do you rate your risk of developing breast cancer?" This item was scored on a five point Likert scale ranging from 0 (Very low) to 4 (Much higher than average). A similar format to assess perceived risk of cancer has been utilized in previous research (Marteau, Hankins, & Collins, 2002).

Perceived control over breast cancer. Perceived control over breast cancer as a result of participating in screening was assessed through one item, "To what extent do you believe that it is within your control to prevent breast cancer by participating in screening?, and scored on a five-point Likert scale ranging from 0 (Not at all) to 4 (Very much so). A higher score indicated a higher level of perceived control. A similar format has been used to assess perceived control in previous research (Barnoy, Bar-Tal, & Treister, 2003).

Perceived efficacy of breast cancer screening measures. Perceived efficacy of breast cancer screening measures was assessed with one item examining the degree to which

these measures were perceived to be accurate in detecting breast cancer ("To what extent do you believe that breast cancer screening techniques are accurate in detecting cancer?"). This item was scored on a five point Likert scale ranging from 0 (Not at all) to 4 (Always), with a higher score indicating a higher level of perceived efficacy.

Beliefs about pain and discomfort. Three separate questions assessed the degree to which respondents perceived BSE, clinical breast examination (CBE) and mammogram as painful and uncomfortable. Items were scored individually on a Likert scale ranging from 0 (Not at all) to 4 (Very much so). Prior research has utilized a similar format (Aro, Absetz-Ylöstalo, Eerola, Pamilo, & Lönnqvist, 1996). As an exploratory procedure to test associations, all 3 items were utilized as separate predictors to assess their relationships with all cancer screening measures.

Breast cancer worries (BCW). The Breast Cancer Worries Scale (Lerman, Daly, Masny, & Balshem, 1994; McInerney-Leo et al., 2004) was utilized to assess breast cancer worry. Items were scored on a Likert scale ranging from 1 (Rarely or never) to 4 (All the time), with a total worry score ranging from 4 to 16. A sample item is "How frequently do you worry about developing breast cancer?" The coefficient alpha for this scale was good at .82.

Statistical Analysis

To assess ethnic differences, chi-squared tests with standardized residual and one-way analyses of variance (ANOVA) using the Bonferroni method examined the relationships between ethnicity and the remaining demographics (e.g., religion, income and years resident in Australia), cancer history, and outcome (BSE, CBE and mammogram) variables. A multivariate analysis of variance (MANOVA) was undertaken to assess the relationships between ethnicity and cognitive and affective variables. Pearson's correlations tested the association between predictor and outcome variables. All demographics (entered as

covariates) and predictor variables significant up to the .05 level were included in binary logistic regression (backward-Wald) analyses which assessed predictor variables most strongly associated with the use of breast cancer screening measures. The backward-Wald method was chosen as it estimates the parameters of the full model by including all variables assessed, produces a predictive model that is parsimonious and accurate, and modifies the current model by removing the variable/s with the largest significance from the model (O'Brien, 2007). Whilst it can be advantageous to utilize hierarchical (e.g., evaluates contributions of predictors above and beyond previously entered predictors), forward (e.g., high predictable ratio) and mixed (e.g., deals with missing values) regression models, these methods have a sensitivity to model specification errors and casual inference is likely to be misinterpreted (O'Brien, 2007).

Results

In relation to the normality of the variables assessed in this study, the standardized skewness coefficients (i.e., skewness divided by the standard error of skewness) and the standardized kurtosis coefficients (i.e., kurtosis divided by the standard error of kurtosis) were all within the range of +/- 3 (Onwuegbuzie & Daniel, 2002), ranging from -1.33 for perceived risk of developing breast cancer to 2.09 for beliefs about pain and discomfort. With all standardized coefficients being within the +/- 3 range, these variables were deemed to be normally distributed.

There were no significant differences between women completing the translated and English language versions of the survey in relation to beliefs, affects and reported usage of breast cancer screening measures. The relationships between ethnicity and demographics are

Table 1

Demographics by Ethnic Group

Variables	**Croatia** (*n*=72)	**Macedonia** (*n*=35)	**Lebanon** (*n*=92)	**Australia** (*n*=103)	**Total** (*n*= 302)	**Total χ^2 or *F***
Age (*Mean & SD)*	46.26 (15.08)	34.26 (12.46)	44.05 (15.15)	34.98 (13.24)	41.36 (14.21)	**1.02**
Years (*Mean & SD)*	23.93 (12.67)	23.20 (10.45)	21.25 (11.82)	34.88 (13.79)	26.76 (13.86)	**22.32****
Resident in Australia						
Education						**26.90****
Up to 10 years	22.2%	17.1%	22.2%	19.4%	20.2%	
Up to 12 years	27.8%	45.7%	32.8%	29.1%	33.9%	
TAFE/ University	50.0%	37.2%	45.0%	51.5%	45.9%	
Marital Status						**23.93****
Married	58.3%	31.4%	44.6%	40.8%	43.7%	
Single	37.5%	44.3%	45.7%	45.6%	43.3%	
Divorce/ Sep/ Widow	4.2%	24.3%	9.7%	13.6%	13.0%	
Income						**16.84****
Below $20 000	18.1%	21.4%	16.5%	9.4%	16.4%	
$20 000- $70 000	58.9%	55.7%	54.4%	62.9%	58.0%	
Above $70 000	23.0%	22.9%	29.1%	27.7%	25.6%	
Religion						**18.86**
Catholic	74.3%	0%	42.2%	34.3%	37.7%	
Protestant	4.2%	0%	0%	19.1%	5.8%	
Muslim	0%	4.2%	41.3%	4.2%	12.4%	
Orthodox	10.1%	79.2%	7.0%	7.2%	25.9%	
Other/No religion	11.4%	16.6%	9.5%	35.2%	18.2%	

Note. 68.2% of Croatian, 71.4% of Macedonian, 61.6% of Lebanese and 73.6% of Australian women had one or more children.

***p< .01,* p< .05.*

presented in Table 1. More Australian women had a post high school qualification and an income between $20 000 to $70 000 per year than any other ethnic group. Croatian women were the highest users of BSE, followed by Australian, Macedonian and Lebanese women, with significantly more Australian women undertaking BSE than Lebanese women $\chi^2(1, N =$

195) = 5.58, p = .018). Mammography use $\chi^2(3, N = 302) = 7.54$, p = .057) was not associated with ethnicity; however between group comparisons (e.g., Macedonian vs Croatian) revealed significantly more Australian women had a mammogram within the last two years than Lebanese women $\chi^2(1, N = 91) = 5.57$, p = .018). More Croatian women reported ever performing a BSE $\chi^2(1, N = 164) = 9.30$, p = .002) and mammogram within the last two years $\chi^2(1, N = 88) = 5.08$, p = .024) than Lebanese women (see Table 2).

There was a statistically significant difference between ethnicity and cognitive and affective factors: multivariate $F(20, 839) = 3.11$, p = .0005; Wilks' $\lambda = 0.806$, MES = .08 (MES, the multivariate effect size, is equal to [1 - Wilks' Lambda]/k, where k = the number of discriminant functions). Univariate main effects for ethnicity were obtained for perceived risk $F(1, 301) = 2.66$, p = .049; MES = .03, BSE anticipated pain/discomfort $F(1, 301) = 8.96$, $p < .0005$; MES = .08, CBE anticipated pain/discomfort $F(1, 301) = 11.78$, $p < .0005$; MES = .11 and breast cancer worry $F(1, 301) = 4.91$, $p < .0005$; MES = .05. Macedonian women were the highest on the BSE and CBE anticipated pain/discomfort and perceived risk for developing

breast cancer variables, and reported the highest level of breast cancer worry followed by Lebanese, Australian and Croatian women (refer to Table 3 for means and standard deviations).

Regression Analyses

Binary logistic regression (backward-Wald) analyses were undertaken on outcome variables, coded 1 for practicing, and 0 for not practicing, cancer screening. The significant results in the final step of the backward elimination analyses are reported (refer to Table 4). Variance inflation factors were below 5 (O'Brien, 2007), ranging from 1.01 to 2.23, and tolerance levels were above .20 (O'Brien, 2007), ranging from .52 to .97. Thus, it was unlikely that multicollinearity would be an issue in these analyses.

Table 2

Differences between Ethnic Groups by Cancer Screening and History

Variables		Croatia (*n*=72)	Macedonia (*n*=35)	Lebanon (*n*=92)	Australia (*n*=103)	Total (*n*=302)	Total χ^2
BSE	*Yes*	59.2%	52.4%	41.3%	61.3%	53.6%	**10.50***
CBE	*Yes*	51.1%	48.6%	43.3%	48.2%	47.8%	**2.88**
Mammogram *50-65 yrs* **Every Two Years**	*Yes*	60.8%	49.0%	46.5%	65.0%	55.3%	**7.54**
Personal History of Breast Cancer	*Yes*	12.5%	8.6%	10.9%	12.6%	11.5%	**1.12**
Family History of Breast Cancer	*Yes*	16.7%	20.0%	15.2%	13.6%	16.4%	**.904**

Note. Women under 50 years of age (n= 132) were excluded from the mammogram variable as this is not the target age group for mammography screening. No participants reported a personal and/or family history of breast disease. All women with a personal history of breast cancer reported having a mammogram within the last two years.

** $p < .05$.*

Variables associated with BSE. The CBE anticipated pain variable was negatively associated with BSE use at the .05 level in the preliminary Pearson's correlation analyses (r = -.15, p = .01) and was subsequently entered into the regression analysis. However, this variable was not included in the final step of the model as it was no longer statistically significant. The final model had acceptable fit (Hosmer-Lemeshow test $\chi^2(8, N = 302) = 2.97$, p = .532), Nagelkerke R^2 = .18. Lower breast cancer worry was associated with higher odds inperforming a BSE (*OR* = .57). Single women were less likely to carry out a BSE than married women (*OR* = .47), and Lebanese women were less likely to partake in this screening behaviour than Australian women (*OR* = .42).

Variables associated with CBE. BSE (r = -.13, p = .02) and CBE anticipated pain/discomfort (r = -.15, p = .01) were negatively associated with CBE use in the preliminary analyses. These variables, however, were not included in the final step of the backward elimination due to being statistically non-significant. The final CBE model had

satisfactory model fit, (Hosmer-Lemeshow test $\chi^2(8, N = 302) = 4.73$, $p = .714$), Nagelkerke $R^2 = .24$. Single women were less likely to perform a CBE than married women ($OR = .56$), and lower breast cancer worry was related to an increased likelihood of undertaking a CBE ($OR = .60$).

Table 3

Differences between Ethnic Groups by Cognitive and Affective Factors

Variables		**Croatia** (n=72)	**Macedonia** (n=35)	**Lebanon** (n=92)	**Australia** (n=103)	**Total *F*** *df* (3,299)
	Scoring Range		*Mean & SD*			
Cognitive and Affective Factors						
Perceived Risk	(0-4)	1.50 (1.06) [a]	2.17 (1.18) [b]	1.65 (1.30) [a b]	1.65 (1.12) [a b]	**2.66***
BSE Painful	(0-4)	.85 (1.11) [a]	1.89 (1.18) [b]	1.59 (1.35) [b]	1.05 (1.20) [a]	**8.96****
CBE Painful	(0-4)	1.06 (1.11) [a]	2.23 (1.19) [b]	1.76 (1.21) [b]	1.17 (1.21) [a]	**11.78****
Mammogram Pain	(0-4)	1.97 (1.33) [a]	2.37 (1.03) [a]	2.28 (1.25) [a]	1.94 (1.27) [a]	**1.99**
Perceived Efficacy	(0-4)	1.83 (1.28) [a]	2.22 (1.19) [a]	2.32 (1.37) [a]	1.95 (1.31) [a]	**2.31**
Perceived Control	(0-4)	1.99 (1.26) [a]	2.11 (1.35) [a]	1.86 (1.19) [a]	1.93 (1.24) [a]	**2.92**
Breast Worry	(4-16)	5.12 (1.01) [a]	6.95 (1.79) [b]	5.98 (1.54) [a b]	5.37 (1.29) [a b]	**4.91****

Note. Means sharing a common superscript are not significantly different from each other.

$^{**}p < .01$, $^{*}p < .05$.

Variables associated with mammography. The BSE ($r = -.24$, $p = .01$) and CBE anticipated pain ($r = -.22$, $p = .02$) and perceived control over breast cancer ($r = -.18$, $p = .05$) variables were negatively associated with mammography and entered into the analysis; however, these variables were not included in the final step of the model. The Hosmer-Lemeshow test was not significant, $\chi^2(8, N = 170) = 13.98$, $p = .184$), Nagelkerke $R^2 = .29$. Women living in Australia for longer were more likely than those living in Australia for less time to have had a two-yearly mammogram ($OR = 1.10$). Age was negatively associated with mammography use ($OR = .92$).

Table 4

Summary of Binary Logistic Regression Results for Breast Cancer Screening

Variables						95% C.I. for Exp	
	B	S.E.	df	Exp (B) OR	Wald	Lower	Upper
BSE							
Ethnicity			3		6.87		
Macedonian vs Australian	-.25	.46	1	.78	.30	.28	2.17
Lebanese vs Australian	-.88	.39	1	.42*	4.95	.17	1.01
Croatian vs Australian	.23	.35	1	1.26	.42	.57	2.78
Marital			2		13.27**		
Single vs Married	-.76	.30	1	.47**	6.22	.24	.93
Separated/Divorced/Widowed vs Married	.78	.46	1	2.18	2.90	.78	6.08
Breast Worry	-.56	.18	1	.57**	9.19	.38	.86
CBE							
Marital			2		9.93**		
Single vs Married	-.58	.30	1	.56*	3.89	.29	1.08
Separated/Divorced/Widowed vs Married	.78	.47	1	2.19	2.79	.77	6.24
Breast Worry	-.51	.18	1	.60**	7.99	.40	.90
Mammogram							
Age	-.09	.05	1	.92*	3.84	.83	1.01
Years Resident in Australia	.09	.04	1	1.10**	6.65	1.01	1.19

Note. Statistics provided for significant variables only. Reference categories are Australian for ethnicity and married for marital status.

***p< .01,* p< .05.*

Discussion

The aims of the present study were to compare self-reported use of breast cancer screening of Australian-born women with Australian ethnic minority women, and to assess health-related cognitive and affective factors associated with the utilization of these measures. First, we hypothesized that Australian-born women would use breast cancer

screening measures significantly more than immigrant women. Second, we predicted that Australian women would report significantly higher perceived risk than ethnic minority women and there would be significant differences across the remaining health-related beliefs and cancer worry between the ethnic groups. Third, we anticipated that perceived risk, perceived efficacy and breast cancer worry would be positively associated with the uptake of breast cancer screening measures and pain and discomfort would be negatively associated with cancer control. Finally, we predicted that perceived control would be associated with the enactment of screening.

As expected, there were significant differences in cancer control use among the ethnic groups. Specifically, Croatian and Australian women were found to be significantly more likely to have performed a BSE and undertaken a recent mammogram than Lebanese women. The findings are similar to reported breast cancer screening use in prior mammography (BreastScreen NSW, 2003, as cited in South East Health, 2006; BreastScreen Victoria, 2006; BreastScreen Victoria, 2004) and BSE (Siahpush & Singh, 2002) studies, although mammography rates were slightly higher for Croatian, Macedonian and Australian women and lower for Lebanese women in the current study. Ethnicity was only associated with BSE use in the regression analyses, in that Lebanese women were less likely to have performed a BSE than Australian women. In fact, Lebanese women may be more resistant to changing certain health-related behaviours, as they have been found to be more likely to engage in smoking (Centre for Epidemiology and Research, 2010; Centre for Epidemiology and Research, 2006), compared with other ethnic groups, despite the widespread existence of anti-smoking and health-focused media campaigns in Australia (Hurley & Matthews, 2008). In addition, Croatian and Macedonian women did not significantly differ from Australian women in their use of these screening measures and CBE use did not significantly differ by ethnicity. The likely reasons for these findings are that prior research (Siahpush & Singh,

2002) assessed breast cancer screening (e.g., BSE and CBE use) among larger ethnic groupings (e.g., Eastern European/Former USSR), but comparisons were not made between ethnic subgroups (e.g., Macedonian and Croatian), and across the remaining mammography studies (BreastScreen NSW, 2003, as cited in South East Health, 2006; BreastScreen Victoria, 2006; BreastScreen Victoria, 2004), survey data was provided and no analyses were undertaken to determine whether there were significant differences in screening between the ethnic groups.

In partial support of the second hypothesis, significant differences were found between Australian and immigrant women in relation to some of the health-related beliefs and breast cancer worry. Macedonian and Lebanese women were the highest across most cognitions and breast cancer worry, with Australian women reporting significantly lower BSE and CBE painful/comfortable mean scores than Lebanese and Macedonian women, and Lebanese women had significantly higher mean scores across these constructs than Croatian women. In addition, Macedonian women reported significantly higher perceived risk of breast cancer, painful/uncomfortable beliefs pertaining to BSE and CBE and breast cancer worry than Croatian women. Prior research has obtained similar findings in the contexts of painful beliefs pertaining to BSE and CBE (Parajuli, 2010; Samuel, Pringle, James, Fielding, & Fairfield, 2009), perceived risk (Katapodi et al., 2004) and breast cancer worry (Miller & Hailey, 1994) across other ethnic groups. Given that Macedonian and Lebanese women hold significantly stronger beliefs across some of these constructs but reported the lowest use of all breast cancer screening measures, health interventions could be developed that aim to provide these women with accurate information on these health-related constructs (e.g., their actual perceived risk of breast cancer). This may increase their chances of enacting breast cancer screening.

Contrary to prior research (Consedine et al., 2004a; Hay et al., 2006) and the study's hypothesis regarding a positive relationship between breast cancer worry and screening, negative associations between breast cancer worry and utilization of cancer screening measures, namely BSE and CBE were evident in the current study. It has been suggested that a fear of being diagnosed with breast cancer is likely to inhibit health-protective behaviour use for this disease (Consedine et al., 2004b), possibly acting as a demotivator to initiate the behaviours, but also potentially through the use of avoidance strategies, whereby the fear is likely to deter the woman from contemplating enactment of the cancer screening measures. However, it is also possible that many of the women in this study experienced *low* levels of fear pertaining to a breast cancer diagnosis, possibly due to familiarity with these screening measures and prior negative findings (i.e., no breast lump detected), thereby increasing the likelihood of enacting a BSE and CBE. Indeed, the mean level of cancer worry for each ethnic group was relatively low, ranging from 5.12 (*SD* = 1.01) for Croatian women to 6.95 (*SD* = 1.79) for Macedonian women. Breast cancer worry was not associated with mammogram use, suggesting that the likely effect of cancer worry on cancer screening measures is behaviour specific among these diverse ethnic groups in Australia.

In addition, living in Australia for a longer period of time was positively associated with obtaining a recent mammogram. This result may highlight the possibility of acculturation potentially influencing cancer screening, as most of the immigrant women in the present study completed the English language survey and their mean years resident in Australia was over 20 years. Previous research has demonstrated that greater acculturation, including English language use/preference, is associated with mammography screening among immigrant women living in Westernized countries (Graves et al., 2008) and a directive for future research is to administer an Acculturation scale to assess acculturation levels among women from these ethnic groups.

Moreover, the health-related beliefs examined in this study were not associated with breast cancer screening behaviours. This finding is unexpected, but may indicate that the particular set of beliefs assessed was too narrowly defined. There are a broader range of cognitions (e.g., causal, illness coherence and treatment control beliefs) that need to be examined in this context before drawing strong conclusions about their lack of association with screening behaviours for these populations. It is recommended that future research assess whether these constructs are associated with the use of breast cancer screening tools among these ethnic groups.

In relation to demographic predictors, single women were less likely to have a BSE and CBE than married women and age was negatively associated with mammography use. Prior research supports these findings for marital status (Madan et al., 2000) and age (Edwards & Jones, 2000; Gorin & Heck, 2005), and the current study findings highlight the need for health programs to target single and older women from the ethnic groups assessed, in order to increase their likelihood of undertaking the respective breast cancer screening measures.

Limitations of the Study

There are several limitations of this study that need to be considered when interpreting the outcomes. First, the snowballing technique utilized to recruit some of the participants in this study may have limited the generalizability of the study findings. However, this technique is often used to facilitate the accrual of relatively large samples (Atkinson & Flint, 2001), particularly among difficult-to-access populations, such as immigrant groups (Babbie, 2010). Given the relative inaccessibility of the minority women, and there was a rather high refusal rate (34%) recruiting via community organizations, this technique was chosen as it enabled the researcher to recruit participants that may have otherwise been reluctant to take part in research utilizing traditional approaches (Atkinson &

Flint, 2001). The sample size for Macedonian participants was smaller than the other groups, however, the city in which this research was located is home to the greater majority of Lebanese- and Croatian-Australians, and the second largest home city of Macedonian-Australians (Australian Bureau of Statistics, 2006), suggesting that the sample obtained for this study is likely to be a good representation of these ethnic groups. Another aspect of the sample that brings into question its representativeness is the possibility that the participants from the immigrant groups were mostly acculturated. An argument against this assumption though, is that even with most participants living in Australia for more than 20 years, significant differences in health-related beliefs and cancer worry were evident between the ethnic groups, indicating that the cultural identity of each group remained, to some extent, unique. This issue should be addressed in future studies by focusing investigations on populations of immigrant women who are non-English speakers or who are relatively recent immigrants to Australia. Another limitation is that single item scales were used to examine health-related beliefs, such as perceived control over breast cancer, in accordance with some of the previous research in this field (Aro et al., 1996; Marteau, Hankins, & Collins, 2002). However, the unidimensional nature of these items may have meant that they have not tapped into all of the dimensions that represent each of the constructs examined. It is recommended that future research address this issue by incorporating multi-item and multi-dimensional measures to assess these constructs. Moreover, the use of self-report measures may have been susceptible to impression management, such as manipulating information as a form of self-justification (Caldwell & O'Reilly, 1982), and some women may have over-rated their use of cancer screening measures (McPhee et al., 2002); however, these types of measures are commonly used in research studies on cancer screening (Aro et al., 1996; Marteau, Hankins, & Collins, 2002). Finally, analyses could not be undertaken to determine whether there was a difference in scores by sampling technique (i.e., participants recruited via snowballing

technique vs participants recruited through community organizations) as only a tally, rather than specific information on participants recruited via each technique was kept.

In conclusion, this is the first study to compare cognitive and affective responses in relation to the use of breast cancer screening measures among these ethnically diverse groups. Overall, Lebanese and Macedonian women reported a lower rate of adherence to all cancer screening measures, and a higher number of negative appraisals (e.g., higher perceived risk, cancer worry and painful breast cancer screening), compared with Croatian and Australian women. These findings provide preliminary evidence for ethnicity-specific factors associated with breast cancer. Contrary to previous reports (Australian Bureau of Statistics, 2006), the current study noted higher levels of education among Lebanese women, yet reported rates of mammography use were lower than previously reported (BreastScreen Victoria, 2004).

The current study provides a greater understanding on ethnic differences in breast cancer-specific constructs among these diverse women and on the factors underlying their use of breast cancer screening measures. Their attitudes towards health, including cognitions and cancer worry pertaining to breast cancer are complex, but unlike ethnicity, amenable to change. Further, it is vital to address the role of cancer worry and possibly acculturation in their uptake of these behaviours.

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Chapter Four: Cognitions, Affects and Cervical Cancer Control among Ethnically Diverse Australian Women

The preceding chapter demonstrated that Lebanese women were less likely to undertake certain breast cancer screening measures (BSE and mammogram) than Australian and Croatian women and that there were ethnic differences across several cognitive (pain and discomfort related to BSE and CBE and perceived risk and control) and affective (breast cancer worry) factors. In addition, breast cancer worry was associated with an increased likelihood of undertaking a BSE and CBE (refer to Chapter Three). The goals of the present chapter are to assess cervical cancer-specific psychosocial factors (e.g., cognitions and affects) derived from the Extended Health Belief Model (EHBM) and the Cognitive Social Health Information Processing (C-SHIP) model among Croatian, Lebanese, Macedonian and Australian-born women and to examine whether these psychosocial factors are associated with cervical cancer control. Comparable with breast cancer screening, the use of cervical cancer control varies among Croatian, Lebanese, Macedonian and Australian women (e.g., NSW Cervical Screening Program, 2000; Public Health Division, 2001), making it imperative to understand the factors that are likely to be involved in the uptake of cervical cancer control amongst these ethnic groups.

Abstract

Introduction: Little is known about the factors likely to underlie uptake of cervical cancer control behaviours among women born in Lebanon, Croatia and the Former Yugoslav Republic of Macedonia, when compared to Australian-born women currently living in Australia. This study examined the role of cervical cancer-specific cognitive and affective responses in the use of cervical cancer control behaviours among these immigrant women, in comparison to Australian-born women.

Method: Three hundred and two women born in Australia and overseas (Croatia, Former Yugoslav Republic of Macedonia and Lebanon) participated in the study. Affects, cognitions, demographics, and the cancer control behaviours Pap smear and human papillomavirus (HPV) vaccine uptake were assessed.

Results: Macedonian women were less likely to have received the HPV vaccine than Australian women. Regression analyses were undertaken demonstrating that lower perceived efficacy of cervical cancer control measures was associated with an increased likelihood to obtain the HPV vaccine uptake and years resident in Australia was negatively related to Pap smear use. Ethnicity was not associated with these cancer control behaviours.

Conclusion: Perceived efficacy of cervical cancer control measures was the only psychosocial variable related to cancer control use. This finding suggests that the remaining cognitive and affective variables that were assessed from the Cognitive Social Health Information Processing (C-SHIP) and the Extended Health Belief models were not pertinent to the use of cervical cancer control for these ethnically diverse women. The implications of the study's findings for cervical cancer control and suggestions for future research are made.

Keywords: Cervical cancer control; health; cognitions; cervical cancer worry; ethnic groups

Certain ethnic groups continue to report lower use of cervical cancer control measures than the majority population (e.g., Licht et al., 2010; Renshaw, Jack, Dixon, Møller, & Davies, 2010). Economic barriers (Otero-Sabogal, Stewart, Sabogal, Brown, & Pérez-Stable, 2003), and lack of awareness of available health services and of the need to undergo cancer screening, are significant barriers to the uptake of these services, particularly for recently-arrived immigrants (Amankwah, Ngwakongnwi, & Quan, 2009).

Likewise, cervical cancer screening rates among some ethnic groups in Australia differ from the general population. In this country, it is recommended that women aged 18 to 70 obtain a two-yearly Pap smear for early detection of cervical cancer. Vaccines that provide immunization against the human papillomavirus (HPV) are also available for younger women up to the age of 45 (Cancer Council Australia, 2009b; refer to Chapter One). However, despite these services being freely available to women in the target age groups, usage varies among certain ethnic groups. Pap smear utilization rates among immigrants from Eastern European countries, including Croatia (NSW Cervical Screening Program, 2000) and Macedonia (Fernbach, 2002; NSW Cervical Screening Program, 2000), and Arabic-speaking countries, including Lebanon (Public Health Division, 2001) indicate that screening is lower for these immigrant groups than Australian-born women (Public Health Division, 2001). In contrast, one study found that although Croatian women's Pap smear screening behaviour was comparable with the general population, most of these women reported a low intent to re-screen in the next two years; however, the cultural background endorsed by participants rather than their country of birth differentiated the ethnic groups (Fernbach, 2002). Similarly, another study showed that Lebanese and Australian women reported similar use of this screening measure (Centre for Epidemiology and Research, 2010); however it is possible that socially desirable responses were provided by these women as they were advised of the importance of having a Pap smear prior to reporting their usage (refer to Chapter Two).

Currently, there are no figures available on HPV vaccine uptake for these ethnic groups in Australia.

Given that economic factors (Otero-Sabogal et al., 2003) are unlikely to be salient barriers to utilization of these cancer control measures in the Australian context, it is possible that other factors underlie use of these measures. Health behaviour theories, including the Extended Health Belief Model (Norman & Brain, 2005) and the Cognitive Social Health Information Processing (C-SHIP) model (Miller, Shoda, & Hurley, 1996b) suggest that relationships exist between the cognitive and affective constructs entailed in these theories and the use of health protective behaviours. However, the role of these psychosocial factors in the use of cervical cancer control is yet to be examined among ethnic groups in Australia.

Cognitive and Affective Factors associated with Cervical Cancer Control

The next section provides an overview on the psychosocial factors that will be the focus of the current study. Worry about cervical cancer, perceived susceptibility/risk, control and efficacy of cervical cancer control are central components of the EHBM and C-SHIP models, while beliefs about pain and discomfort regarding cervical cancer control is a key feature of the EHBM. These variables have been found to be predictive of the use of cervical cancer control measures among women living in countries outside of Australia and will subsequently be examined in the current study.

Perceived susceptibility/risk of cervical cancer. In a review of the available literature, Vernon (1999) reported that the relationship between perceived risk and Pap smear use was unclear as one study found a positive association and two studies demonstrated no relationship at all. However, recent studies suggest that perceived risk is a barrier to Pap smear use (Basu et al, 2006; Mutyaba, Mmiro, & Weiderpass, 2006; Wong, Wong, Low, Khoo, & Shuib, 2008) but higher perceived risk has been associated with the intention to obtain the HPV vaccine (Giuseppe, Abbate, Liguori, Albano, & Angelillo, 2008). Moreover,

among ethnically diverse samples (i.e., White, Hispanic and African American) low perceived risk has been associated with low Pap smear use (Behbakht, Lynch, Teal, Degeest, & Massad, 2004); however, another study on minority women found no relation at all (Kim et al., 2008). The key difference between these studies is that the Kim et al. (2008) study comprised of a sample where almost half of the participants had a personal or family history of cancer (Kim et al., 2008), which could have been a stronger motivator to have a recent Pap smear than perceived risk for these women. Further, a review on minority women (i.e., Hispanic, Native American and Asian) found that these women believed that only feeling ill constituted the need to have a Pap smear (Johnson, Mues, Mayne, & Kiblawi, 2008). Hence, most of these studies suggest that relationships exist between perceived risk and the use of cervical cancer control (refer to Chapter Two for a more detailed rationale).

Perceived control and perceived efficacy of cervical cancer control. The perception of control over one's health and its relationship with Pap smear uptake has previously been assessed (Agurto, Bishop, Sa´nchez, Betancourt, & Robles, 2004; Leung & Leung, 2010), but some studies have found no relation at all (Borrayo & Reyes, 2002; Morales, 2010). Despite these inconsistent findings, a study on Hong Kong Chinese women (Leung & Leung, 2010) and qualitative reports from Latin American women living in Peru and El Salvador (Agurto, Bishop, Sa´nchez, Betancourt, & Robles, 2004) have shown that there are positive relationships between feeling in control over one's health and Pap smear usage (refer to Chapter Two for a more detailed rationale).

Moreover, a belief in the perceived efficacy or effectiveness of a Pap smear to detect any abnormal changes has been related to uptake among Hispanic and African American women attending a follow-up smear (Kahn, Goodman, Huang, Slap, & Emans, 2003), while a lower level belief in the effectiveness of this preventive measure has been associated with being late for screening (Waller, Bartoszek, Marlow, & Wardle, 2009). Similarly, in

Australia, those who cite that a Pap smear is effective for early detection utilize this screening tool regularly (Pitts, Dyson, Garland, & Rosenthal, 2006). Further, among women living in Italy (Giuseppe et al., 2008) and minority women residing in the US (Gerend, Lee, & Shepherd, 2007) perceived efficacy has been related to the intent to obtain the HPV vaccine. Hence, these studies suggest that there are relationships between cervical cancer control use and perceived control and efficacy of these measures among specific ethnic groups (refer to Chapter Two for a more detailed rationale).

Beliefs about pain and discomfort regarding cervical cancer control. Pain (Moreira et al., 2006; Ogedegbe et al., 2005; Waller et al., 2009) and/or discomfort (Kahn et al., 1999; Taylor et al., 2004) are often endorsed as barriers to obtaining a Pap smear and these constructs have been related to low use of this measure (Hoyo et al., 2005). In addition, pain has been associated with lack of Pap smear use among African American (Hoyo et al., 2005), Asian American (Yoo, Le, Vong, Lagman, & Lam, 2011), Hispanic American (Byrd, Peterson, Chavez, & Heckert, 2004), and Turkish (Esin, Bulduk, & Ardic, 2011) women. Thus, pain and discomfort is an obstacle to Pap smear enactment across these studies (refer to Chapter Two for a more detailed rationale).

Cervical cancer worry. Fear or worry about test findings has been negatively associated with obtaining a Pap smear (Wilson & Fazey, 1995); however, no relationships have also been found between cervical cancer worry and future intent to enact cancer screening in the general population (Orbell, 1996), and Pap smear utilization among ethnically diverse women (Wilcox, Ainsworth, LaMonte, & DuBose, 2002). These inconsistencies in findings may be due to these studies using divergent measures to assess cancer worry, highlighting the need for a more reconciled approach to measure cancer worry (Hay, Buckley & Ostroff, 2005; Hay, McCaul, & Magnan, 2006). Conversely, in Australia, a fear of the test results was negatively correlated with Pap smear use in the general population

(Hill, Gardner, & Rassaby, 1985) and it is not known whether similar relationships exist among specific ethnic groups in the Australian context. Moreover, worry about contracting a HPV infection has been related to intent to obtain the HPV vaccine (de Visser, Waites, Parikh, & Lawrie, 2011) (refer to Chapter Two for a more detailed rationale).

Current Study

The aims of the present research were to examine the cervical cancer control behaviours of women born in Lebanon, Croatia and Macedonia, in comparison to Australian-born women, and to then examine the association between cognitions and cervical cancer worry in the use of these cancer control behaviours among these ethnic groups. Given the limited cervical cancer control data for these ethnic groups in Australia (Centre for Epidemiology and Research, 2010; Fernbach, 2002; NSW Cervical Screening Program, 2000; Public Health Division, 2001), we hypothesized that Macedonian-born women would report significantly lower cervical cancer control use than Croatian-, Lebanese- and Australian-born women. In relation to cognitive and affective responses, we predicted that there would be significant differences in cervical cancer worry, pain and discomfort related to cancer control and perceived risk, control and efficacy beliefs among these ethnic groups. In addition, we predicted that perceived efficacy of cancer control measures would be positively associated with cancer control uptake and pain and discomfort would be negatively associated with the enactment of these measures. Further, we hypothesized that cervical cancer worry and perceived risk and control would be associated with cancer control use.

Method

Sample and Procedure

A total of 302 participants (103 Australian-born, 72 Croatian-born, 35 Former Yugoslav Republic of Macedonia-born and 92 Lebanese-born women) participated in the present research. Participant recruitment occurred via recreational clubs, family centres and

community contacts, with community contacts provided with study packages (consent form, survey and addressed envelopes) to invite people known to them to complete the survey. Seventy four participants (29 Croatian; 34 Lebanese and 11 Australian) were employed into the study via community contacts. All participants reported they were sexually active. Translators accredited with the National Accreditation Authority for Translators and Interpreters (NAATI) translated the consent forms and surveys into Croatian, Macedonian and Arabic. Different translators back-translated these translated versions into English to ensure that the translated study packages were similar to the original English version, with six Croatian, four Macedonian and seven Lebanese women completing the Croatian, Macedonian and Arabic surveys, respectively.

Measures

Demographics. Demographic questions were asked, including age, marital status, income and number of years having lived in Australia.

Personal and family history of cervical cancer. Participants were asked to indicate whether they had a personal and/or family history of cervical cancer. If participants answered "yes" to either question, they were asked to indicate whether first degree relative/s (e.g., mother, daughter or sister), second degree relative/s (e.g., aunt or grandmother) and/or the participant herself had been diagnosed with this illness.

Cancer control behaviours. Participants reported whether they had a Pap smear in the last two years or received the HPV vaccine. Items were scored dichotomously, (0= No; 1= Yes).

Perceived risk of developing cervical cancer. Participants were asked the following question: "How do you rate your risk of developing cervical cancer?", with this item scored on a five point Likert scale ranging from 0 (Very low) to 4 (Much higher than average).

Previous research has assessed cancer risk in this format (Marteau, Hankins, & Collins, 2002).

Perceived control over cervical cancer. Perceived control over cervical cancer was assessed via one item: "To what extent do you believe that it is within your control to prevent cervical cancer by participating in screening?" This item was scored on a five point Likert scale ranging from 0 (Not at all) to 4 (Very much so). Perceived control over cervical cancer has been assessed similarly in prior research (Barnoy, Bar-Tal, & Treister, 2003).

Perceived efficacy of cancer control measures. The degree to which cervical cancer control measures were perceived to be accurate in detecting cervical cancer was assessed via one item, "To what extent do you believe that cervical cancer screening techniques are accurate in detecting cancer?", and scored on a five point Likert scale. The item responses ranged from 0 (Not at all) to 4 (Always).

Beliefs about pain and discomfort. Participants indicated whether they believed receiving a Pap smear is painful or uncomfortable. A five point Likert scale ranging from 0 (Not at all) to 4 (Very much so) was used to assess this item, with prior research assessing this construct in a similar format (Esin et al., 2011).

Cervical cancer worries (CCW). A Cervical Cancer Worries Scale was developed by modifying items from the Breast Cancer Worries Scale (Lerman, Daly, Masny, & Balshem, 1994) to refer to *cervical cancer worries*. A Likert scale is used with item responses ranging from 1 (Rarely or never) to 4 (All the time). The coefficient alpha for this measure was satisfactory at .76.

Statistical Analysis

Chi-squared tests with standardized residual and one-way analyses of variance utilizing the Bonferroni technique assessed the relationships between ethnicity and other demographic variables (e.g., education, income, and marital status), cancer history, cancer

control (Pap smear and HPV vaccine) use and years resident in Australia. The multivariate analysis of variance (MANOVA) approach was used to assess the relationships between ethnicity and cognitive and affective variables. Pearson's correlations examined the degree to which predictor and outcome variables were associated. Demographics (were controlled for) and significant predictor variables (up to .05 level) were entered into binary logistic regression (backward-Wald) analyses to determine variables associated with cervical cancer control measures.

Results

The standardized skewness and kurtosis coefficients were within the accepted +/- 3 range (Onwuegbuzie & Daniel, 2002) for all variables assessed, ranging from -1.86 for cervical cancer worry to 2.17 for beliefs about pain and discomfort. Hence, these variables were considered to be normally distributed.

The demographics (i.e., age, culture and education) were previously reported (refer to Chapter Three). There were no significant differences between participants completing translated and English language versions of the survey in terms of beliefs, affects and cancer control behaviours. For immigrant women, the mean age was 37.6 years (*SD* = 1.47) and the mean years resident in Australia was 22.6 (*SD* = 11.92), compared to 37 years old (*SD* = 1.32) and 34.9 years resident in Australia (*SD* = 13.79) for Australian-born women. For Australian-born women, 51.5% completed qualifications post high school, 40.8% were married and 27.7% reported an income over $70 000 per year, compared to 44.1%, 44.8% and 24.9% for immigrant women, respectively.

Table 1

Cancer Control and Cancer History by Ethnicity

Variables		Croatia (*n*=72)	Macedonia (*n*=35)	Lebanon (*n*=92)	Australia (*n*=103)	Total (*n*= 302)	Total χ^2
Pap Smear Every Two Years	*Yes*	45.8%	37.1%	45.7%	48.9%	44.4%	**2.00**
Vaccine *18-45yrs*	*Yes*	65.3%	51.2%	57.8%	63.7%	59.5%	**4.78**
Personal History of Cervical Cancer	*Yes*	6.9%	5.7%	10.9%	9.7%	8.3%	**1.30**
Family History of Cervical Cancer	*Yes*	5.6%	17.1%	15.2%	19.4%	14.3%	**6.86**

Note. Women over 45 years of age (n= 87) were excluded from the vaccine variable as the HPV vaccines Gardasil and Cervarix are generally not administered to women in this age group. All women with a personal history of cervical cancer reported having a Pap smear every two years.

***p< .05.*

Table 1 provides the relationships between ethnicity and cancer history and cancer control behaviours. Overall HPV vaccine use were not associated with ethnicity; however between group comparisons (e.g., Croatian vs Lebanese) demonstrated that significantly more Australian women had the HPV vaccine than Macedonian women $\chi^2(1, N = 102) = 4.11, p = .043$).

A statistically significant difference was obtained between ethnicity and cognitive and affective factors pertaining to cervical cancer multivariate $F(14, 812) = 2.72$, $p < .0005$; Wilks' $\lambda = 0.874$, MES = .07 (MES, the multivariate effect size, is equal to [1 - Wilks' Lambda]/k, where k = the number of discriminant functions). Significant univariate main effects for ethnicity were obtained for perceived efficacy of cervical cancer control measures $F(1, 301) = 8.01$, $p < .0005$; MES = .08, perceived control over cervical cancer $F(1, 301) = 4.25$, $p = .001$; MES = .04, and cervical cancer worry $F(1, 301) = 7.19$, $p < .0005$; MES = .07. Macedonian women were the highest across all of the cognitive and affective variables pertaining to cervical cancer (refer to Table 2 for means and standard deviations).

Table 2

Cognitive and Affective Responses by Ethnicity

Variables		Croatia (*n*=72)	Macedonia (*n*=35)	Lebanon (*n*=92)	Australia (*n*=103)	Total χ^2 *df* (3,299)
Cognitive and Affective Factors						
	Scoring Range		*Mean & SD*			
Perceived Risk	(0-4)	1.35 (.91) [a]	1.71 (1.32) [a]	1.48 (1.27) [a]	1.39 (1.02) [a]	**.980**
Pap Smear Painful	(0-4)	1.81 (1.21) [a]	2.20 (1.11) [a]	2.05 (1.18) [a]	1.84 (1.14) [a]	**1.48**
Perceived Efficacy	(0-4)	1.94 (1.29) [b]	2.97 (1.07) [a]	1.66 (1.28) [b]	1.78 (1.15) [b]	**8.01****
Perceived Control	(0-4)	1.38 (1.04) [a]	2.11 (1.18) [b]	1.71 (1.14) [a b]	1.46 (1.14) [a]	**4.25****
Cervical Worry	(4-16)	6.30 (2.47) [b]	7.80 (2.96) [a]	6.47 (2.62) [b]	6.38 (2.57) [b]	**7.19****

Note. Means sharing a common superscript are not significantly different from each other.

***p< .01.*

Regression Analyses

Binary logistic regression (backward-Wald) analyses were carried out on outcome variables, coded 1 for completing, and 0 for not completing, cancer control behaviours. The significant results in the final step of the model are presented in Table 3. Variance inflation factors were below 5 (O'Brien, 2007), with a range of 1.44 to 2.18, and tolerance levels exceeded .20 (O'Brien, 2007), with a range of .59 to .86. Hence, it was not likely that multicollinearity would be a problem in the regression analyses.

Variables related to Pap smear use. Only demographic variables were entered into the binary logistic regression analysis, as no cognitive and affective factors achieved statistical significance in the preliminary Pearson's correlation analyses. The Hosmer-Lemeshow test was $\chi^2(8, N = 602) = 7.98$, $p = .634$), Nagelkerke $R^2 = .22$, indicating satisfactory model fit. Women living in Australia for a shorter period of time were more likely to have received a Pap smear every two years than women living in Australia for a

longer period of time (*OR* = .95). Age and education were also positively associated with Pap smear use (Refer to Table 3).

Table 3

Binary Logistic Regression Results for Cervical Cancer Control Behaviours

Variables						**95% C.I. for Exp**	
	B	**S.E.**	**df**	**Exp (B) OR**	**Wald**	**Lower**	**Upper**
Pap Smear							
Age	.05	.02	1	1.05*	5.83	1.00	1.10
Education			4		16.31**		
Up to 12 years vs Up to 10 years	1.06	.42	1	2.90*	6.53	1.14	7.36
TAFE vs Up to 10 years	1.34	.43	1	3.84**	9.94	1.48	9.98
University undergraduate vs Up to 10 years	1.37	.49	1	3.91**	7.81	1.31	11.69
University Postgraduate vs Up to 10 years	.06	.53	1	1.06	.01	.33	3.46
Years Resident in Australia	-.05	.02	1	.95**	10.09	.910	1.00
HPV Vaccine							
Education			4		10.77*		
Up to 12 years vs Up to 10 years	.18	.54	1	1.19	.11	.36	3.96
TAFE vs Up to 10 years	1.33	.57	1	3.77*	5.47	1.06	13.46
University Undergraduate vs Up to 10 years	1.30	.64	1	3.66*	4.09	.87	15.43
University Postgraduate vs Up to 10 years	.81	.65	1	2.25	1.56	.52	9.69
Perceived Efficacy Cervical	-.29	.14	1	.75*	.43	.55	1.02

Note. Statistics provided for significant variables only. Reference categories are married for marital status and up to 10 years for education.

***p< .01,* p< .05.*

Variables related to HPV vaccine uptake. Perceived control over cervical cancer (*r* = -.18, *p* = .01) and perceived efficacy of cervical cancer control measures (*r* = -.16, *p* = .02) were negatively associated with HPV vaccine use in the preliminary analyses, but perceived control over cervical cancer was not included in the final step of the model, as this variable was no longer statistically significant. The final HPV vaccine model was satisfactory,

(Hosmer-Lemeshow test $\chi^2(8, N = 215) = 6.68$, $p = .526$), Nagelkerke $R^2 = .17$. A lower level of perceived efficacy of cervical cancer control measures was associated with an increased likelihood of obtaining the HPV vaccine ($OR = .75$) and education was positively associated with HPV vaccine use (Refer to Table 3).

Discussion

The current study assessed cervical cancer control behaviours among Australian ethnic groups, compared to Australian-born women, and examined the degree to which cognitions and cervical cancer worry were related to the use of these cancer control behaviours among these ethnic groups. First, we predicted that Macedonian-born women would utilize cervical cancer control behaviours significantly less than Australian-, Croatian- and Lebanese-born women. Second, we hypothesized that there would be significant differences in cervical cancer-specific cognitions and worry between Australian-born women and the immigrant groups. Third, we hypothesized that perceived efficacy of cancer control measures would be positively related to cancer control and pain and discomfort would be negatively associated with the use of these measures. Lastly, we hypothesized that cervical cancer worry and perceived risk and control would be related to the use of cervical cancer control.

Contrary to prediction, there were no significant differences in Pap smear use among the ethnic groups, when compared to Macedonian women. However, Pap smear utilization rates were low across all groups (44.4% total sample), in comparison to HPV vaccine uptake rates (59.5% total sample), and lower than most prior reports on Pap smear usage among the ethnic groups assessed (Centre for Epidemiology and Research, 2010; Fernbach, 2002; Public Health Division, 2001). Possibly, many of these women erroneously believed that a Pap smear is no longer required following HPV vaccine immunization. Moreover, in support of the study hypothesis, Macedonian women were immunized with the HPV vaccine

significantly less than Australian women. These lower vaccination rates among Macedonian women may be attributed to lower levels of awareness of the link between HPV infection and cervical cancer. Thus, future research should explore the specific health beliefs and awareness regarding HPV vaccine immunization among all of these ethnic groups.

In relation to ethnic differences in cognitive and affective factors, Macedonian women reported significantly higher perceived efficacy of cervical cancer control and significantly higher cervical cancer worry than all other ethnic groups. In addition, Macedonian women reported significantly higher perceived control over cervical cancer than Australian and Croatian women. The findings pertaining to perceived control and efficacy are intriguing, as Macedonian women reported the lowest Pap smear and HPV vaccine use, compared to all other ethnic groups. It seems apparent that although Macedonian women may feel more in control over this disease and perceive Pap smears as more likely to prevent cancer, these health-related beliefs have little impact on their decision to obtain a Pap smear. It is recommended that these women are educated on the association between cancer control use and efficacy and control beliefs in order to increase their likelihood of undertaking these health-protective behaviours. However, these findings may simply reflect an ambiguously worded item. Specifically, the actual question used to assess screening behaviour was misleading as it referred to screening and prevention in the one item, whereas screening serves as early detection and not as prevention. In addition, the item relating to one's perceived control in preventing cervical cancer by participating in screening (i.e., Pap smear use) did not measure perceived control associated with obtaining the HPV vaccine (a preventive measure).

Contrary to the study's hypotheses on psychosocial factors associated with cancer control enactment, cancer worry and most of the cognitions (i.e., painful and uncomfortable beliefs pertaining to Pap smears and perceived control and risk) were not related to cancer

control use. Although relationships between cervical cancer control use and worry (de Visser et al., 2011), uncomfortable and/or painful Pap smear screening (Hoyo et al., 2005), perceived control (Leung & Leung, 2010) and risk (Behbakht et al., 2004) have been documented, some studies have found no association between most of these psychosocial factors and cancer control enactment (Borrayo & Reyes, 2002; Kim et al., 2008; Wilcox et al., 2002), indicating that most of these cognitions and worry are not always barriers to cancer control enactment. Indeed, along with pain beliefs, this is the case for the ethnic groups in the current study. In addition, it is possible that cervical cancer worry was not associated with Pap smear uptake due to some of these women experiencing uncertainty about the need to have a Pap smear, given their low Pap smear utilization rates compared to most previous studies (Centre for Epidemiology and Research, 2010; Fernbach, 2002; Public Health Division, 2001).

An unexpected finding was that living in Australia for a shorter period of time was positively associated with having obtained a recent Pap smear. One possible explanation for this finding is that upon entry to Australia as a new resident the women were provided with extensive information about available health services, including information about cervical cancer screening. The recency of this information may have led to a higher initial uptake of this screening; however, given that overall the rates of Pap smear were low across all samples, it is likely that after an initial high level of screening participation, immigrant women may have become less adherent over time. Another possible explanation for this finding is that newly arrived immigrants may have undergone Pap smears in their home country prior to immigrating to Australia.

Moreover, in contrast to most prior research (Gerend, Lee, & Shepherd, 2007; Giuseppe et al., 2008), another unexpected finding was that lower perceived efficacy of cervical cancer control measures was positively associated with HPV vaccine uptake. It is

possible that in answering the question relating to efficacy of cancer control measures, that many women in this study provided their responses in the context of Pap smears only, rather than thinking more broadly about the HPV vaccines. If this were the case, then it would be logical that a lower belief in Pap smear efficacy would be linked to higher uptake of vaccines (although this would be erroneous thinking as Pap smears are still required following HPV vaccination). It is also possible that these women were prompted by family, friends and/or health professionals to obtain the vaccine, even though they had doubts about its efficacy to prevent HPV infections. A directive for future research is to more closely investigate understandings and beliefs about cervical cancer prevention and screening, particularly as the younger vaccinated women become older and more sexually active.

Education and age were positively associated with recent Pap smear use and education was positively related to HPV vaccine uptake. Prior research supports these findings in the Pap smear context (Gorin & Heck, 2005; Hsia et al., 2000; Marlow, Waller, & Wardle, 2008). These findings suggest that women possessing a lower level of education and younger women are less likely to utilize cancer control and it is recommended that health promotion campaigns on cervical cancer control use are tailored specifically to reach and engage these populations.

Furthermore, ethnicity *per se* was not related to the use of cervical cancer control behaviours, even when background factors (i.e., demographics and cancer history) were controlled for, and despite the various differences by ethnicity in beliefs evident in this research. A possible reason for this finding is that the influence of ethnicity was more diffuse and reflected through ethnic differences in certain psychological factors (Magai, Consedine, Adjei, Hershman, & Neugut, 2008). These cognitions and cancer worry are likely to have been shaped by socialization processes over the years, and more specifically, by the culturally-bound beliefs and practices of the socializing influences. Hence, ethnicity may be

implicated as an underlying factor that contributes to differences in cognitive and affective responses between the ethnic groups, rather than being directly associated with the use of cervical cancer control behaviours.

Limitations of the Study

The limitations of this research include the use of the snowballing technique to recruit a subset of participants, which may have restricted the generalizability of the findings. Nonetheless, this technique is often utilized to recruit rather large samples (Atkinson & Flint, 2001), including participants deemed to be difficult-to-access, such as ethnic groups (Babbie, 2010). In addition, the sample size for Macedonian women was small, in comparison to other groups, however the city participants were recruited from is the largest city for Lebanese- and Croatian-Australian residents and second largest for Macedonian-Australian residents (Australian Bureau of Statistics, 2006), indicating that the sample is likely to be representative of these ethnic groups. It is possible that the immigrant groups were mostly acculturated, given the length of time they had been living in Australia, however, certain health beliefs and cancer worry differed between the ethnic groups, suggesting that the ethnic differences continued, to some degree, stay distinct. A recommendation for future research is to recruit non-English speaking minority women or recent arrivals to Australia. Another limitation is the use of self-report measures and as a result, some women may have over-rated their Pap smear and HPV vaccine use; however, self-report measures are often utilized in cancer control studies (Barnoy et al., 2003; Marteau et al., 2002). In accordance with much of the prior research (e.g., Barnoy et al., 2003; Marteau et al., 2002), single item measures were used to examine health-related beliefs, and it is possible that these items did not tap into all aspects of each construct. A directive for future research is to employ multi-item and multi-dimensional scales to measure these cognitions. Further, the question relating to one's perceived control in preventing cervical cancer by participating in screening (i.e., Pap smear

use) did not measure perceived control associated with obtaining the HPV vaccine (a preventive measure). This item may have also been poorly worded as screening *detects* cancer but it does not *prevent* it.

In summary, Macedonian women were the lowest users of cervical cancer control behaviours and Lebanese and Macedonian women reported more negative health-related beliefs (e.g., perceived control and efficacy) and cancer worry, when compared to Australian and Croatian women. In contrast to prior research (Australian Bureau of Statistics, 2006; Tracey, Kerr, Dobrovic, & Currow, 2010), Lebanese women had a slightly higher level of education, and across all ethnic groups, a higher number of participants reported a prior personal history of cervical cancer. Nonetheless, Pap smear utilization rates were lower than prior studies (Centre for Epidemiology and Research, 2010; Fernbach, 2002; Public Health Division, 2001). It is imperative to examine whether acculturation levels among ethnic groups are associated with cervical cancer control enactment, given that years resident in Australia was negatively associated with Pap smear use. It is also necessary to develop strategies to address negatively held cognitions and cancer worry related to cervical cancer among some ethnic women.

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Chapter Five: Validation of the Revised Illness Perception Questionnaire for Healthy People (IPQ-RH) for Breast and Cervical Cancer

It is clear from the preceding chapters that psychosocial factors pertaining to breast and cervical cancer cognitions and affective responses are likely to underlie enactment of health protective behaviours associated with these illnesses. This applies both among Australian ethnic groups, as well as Australian-born women. In particular, Study One demonstrated that breast cancer worry and perceived efficacy of cervical cancer control measures are associated with breast self-examination (BSE), clinical breast examination (CBE) and human papillomavirus (HPV) vaccine use, respectively, among these groups (refer to Chapters Three and Four). However, these factors were only found to account for a relatively small proportion of the overall variance related to the enactment of these behaviours, suggesting that other variables are implicated. In addition, Study One examined a relatively narrow selection of potential cognitive and affective factors that may be entailed in these behaviours. Broader illness perceptions as conceptualized by the Common Sense Model (CSM) of self-regulation (Leventhal, Meyer, & Nerenz, 1980), including identity, treatment, and emotional representations were not examined.

Illness perceptions have been shown to be associated with health protective behaviours in a number of health contexts, including breast cancer control (Anagnostopoulos et al., 2012). However, there are currently no validated versions of the Revised Illness Perception Questionnaire for healthy people (IPQ-RH) for breast and cervical cancer (IPQ measures are most commonly used to measure CSM constructs). Indeed, Moss-Morris et al. (2002) recommend that an IPQ measure should refer to the health-related condition being examined.

Hence, the purpose of this study was to validate breast and cervical cancer IPQ-RH measures for use among English-speaking populations in future health-related studies focused on cancer control.

Abstract

Introduction: Given the importance of breast and cervical cancer control for asymptomatic individuals, and that adherence to these cancer control measures differs worldwide, there is a need to understand cognitive and affective factors that facilitate or hinder adherence. The Revised Illness Perception Questionnaire for healthy people (IPQ-RH) is a validated measure, based on self-regulation theory, to assess cognitive and affective factors associated with specific illnesses among healthy populations. This was originally developed in the Portuguese language, and in the contexts of skin cancer, tuberculosis and AIDS. The current study utilized the gold-standard confirmatory factor analytic (CFA) approach to empirically validate breast- and cervical-cancer specific versions of the IPQ-RH for use among English-speaking populations.

Method: Modified versions of the original IPQ-RH were administered to Australian women eligible for breast and cervical cancer control (N = 240). The IPQ-RH breast and cervical cancer illness perceptions were examined, along with the Negative Affect (NA) subscale of the Positive and Negative Affect Schedule (PANAS) to assess the discriminant validity of these measures.

Results: The confirmatory factor analyses demonstrated good model fit across all of the incremental indices of good-fit utilized for the IPQ-RH measures. Most IPQ-RH subscales were not associated with the NA subscale of the PANAS, hence, showing good discriminant validity.

Conclusion: The English-language versions of the IPQ-RH breast- and cervical-cancer measures have factor structures similar to the original version and are largely distinguishable from negative affect. These findings indicate that these measures are appropriate for use among English-speaking populations, providing comprehensive and valid tools to assess factors underlying cancer control behaviours. The findings provide further empirical support for the tenets of self-regulation theory.

Keywords: Breast cancer; cervical cancer; illness perceptions; empirical validation; IPQ-RH

Screening rates for breast (e.g., Bennett, Probst, & Bellinger, 2012; BreastScreen Victoria, 2006; Quan et al., 2006) and cervical (e.g., Licht et al., 2009; Public Health Division, 2001; Quan et al., 2006) cancer control measures in countries where these services are readily available are variable. Some attempts have been made to understand the barriers to participating in cancer control, with logistic barriers, including access to cancer control services (Peek & Han, 2004), low socio-economic status (Feldstein et al., 2011; Peek & Han, 2004; Sambamoorthi & McAlpine, 2003), and perceived difficulty in organizing an appointment (Waller, Bartoszek, Marlow, & Wardle, 2009) found to be obstacles to cancer control.

Cognitive and affective factors incorporated in health behaviour theories (e.g., Extended Health Belief Model) have also been linked with the use of cancer control measures (Norman & Brain, 2005). These include perceived risk of developing cancer (Giuseppe, Abbate, Liguori, Albano, & Angelillo, 2008; Katapodi, Lee, Faicone, & Dodd, 2004), pain beliefs related to the use of cancer control (Aro, de Koning, Absetz, & Schreck, 2001; Hoyo et al., 2005), perceived efficacy of cancer control measures (Mason & White, 2008; refer to Chapter Four) and cancer worry (Hay, Buckley, & Ostroff, 2005; refer to Chapters Three; Wilson & Fazey, 1995).

In comparison, much less is known about the role of specific illness perceptions in the enactment of these cancer control measures (Leventhal, Brissette, & Leventhal, 2003). The CSM suggests that the way people perceive an illness affects their preventive and health protective behaviours (Leventhal et al., 2003). Derived from self-regulation theory (Leventhal et al., 1980), illness perceptions are regarded as cognitive and affective representations of a particular illness, comprising five core illness components (refer to Chapter One). These representations exist in a parallel processing modality whereby both cognitive and emotional representations are developed in response to an illness or health

threat (Leventhal, Leventhal & Cameron, 2001). These CSM constructs are commonly measured with the validated and reliable Illness Perception Questionnaire (IPQ) (Weinman, Petrie, Moss-Morris, & Horne, 1996) and more recently, the Revised Illness Perception Questionnaire (IPQ-R) (Moss-Morris et al., 2002). A major limitation of the IPQ was that it only explored the cognitive elements of responses to illness, while the IPQ-R included an emotional representations subscale relating to various emotional responses (e.g., depressed, anxious and upset) that can be experienced in relation to an illness (Moss-Morris et al., 2002). The IPQ-R consists of subscales relating to illness perceptions of identity, timeline, consequences, illness coherence, personal and treatment control, emotional representations, and causal attributions (Moss-Morris et al., 2002). The IPQ measures have been validated and administered in various health contexts, including cervical cancer screening (Hagger & Orbell, 2005) irritable bowel syndrome (Boddington, Myers, & Newman, 2002) and hypertension (Theunissen, & de Ridder, 2001).

Prior research using the IPQ and IPQ-R has identified that healthy women do hold breast cancer illness perceptions (Anagnostopoulos et al., 2012; Anagnostopoulos & Spanea 2005; Buick & Petrie, 2002). Healthy women have been found to perceive more severe consequences (Buick & Petrie, 2002) and hold weaker beliefs pertaining to the cure and control (Anagnostopoulos & Spanea 2005) of breast cancer than cancer patients, and their ability to recognize breast cancer symptoms has been associated with their intention to seek (Hunter, Grunfeld, & Ramirez, 2003) or delay (Grunfeld, Hunter, Ramirez, & Richards, 2003) medical care. Two studies have attempted to assess illness perceptions in the breast cancer control context (Anagnostopoulos et al., 2012; Savage & Clarke, 2001), finding that negative emotional representations (e.g., experiencing depression when thinking about breast cancer) (Anagnostopoulos et al., 2012), and an illness perceptions measure containing identity, cause, treatment and emotional response items (Savage & Clarke, 2001) were related

to poor adherence to mammography. Utilizing a variety of methodologies, all of these studies either modified the wording of the IPQ to refer to breast cancer (Buick & Petrie, 2002), adapted the IPQ-R by adding further items (Anagnostopoulos et al., 2012; Anagnostopoulos & Spanea 2005), or utilized a measure based on the IPQ format (Grunfeld et al., 2003; Hunter et al., 2003; Savage & Clarke, 2001), which may have led to differences in findings across some of these studies. Only two of these studies employed factor analyses to validate the IPQ-R in the breast cancer context (Anagnostopoulos et al., 2012; Anagnostopoulos & Spanea 2005); however, no rationale was provided for excluding the emotional representations subscale from the former study, and the identity subscale from this measure in both of these studies. Given the prior findings relating to emotional representations predicting breast cancer screening (i.e., Anagnostopoulos et al., 2012) and an ability to identify breast cancer symptoms (identity) associated with seeking medical care (i.e., Hunter, Grunfeld, & Ramirez, 2003) in the general population, the omission of these IPQ-R subscales is concerning as it is likely that these constructs will also predict the use of breast cancer screening measures among diverse ethnic groups.

None of the aforementioned studies have provided confirmatory factor analytic evidence using a latent variable approach to verify the proposed structures of these measures. Confirmatory factor analysis (CFA) is the unsurpassed standard in factor analytic research, as it allows for a theoretically derived *a priori* specification for selecting variables in the factor structure using hypothesis-testing (Hu & Bentler, 1999), rather than naming post hoc extracted factors, as seen in other factor analytic techniques, including exploratory factor analysis (Hagger & Orbell, 2005). Thus, an aim of the present study is to utilize the CFA approach to empirically validate an IPQ measure for breast cancer for use among healthy individuals in the breast cancer control context.

Fewer studies have examined illness perceptions in the cervical cancer control context (Hagger & Orbell, 2005; Hagger & Orbell, 2006). Among women attending a follow-up appointment after a positive cervical smear result, the illness perceptions of identity, consequences, causes and emotional representations were pertinent to their experience (Hagger & Orbell, 2006). Confirmatory factor analytic validation has also been provided for the IPQ-R in this context (Hagger & Orbell, 2005), however, it is yet to be provided for a measure assessing healthy women's illness perceptions in the cervical cancer control context. One study did not utilize the IPQ or IPQ-R but demonstrated that illness perceptions (identity, cause, treatment and emotional representations) were associated with lack of Pap smear use among healthy women (Savage & Clarke, 2001). Although, the measure developed in this study was limited as it stemmed from illness perception items loading onto one factor via exploratory factor analysis, possibly due to a limited number of items utilized (Savage & Clarke, 2001), rather than the development of multiple illness perception subscales, as found with the IPQ and IPQ-R measures. A further aim of the present study is to use the CFA approach to develop an empirically validated healthy version of an IPQ measure for cervical cancer for use in health-related studies, such as cervical cancer control.

As the present study is focused on the illness perceptions of healthy, asymptomatic individuals, it is important to utlitise a version of the IPQ measure that has specifically been adapted for this purpose. Recognising that comparable illness perceptions exist among healthy individuals, Figueiras and Alves (2007) further modified the IPQ-R, and developed and validated the Revised Illness Perception Questionnaire for healthy people (IPQ-RH). This measure was developed in Portuguese across the skin cancer, tuberculosis and AIDS contexts. The phrasing of some of these items was changed in the original IPQ-R from "my illness" to "this illness". Principal Components Analyses (PCA) showed a factor structure similar to the original IPQ-R, with 12 items omitted due to achieving low Cronbach's alpha

(Figueiras & Alves, 2007), and a similar pattern of intercorrelations emerged between the IPQ-RH constructs seen in previous research studies (Hagger & Orbell, 2005; Moss-Morris et al., 2002).

However, currently there are no validated versions of the IPQ-RH in the breast and cervical cancer contexts and there are no adapted versions of these measures in the English language. Given that limited research has shown breast- and cervical-cancer specific illness perceptions are evident among healthy individuals in the breast (Anagnostopoulos et al., 2012; Savage & Clarke, 2001) and cervical (Savage & Clarke, 2001) cancer control contexts, it is important to develop empirically validated measures to assess these constructs, using the gold-standard CFA approach (Hu & Bentler, 1999). In the current study, we hypothesized that the theoretically derived *a priori* structures of breast- and cervical-cancer specific IPQ-RH subscales (e.g., timeline acute/chronic and timeline cyclical) would adequately explain the covariances among the items from IPQ-RH responses of healthy individuals in the breast and cervical cancer contexts. We also predicted that the illness representation constructs would demonstrate satisfactory discriminant validity and reliabilities. Finally, the intercorrelations between the illness representations were explored and compared to patterns reported in prior IPQ-RH research (Figueiras & Alves, 2007).

Method

Sample and Procedure

English-speaking women (N = 240) born in Australia and ranging in age from 18 to 66 years of age, were recruited into the current research through community organizations (i.e., family centres) and clubs (i.e., social and recreational) situated in Sydney, Australia. Individuals were either directly approached to participate in this study at these establishments, or they responded to advertisements placed at the front desks of these organizations by contacting the researcher. Prior to completing the study package,

participants were asked whether they had undergone a prior hysterectomy, as this can involve removal of the cervix; all participants answered no to this question. Study packages (participant information sheet, consent form and study questionnaire) were subsequently provided to all participants to complete. The age range in this study reflected the age group currently targeted by the cervical cancer screening program in Australia (Cancer Council Australia, 2009b), which incorporates the recommended age range for CBE and mammography (National Breast and Ovarian Cancer Centre, 2009a).

Confirmation of model fit. To examine the factor structure and goodness-of-fit of the IPQ-RH breast and cervical cancer measures, 201 English-speaking women completed the study questionnaire; including demographics, the IPQ-RH breast and cervical cancer measures, and the Negative Affect (NA) subscale of the Positive and Negative Affect Schedule (PANAS) to assess the discriminant validity of the IPQ-RH measures.

Test-retest reliability. A further 39 English-speaking women completed a shortened version of the study questionnaire, on two separate occasions, separated by a three-week interval to assess test-retest reliability of the measures. An *a priori* power analysis showed that 39 Australian women were needed to have 80% power for detecting a medium sized effect when employing the .001 criterion of statistical significance. For this part of the study, in accordance with prior research (Figueiras & Alves, 2007), the NA subscale of the PANAS was excluded as only test-retest reliabilities of the IPQ-RH constructs were assessed. All participants completed the surveys at both time intervals and were telephoned to ensure completion of the second survey.

Measures

Illness perceptions relating to breast and cervical cancer. Adapted versions of the IPQ-RH were used to assess illness-related beliefs and affects in relation to breast and cervical cancer among healthy individuals (Figueiras & Alves, 2007). The first section contains the identity subscale which was modified to include symptoms related to breast cancer (e.g., hard or tender growths in body) (Rees, Cull, Sutton, & Fry, 2004) and cervical cancer (e.g., discomfort during sexual intercourse) (Hagger & Orbell 2005). Individual identity items were scored dichotomously (1 = Yes; 0 = No), with higher scores indicating the belief that more symptoms are associated with each illness. The second section contains the subscales of personal control, treatment control, consequences, emotional representations, timeline acute/chronic, timeline cyclical, and illness coherence which were measured with the original 38 IPQ-RH items (Figueiras & Alves, 2007), but were modified slightly to refer to "breast cancer" or "cervical cancer" (e.g., "The course of this illness depends on me" to ''The course of breast cancer depends on me"). Individual items were assessed on a five-point Likert scale (1 Strongly disagree to 5 Strongly agree). Comparable with the Figuerias and Alves (2007) study, 12 items were removed (e.g., "Nothing I do will affect breast cancer" and "Nothing I do will affect cervical cancer") following Cronbach's analysis, in order to improve the reliability of these subscales (Figueiras & Alves, 2007), leaving a total of 26 items for each cancer-specific measure across these subscales. The final section contains the causal subscales, namely psychological attributions and general risk factors which were modified to include risk factors for breast (e.g., hormonal) (Rees et al., 2004) and cervical (e.g., smoking) (Hagger & Orbell, 2005) cancer. The causal attribution items were rated on the same five-point Likert scale as the previous section, with higher scores indicating a higher level of agreement to a risk factor being associated with breast or cervical cancer.

Negative affect. The NA subscale of the PANAS assessed the discriminant validity of the IPQ-RH breast and cervical cancer measures, with regard to negative affectivity. This approach has previously been used to assess the discriminant validity of both the IPQ-R (Moss-Morris et al., 2002) and IPQ-RH (Figueiras & Alves, 2007) measures. Although these researchers specifically utilized this measure to examine whether IPQ measures are distinguishable from negative affect, the NA subscale of the PANAS has high internal consistency (reliabilities ranging from .84 to .87), superior factorial validity (Watson, Clark, & Tellegen, 1988), and has demonstrated good convergent validity with other affective measures, including the Hedonic Balance Scale (convergent correlations ranged from .62 to .71) (Schimmack, 2003). For the present study, individual items on this measure were scored on a five-point Likert scale (1 = Very slightly or not at all to 5 = Extremely), assessing the degree to which negative affects (e.g., hostile) were experienced, and summed together with a total score ranging from 10 to 50. Higher scores are indicative of higher levels of distress (Watson, Clark, & Tellegen, 1988). The coefficient alpha for this scale was .78 for the current study.

Demographics. Participants provided demographic information pertaining to their age, marital status, education, income and religion.

Statistical Analysis

Utilizing Analysis of Moment Structures (AMOS) software, four separate CFAs were undertaken to assess the factor structure and model fit of the IPQ-RH breast and cervical cancer measures (two factor analyses for the breast and cervical cancer items for the personal control, treatment control, consequences, emotional representations, timeline acute/chronic, timeline cyclical, and illness coherence subscales and two factor analyses for the breast and cervical cancer causal attributions items). The incremental indices of fit utilized were the Comparative Fit Index (CFI), Non-Normed Fit Index (NNFI) and the Root Mean Square

Error of Approximation (RMSEA), as the goodness-of-fit chi-square (χ^2) statistic is deemed to be sensitive to sample size (Bentler, 1990). The CFI and NNFI indices need to exceed .90 (Bentler, 1990) and the RMSEA is required to be near or below .05 (Hu & Bentler, 1999) to demonstrate an acceptable model fit.

As previously undertaken in prior IPQ-RH research for the identity subscales (Figueiras & Alves, 2007), the percentage of participants who endorsed each symptom was calculated for the breast and cervical cancer symptoms (identity subscales), as these items are scored dichotomously. In order to assess intercorrelations among IPQ-RH constructs, and discriminant validity, Pearson's correlations were computed to examine the associations between the IPQ-RH subscales for each cancer-specific measure and the NA subscale of the PANAS. Finally, the test-retest reliability was assessed with Cronbach's alpha calculated for the IPQ-RH breast and cervical cancer measures, and Pearson's correlations computed to determine the correlation coefficient for the subscales of the IPQ-RH breast and cervical cancer measures administered at both time points.

Results

For the participants completing the survey to confirm model fit (n = 201), their mean age was 36.2 years (SD = 12.86). Almost half the women were single (49.3%), with fewer married (37.8%) or divorced (12.9%), and most women had completed secondary schooling (89.6%), with fewer completing post high school qualifications (51.2%). Almost three quarters of the women reported being Catholic (27.9%), other religion (18.9%), or no religion (19.9%), and 70.6% stated an income between $20 000-$70 000 per year. In addition, most women (74.1%) had at least one child.

The standardized skewness and kurtosis coefficients lied within the acceptable +/- 3 range (Onwuegbuzie & Daniel, 2002) across all variables examined, ranging from -1.92 for

personal control to 2.32 for emotional representations. Thus, all variables were normally distributed.

Across the sample completing the survey to assess test-retest reliability (n = 39), the majority of women were married (41.2%) and single (48.9%), with less women divorced (9.9%). The participants' mean age was 34.8 years (SD = 14.26), and most had acquired a secondary education (84.4%), with less women obtaining qualifications following high school (48.8%). The majority of women were Catholic (28.3%), other religion (15.6%), or no religion (20.3%). Furthermore, a large proportion of women had an income between $20 000-$70 000 per year (74.5%) and one or more children (64.2%).

Confirmation of Model Fit

The first CFA model produced for the 26 breast cancer items contained seven factors; however, the model was not a good fit to the observed covariance matrix. Utilizing a systematic approach (Bollen, 1989; Hagger & Orbell, 2005), two breast cancer items ("Breast cancer makes me feel angry" and "I expect breast cancer to last for the rest of one's life") were omitted for obtaining factor loadings below the acceptable requirement of .40 (Ford, McCallum, & Tait, 1986) and for being associated with large standardized residuals. The final CFA model fitted adequately, demonstrating satisfactory goodness-of-fit (CFI = .925; NNFI = .913; RMSEA = .053) across a seven-factor (timeline acute/chronic and cyclical, consequences, illness coherence, personal and treatment control, and emotional representations) model. Factor loadings for these items are shown in Table 1, with most factor loadings well above .40. The reliability coefficients ranged from .73 for the timeline illness perceptions, to .84 for consequences.

Table 1

Factor Loadings and Reliabilities of IPQ-RH Breast Cancer Items

	SFL		SFL
Emotional representations *(α = .80)*		***Consequences*** *(α = .84)*	
When I think about breast cancer I get upset.	**.66**	Breast cancer has serious financial consequences.	**.79**
I get depressed when I think about breast cancer.	**.76**	Breast cancer strongly affects the way the patient sees themselves.	**.67**
Breast cancer makes me afraid.	**.76**	Breast cancer causes difficulties to those close to the patient.	**.66**
Thinking about having breast cancer makes me feel anxious.	**.69**	Breast cancer is very serious.	**.72**
Personal control *(α = .81)*		***Treatment control*** *(α = .83)*	
The course of breast cancer depends on me.	**.70**	The negative effects of breast cancer can be prevented (avoided) by treatment.	**.74**
I have the power to influence breast cancer.	**.74**	The treatment can control breast cancer.	**.79**
What I do can determine whether breast cancer gets better or worse.	**.79**	The treatment will be effective in curing breast cancer.	**.74**
Illness coherence *(α = .78)*			
The symptoms of breast cancer are puzzling to me. (r)	**.67**	***Timeline acute/chronic*** *(α = .73)*	
Breast cancer is a mystery to me. (r)	**.79**	Breast cancer will last a short time. (r)	**.71**
I don't understand breast cancer. (r)	**.81**	Breast cancer will last for a long time.	**.76**
Timeline cyclical *(α = .73)*		Breast cancer will pass quickly. (r)	**.74**
The symptoms come and go in cycles.	**.67**	Breast cancer is likely to be permanent.	**.43**
Breast cancer is very unpredictable.	**.76**		
Breast cancer goes through cycles in which it gets worse and better.	**.61**		

Note. SFL = Standardized factor loading; α = Cronbach's alpha; r = reverse scored

The CFA model for the 26 cervical cancer items fitted well, in accordance with the multiple goodness-of-fit criteria (CFI = .915, NNFI = .904, RMSEA = .050). Again, a seven-factor (timeline acute/chronic and cyclical, consequences, illness coherence, personal and treatment control, and emotional representations) model was produced. The Cronbach's alphas were above the accepted .60 level (Baars, Atherton, Koopman, Bullinger, & Power, 2005), ranging from .66 for personal control, to .84 for treatment control and timeline acute/chronic. Table 2 illustrates the factor loadings for each item in this model. All items had factor loadings considerably higher than .40. Separate factorial analyses were undertaken

for the IPQ-RH breast and cervical cancer causal attribution items. The initial CFA models generated for both diseases did not demonstrate acceptable model fit in relation to multiple goodness-of-fit criteria. Items were subsequently removed using an iterative approach (Bollen, 1989; Hagger & Orbell, 2005), as low factor loadings and large standardized residuals were apparent for certain items. For the breast cancer CFA, eight items were removed (germ or virus, pollution, diet, accident or injury, smoking, family problems, overwork and emotional state), and for the cervical cancer CFA, five items were removed

Table 2

Factor Loadings and Reliabilities of IPQ-RH Cervical Cancer Items

	SFL		SFL
Emotional representations *(α = .76)*		***Consequences*** *(α = .74)*	
When I think about cervical cancer I get upset.	**.72**	Cervical cancer has serious financial consequences.	**.68**
I get depressed when I think about cervical cancer.	**.69**	Cervical cancer strongly affects the way the patient sees themselves.	**.52**
Cervical cancer makes me afraid.	**.54**	Cervical cancer causes difficulties to those close to the patient.	**.67**
Thinking about having cervical cancer makes me feel anxious.	**.62**	Cervical cancer is very serious.	**.73**
Cervical cancer makes me feel angry.	**.65**		
		Treatment control *(α = .84)*	
Personal control *(α = .66)*		The negative effects of cervical cancer can be prevented (avoided) by treatment.	**.77**
The course of cervical cancer depends on me.	**.60**	The treatment can control cervical cancer.	**.71**
I have the power to influence cervical cancer.	**.71**	The treatment will be effective in curing cervical cancer.	**.81**
What I do can determine whether cervical cancer gets better or worse.	**.63**		
		Timeline acute/chronic *(α = .84)*	
Timeline cyclical *(α = .78)*		Cervical cancer will last a short time. (r)	**.70**
The symptoms come and go in cycles.	**.66**	Cervical cancer will last for a long time.	**.66**
Cervical cancer is very unpredictable.	**.84**	Cervical cancer will pass quickly. (r)	**.80**
Cervical cancer goes through cycles in which it gets worse and better.	**.75**	I expect cervical cancer to last the rest of one's life.	**.66**
		Cervical cancer is likely to be permanent.	**.69**
Illness coherence *(α = .82)*			
The symptoms of cervical cancer are puzzling to me. (r)	**.68**		
Cervical cancer is a mystery to me. (r)	**.74**		
I don't understand cervical cancer. (r)	**.84**		

Note. SFL = Standardized factor loading; α = Cronbach's alpha; r = reverse scored

(germ or virus, diet, accident or injury, overwork and emotional state), as they contributed to model misspecification. The final breast (CFI = .974, NNFI = .967, RMSEA = .056) and cervical (CFI = .953, NNFI = .943, RMSEA = .061) cancer two-factor (psychological attributions and general risk factors) models demonstrated good model fit. Factor loadings and internal reliabilities are shown in Table 3. The most endorsed causes were stress or worry and age for breast and cervical cancer, respectively.

Table 3

Factor Loadings and Reliabilities of Causal Attributions

	SFL		**SFL**
Breast			
Psychological attributions *(α = .83)*		***General risk factors*** *(α = .91)*	
Stress or worry	**.82**	Alcohol	**.78**
Mental attitude	**.79**	Chance or bad luck	**.74**
Person's personality	**.58**	Poor medical care	**.82**
Person's own behaviour	**.77**	Ageing	**.75**
		Heredity	**.72**
		Hormonal	**.75**
		Altered Immunity	**.76**
Cervical			
Psychological attributions *(α = .86)*		***General risk factors*** *(α = .85)*	
Family problems	**.63**	Alcohol	**.52**
Mental attitude	**.81**	Pollution	**.71**
Person's personality	**.82**	Poor medical care	**.69**
Person's own behaviour	**.62**	Ageing	**.65**
Stress or worry	**.85**	Heredity	**.72**
		Smoking	**.48**
		Altered Immunity	**.61**
		Chance or bad luck	**.73**

Note. SFL = Standardized factor loading; α = Cronbach's alpha

Table 4

Correlations between IPQ-RH Breast and Cervical Cancer Subscales and PANAS Negative Affect

Scales	1	2	3	4	5	6	7	8	9	10
Breast										
Identity	-									
Timeline acute/chronic	-.03	-								
Consequences	.04	.28**	-							
Personal control	.20**	.27**	.20**	-						
Treatment control	.15**	.20**	.27**	.24**	-					
Illness coherence	.11	.18**	.31**	.35**	.51**	-				
Timeline cyclical	.08	.20**	.29**	.29**	.44**	.60**	-			
Emotional representations	.19**	.13	.22**	.33**	.51**	.43**	.40**	-		
Psychological attributions	.08	.05	-.07	-.07	-.03	-.03	-.03	.07	-	
General risk factors	.08	.01	-.09	-.08	.01	.05	-.06	-.10	-.17*	-
PANAS Negative Affect	.03	-.14*	-.03	-.11	-.05	-.05	-.18**	-.17*	-.09	.09
Cervical										
Identity	-									
Timeline acute/chronic	-.06	-								
Consequences	-.18**	.27**	-							
Personal control	.01	.07	.34**	-						
Treatment control	.01	.08	.19**	.20**	-					
Illness coherence	.01	.16*	.25**	.18**	.25**	-				
Timeline cyclical	.09	.21**	.33**	.20**	.22**	.26**	-			
Emotional representations	-.07	.27**	.22**	.16**	.21**	.18**	.21**	-		
Psychological attributions	-.03	.02	-.05	-.01	.05	.02	.10	-.10	-	
General risk factors	.05	.03	-.05	-.12	-.01	-.01	-.05	-.06	-.56**	-
PANAS Negative Affect	.01	.06	.03	-.02	.07	-.04	.03	-.05	.03	-.20**

*** p< .01, * p< .05.*

For the identity subscales, the most cited breast cancer symptom was fatigue (70.6%) followed by loss of strength (66.7%); and for cervical cancer; the most cited symptom was pain (58.7%) followed by wheeziness (58.2%). The internal consistencies were good, α =.78 for the breast cancer and α =.72 for the cervical cancer identity subscales.

The correlations between IPQ-RH breast and cervical cancer subscales and the NA subscale of the PANAS are shown in Table 4. Positive correlations were evident between most of the illness perceptions and most correlations were not moderate in size (i.e., -0.3 and above or 0.3 and above), suggesting that a response set or bias is not evident in the sample. However, the causal attribution subscales, psychological attributions and general risk factors, were negatively associated across both of these measures. The breast and cervical cancer IPQ-RH measures demonstrated good discriminant validity with the NA subscale of the PANAS, with few breast and cervical cancer illness perceptions negatively associated with this subscale.

Table 5

Internal Consistency and Test-Retest Reliability of IPQ-RH Constructs

	Breast			**Cervical**		
	Item consistency	**Test**	**Retest**	**Item consistency**	**Test**	**Retest**
Identity	.83**	.73	.75	.82**	.92	.82
Timeline acute/chronic	.88**	.77	.72	.82**	.77	.65
Timeline cyclical	.86**	.81	.80	.68**	.89	.77
Consequences	.45**	.75	.75	.74**	.73	.80
Personal control	.78**	.73	.77	.62**	.75	.80
Treatment control	.57**	.85	.92	.70**	.88	.79
Emotional representations	.83**	.76	.84	.70**	.75	.69
Illness coherence	.89**	.81	.77	.85**	.86	.65
Psychological attributions	.46**	.72	.63	.62**	.88	.67
General risk factors	.70**	.67	.66	.74**	.84	.66

** *p< .01.*

Test-Retest Reliability

The IPQ-RH breast and cervical cancer perceptions demonstrated good stability over a three-week period, with all correlations achieving statistical significance. The correlations ranged from .45 to .89 for the IPQ-RH breast cancer, and .62 to .85 for the IPQ-RH cervical cancer measures (See Table 5). The benchmark for significant correlations in prior IPQ-R (Moss-Morris et al., 2002) and IPQ-RH (Figueiras & Alves, 2007) research is .29 or above.

Discussion

The aim of the current study was to provide *a priori* confirmatory factor analytic support for the theoretically derived structures of breast- and cervical-cancer specific versions of the IPQ-RH. We predicted that the IPQ-RH subscales would adequately explain the covariances among the items from IPQ-RH responses of healthy individuals for breast and cervical cancer and these illness perceptions would exhibit satisfactory discriminant validity and reliabilities. The intercorrelations between IPQ-RH illness perceptions were also examined across both measures, and compared to those reported in previous research (Figueiras & Alves, 2007).

The factorial analyses undertaken using the robust CFA method revealed that the illness dimensions in these adapted measures provide support for the illness perceptions, in accordance with self-regulation theory (Leventhal et al., 1980). All models demonstrated good-fit and produced a seven-factor solution for the IPQ-RH breast and cervical cancer items, and a two-factor solution for the IPQ-RH breast and cervical cancer causal attributions. Similar findings for the IPQ-RH (Figueiras & Alves, 2007) and the IPQ-R (Moss-Morris et al., 2002) have been attained in previous studies. Hence, the IPQ-RH subscales satisfactorily accounted for the covariances among the IPQ-RH items.

For the IPQ-RH breast cancer items, there were two items removed due to obtaining low factor loadings and large standardized residuals in the CFA model (“Breast cancer makes

me feel angry" and "I expect breast cancer to last for the rest of one's life"); however, no IPQ-RH cervical cancer items needed to be removed to achieve an acceptable model fit. Over half of the women had indicated that they disagreed or neither disagreed or agreed that the anger and rest of one's life items were related to breast cancer, indicating that these breast cancer items were not pertinent to their beliefs relating to this disease. With the increasing efficacy of treatment modalities leading to lower mortality rates and improving survival rates (Kalager et al., 2009), it is likely that for some of the women studied perceptions of breast cancer are relatively optimistic, and they feel little anger about this disease. The fact that these items were applicable to cervical cancer may be due to the participants understanding some of the issues associated with this disease (Shand, Burney, & Fletcher, 2010), and perhaps engendering feelings of anger when thinking about their response to a hypothetical HPV infection for themselves.

For both IPQ-RH breast and cervical cancer measures, several causal attributions were removed due to contributing to model misspecification. However, breast- (e.g., hormonal) (Rees et al., 2004) and cervical- (e.g., smoking) (Hagger & Orbell, 2005) cancer specific risk factors were included in these models. Given that HPV is a common cause of cervical cancer (Cancer Council Australia, 2009b), the need to remove germ or virus as a risk factor for this disease was unexpected. It is possible that some of these women perceived germ or virus to be linked only with other viral illnesses, such as the flu (Enserink, 2011), while limited HPV knowledge (Lopez & McMahon, 2007; Pitts & Clarke, 2002) may also be evident.

The IPQ-RH measures are more than just a reflection of negative affect, with only few breast and cervical cancer illness perceptions negatively and weakly associated with the NA subscale of the PANAS. This supports the discriminant validity of these measures, and reflect similar findings obtained in previous research assessing the discriminant validity of

the IPQ-RH with the NA subscale of the PANAS (Figueiras & Alves, 2007; Moss-Morris et al., 2002).

Moreover, associations were found between IPQ-RH illness perceptions across both measures. Most of the personal control, timeline acute/chronic, timeline cyclical, treatment control, consequences, illness coherence and emotional representations illness perceptions exhibited positive associations with one another. Many of these intercorrelations are consistent with those found in prior research among healthy individuals (Figueiras & Alves, 2007). For example, a positive relationship was found between emotional representations and both timeline cyclical and consequences, demonstrating that the experience of negative emotions towards breast and cervical cancer is associated with greater perceptions of the disease being ongoing, occurring in a cyclical timeframe, and perceptions of more negative consequences for these illnesses. Contrary to prior research (Figueiras & Alves, 2007), negative associations were found between psychological attributions and general risk factors across both disease contexts, indicating that the breast and cervical cancer illness perceptions of healthy individuals differ to some degree to those seen in other health-related contexts (i.e., AIDS, skin cancer and tuberculosis).

In relation to symptoms commonly associated with both disease types (e.g., Das, Jeba, & George, 2005; Stone, Richards, A'Hern, & Hardy, 2005), fatigue and loss of strength were most endorsed for breast cancer and pain for cervical cancer. However, wheeziness, a symptom typically associated with respiratory conditions (Panitch, 2007), was the second most endorsed symptom for cervical cancer. It is not clear why this misperception has emerged, however, it could be due to a lack of knowledge relating to the symptoms of cervical cancer (Issah, Maree, & Mwinituo, 2011) and HPV (Pitts & Clarke, 2002), as participants were not asked whether they knew what cervical cancer is and less than half of these women endorsed the relatively common symptom of discharge (Hagger & Orbell,

2005) for cervical cancer. The misattribution of a respiratory symptom to cervical cancer is concerning as it suggests that these women may subsequently miss some of the early indicators of cervical cancer, leading to delayed medical treatment for this condition should it arise.

Finally, these modified versions of the IPQ-RH showed good stability over a three week timeframe. Again, the results correspond with previous research on the test-retest reliability of the IPQ-RH (Figueiras & Alves, 2007), with all correlations achieving statistically significance across both measures.

This is the first study to utilize the CFA hypothesis-testing framework to empirically validate English-language IPQ-RH measures for breast and cervical cancer. The factor structures obtained across both measures provide empirical support for self-regulation theory (Leventhal et al., 1980). The establishment of breast and cervical cancer IPQ-RH measures using the rigorous CFA method is an important step forward, as these measures can now be utilized in future health-related research, including studies assessing the link between illness perceptions and breast and cervical cancer control behaviours.

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Chapter Six: Validation of the Croatian and Lebanese Revised Illness Perception Questionnaires for Healthy People (IPQ-RH)

The previous chapter provided empirical validation for the IPQ-RH breast and cervical cancer measures for use among English-speaking populations in future health-related studies (refer to Chapter Five). However, there are no validated versions of these measures in languages other than English, particularly for Croatian and Lebanese speaking populations.

Another limitation of Study One was that the sample comprised predominantly of Croatian and Lebanese immigrant women who spoke and responded to the study questionnaire in English. It is possible that this was a somewhat biased representation of women from these ethnic groups; hence, there is a need to investigate the role of broader cognitive and affective factors (illness representations entailed in the CSM) amongst a more representative, and non-English-speaking sample of these immigrant women.

In addition, there was only a relatively small sample of Macedonian participants (n = 35) recruited for Study One, as there are few Macedonian organizations in Sydney, Australia (i.e., Macedonian Orthodox Church St. Petka, Macedonian Orthodox Church Cabramatta, Macedonian Community Child Care Centre Ilinden and Macedonian Australian Welfare Association of Sydney) and none of these organizations provided permission for the researcher to directly approach their patrons to participate in the current research and to leave advertisements at their reception desks. Due to the aforementioned stated issues in participant recruitment for this ethnic group, it was decided that Macedonian women would be excluded from the present study.

Currently, there are no validated versions of the Revised Illness Perception Questionnaire for Healthy People (IPQ-RH) for Croatian or Lebanese populations. Thus, the purpose of this study was to validate this known measure for use within these ethnic populations in studies on breast and cervical cancer control.

Abstract

Introduction: The absence of Croatian- and Arabic-language measures to assess the illness representations of Croatian- and Arabic-speaking individuals has contributed to a lack of research among these populations, particularly among immigrants from these backgrounds in English-speaking countries. Utilizing the robust confirmatory factor analysis (CFA) approach, the present study aimed to validate Croatian and Arabic versions of the Revised Illness

Perception Questionnaire for healthy people (IPQ-RH) in the contexts of breast and cervical cancer prevention, and compared breast and cervical cancer illness perceptions among Croatian and Lebanese women living in Australia.

Method: Forward and back-translated versions of the IPQ-RH were administered in Croatian to Croatian-born (n = 238), and in Arabic to Lebanese-born (n = 240) women living in Australia. The IPQ-RH illness perceptions were assessed for each cancer type, and the Negative Affect (NA) subscale of the Positive and Negative Affect Schedule (PANAS) assessed discriminant validity.

Results: The CFA method demonstrated acceptable models across the Croatian and Lebanese IPQ-RH measures, with factor loadings ranging from .51 to .88. The internal reliabilities for the IPQ-RH subscales ranged from .66 to .92, and the subscales had low correlations with the NA subscale of the PANAS, indicating that the IPQ-RH measures are largely distinguishable from negative affective dispositions.

Conclusion: These findings demonstrate that the Croatian and Lebanese IPQ-RH breast and cervical cancer measures have a factor structure similar to the originally-developed IPQ-RH scale and acceptable subscale reliabilities. The validation of these IPQ-RH measures provides further support for the applicability of the theoretically-developed illness representations and

for the use of these measures among Croatian- and Arabic-speaking women in future health-related research studies.

Keywords: Illness representations; self-regulation theory; breast and cervical cancer; Croatian; Lebanese.

Increasing numbers of ethnically diverse immigrants reside in Western countries worldwide, with 14%, 10% and 25% of the United States (US), United Kingdom (UK) and Australian populations, respectively, comprising first generation immigrants (OECD, 2009). An important health challenge facing these countries is that certain ethnic immigrant groups differ in their use of breast and cervical cancer control behaviours from the majority population, despite these services having minimal barriers of access due to their low cost (Moser, Patnick, & Beral, 2009). In the US, Hispanic women utilize breast (mammography) (Breen, Waegner, Brown, Davis, & Ballard-Barbash, 2001) and cervical (Pap smear) (Behbakht, Lynch, Teal, Degeest, & Massad, 2004) cancer control services less than White women, and in the UK, Black women (Renshaw, Jack, Dixon, Møller, & Davies, 2010) show low screening rates compared with White women.

Similarly, in Australia, immigrants from Eastern-European countries, including Croatia, and Arabic-speaking countries, including Lebanon are low users of breast (Australian Government Department of Health and Ageing, 2009; BreastScreen Victoria, 2004; BreastScreen NSW, 2003, as cited in South East Health, 2006) and cervical (NSW Cervical Screening Program, 2000; Public Health Division, 2001) cancer control services, even when compared to Australian-born women (BreastScreen Victoria, 2006; BreastScreen Victoria, 2004; Public Health Division, 2001). In contrast, a further study has reported that Lebanese women are high users of mammography and Pap smear (Centre for Epidemiology and Research, 2010). In light of this discrepancy in rates of screening, it is important to note that that the BreastScreen data in the former study are more comprehensive, and possibly provides a more accurate account of mammography rates, and that there may have been some level of over-reporting of Pap smear rates in the latter study as participants were advised of the importance of having regular Pap smears prior to being asked about their adherence to this cancer control behaviour (Centre for Epidemiology and Research, 2010), which may

have prompted socially desirable and inaccurate responses (refer to Chapter One for a more detailed rationale; refer to Chapters Three and Four). More recent evidence suggests that of the two ethnic groups, Lebanese women are the lowest adherers to cancer control behaviours, with Croatian immigrant women reporting greater adherence to breast self-examination (BSE) and biennial mammography than Lebanese immigrant women living in Australia (refer to Chapter Three). Moreover, low screening rates are evident in these women's homelands, with approximately 40% of Croatian (Polasek et al., 2007; Stamenic, & Strnad, 2011) and 80% of Lebanese (Adib, Saghir, & Ammar, 2009) eligible women not using recommended breast cancer control services.

Despite variable adherence rates of these ethnic immigrant groups to cancer control programs, little is known about the factors underlying their use of these behaviours. Research among ethnically diverse immigrants in the US suggests that attitudinal and affective barriers are prevalent (Consedine, Magai, Horton, Neugut, & Gillespie, 2005; Consedine, Magai, & Neugut, 2004a). Likewise, research undertaken in Australia has shown that cognitive (perceived efficacy of cervical cancer control measures) and affective (breast cancer worry) factors are related to HPV vaccine, BSE and CBE use, respectively, among Croatian and Lebanese Australian groups (refer to Chapters Three and Four). Given the associations between these psychosocial factors and the enactment of cancer control measures, it is likely that illness perceptions will be linked with the use of these behaviours. Unfortunately, investigations amongst these ethnic groups are limited by the absence of appropriate validated measures in languages other than English. Specifically, no validated measures of cognitive and affective factors related to cancer control practices are available for Croatian and Lebanese populations, despite their use of cancer control behaviours, both as immigrant populations (in Australia) and in their homelands. The aim of the present study was to utilize the confirmatory factor analytic method to validate an existing measure of these cognitive

and affective factors, the Revised Illness Perception Questionnaire for Healthy People (IPQ-RH), for use among Croatian and Lebanese groups. Confirmatory factor analysis (CFA) is the highest standard in factor analytic research, as it permits a hypothesis-testing *a priori* specification for the selection of variables in the models (Hu & Bentler, 1999).

Using the validated Illness Perception Questionnaire (IPQ) (Weinman, Petrie, Moss-Morris, & Horne, 1996) and its revised version, the Revised Illness Perception Questionnaire (IPQ-R) (Hagger & Orbell, 2005), illness perceptions have been found to be associated with the enactment of health protective behaviours among disease-affected individuals across diverse health contexts (Cabassa, Lagomasino, Johnson, Hansen, & Xie, 2008; Hill, Dziedzic, Thomas, Baker, & Croft, 2007; Moss-Morris et al., 2002). The measures were developed from the Common Sense Model (CSM) of self-regulation (Leventhal, Meyer, & Nerenz, 1980), and comprise of five core illness dimensions (refer to Chapter One). Little research has assessed illness perceptions in the breast (Anagnostopoulos et al., 2012; Anagnostopoulos & Spanea 2005) and cervical (Hagger & Orbell, 2005) cancer control contexts, however, one study utilizing the CFA approach confirmed the factorial and discriminant validity of the IPQ-R among women attending a follow-up appointment in receipt of an abnormal Pap test (Hagger & Orbell, 2005). Unfortunately, the relationship between cervical cancer illness perceptions and use of cervical cancer control behaviours was not explored.

In recognition of the unique characteristics of asymptomatic populations, a modified version of the IPQ-R has been developed in Portuguese, the Revised Illness Perception Questionnaire for Healthy People (IPQ-RH) (Figueiras & Alves, 2007). This measure contains the subscales of identity (symptoms related to an illness), timeline acute/chronic and cyclical (beliefs about the chronicity and unpredictability of an illness), emotional representations (emotions associated with an illness), consequences (effect an illness has on one's well-being), illness coherence (degree to which an illness makes sense), personal and

treatment control (beliefs pertaining to personal abilities and the effectiveness of treatment), and psychological attributions and general risk factors (psychological and generic causes of an illness) (Figueiras & Alves, 2007). Empirical validation has also been provided for adapted versions of the IPQ-RH in the contexts of breast and cervical cancer (refer to Chapter Five). However, to date no studies have examined how illness representations relate to adherence to breast and cervical cancer control behaviours among ethnically diverse immigrant populations. Further, although research has been conducted with disease-affected ethnic populations using language-specific validated IPQ measures, such as Italian (Giardini, Majani, Pierobon, Gremigni, & Catapano, 2007), Swedish (Brink, Alsen, & Cliffordson, 2011), and Greek (Giannousi, Manaras, Georgoulias, & Samonis, 2010) versions, there are no validated Croatian or Lebanese versions.

Thus, the aims of the present study were to develop empirically validated Croatian and Lebanese versions of the IPQ-RH using the CFA method, and to examine and compare illness perceptions related to breast and cervical cancer among healthy Croatian- and Lebanese-born immigrant women. We predicted that the *a priori* structures of the IPQ-RH subscales would satisfactorily describe the covariances among items from the IPQ-RH responses of Croatian and Lebanese women. In addition, we hypothesized that the breast and cervical cancer illness representations would exhibit satisfactory discriminant validity and reliabilities.

Method

Sample and Procedure

Croatian- (n = 238) and Lebanese- (n = 240) born women residing in Australia were recruited into this study. In accordance with national cancer control guidelines (National Breast and Ovarian Cancer Centre, 2009a; Cancer Council Australia, 2009a), participants ranged in age from 18 to 65 years. Participants had no prior diagnoses or current symptoms

of breast and cervical cancer and before completing the study questionnaire, all participants indicated no prior history of hysterectomy. All participants were recruited through direct invitation at community organisations (i.e., family centres and recreation clubs) and given language-appropriate study packages. Consent forms and study questionnaires were translated into Croatian and Arabic by translators accredited with the National Accreditation Authority for Translators and Interpreters (NAATI). To test equivalence, two NAATI accredited Croatian and Lebanese translators back translated the consent forms and surveys into English, ensuring that the meaning was retained. This study was approved by the Macquarie University Human Ethics Research Committee.

Confirmation of factor structure. The confirmatory factor analytic method was used to assess the structure and internal consistency of the IPQ-RH breast and cervical cancer measures, with 200 Croatian women and 201 Lebanese women completing the Croatian and Lebanese versions of the main study questionnaire, respectively. The questionnaire included demographics, the IPQ-RH breast and cervical cancer measures, and the Negative Affect (NA) subscale of the Positive and Negative Affect Schedule (PANAS), a procedure implemented in the original validation of the IPQ-RH to assess discriminant validity (Figueiras & Alves, 2007).

Test-retest reliability. An additional 77 women (38 Croatian; 39 Lebanese) were recruited from the same sources to assess test-retest reliability of the Croatian and Lebanese IPQ-RH measures. *A priori* power analyses indicated that 38 Croatian and 39 Lebanese participants were required to have 80% power for detecting a medium sized effect when employing the .001 criterion of statistical significance. Participants completed the Croatian and Lebanese questionnaires on two occasions separated by a three-week interval. All participants completed the surveys at both time points and were telephoned to ensure that the second survey was completed on time.

Measures

Illness representations relating to breast and cervical cancer. The IPQ-RH breast and cervical cancer measures assess breast and cervical cancer illness perceptions among asymptomatic individuals (refer to Chapter Five). These measures contain three sections. First, the identity subscales relate to perceived symptoms of each disease type and are scored on a dichotomous scale, with participants indicating (1 = Yes; 0 = No) for breast (e.g., hard or tender growths in body) and cervical (e.g., discharge) cancer symptoms, respectively, for each measure. Scores were summed for each measure, with higher scores indicating more perceived symptoms associated with each illness. Second, the consequences, emotional representations, timeline acute/chronic, timeline cyclical, personal control, treatment control and illness coherence subscales are assessed with standard IPQ-RH items and individual items were rated on five-point Likert scales (1 = Strongly disagree to 5 = Strongly agree). The original 38 items utilized in prior research (refer to Chapter Five) were administered to participants in order to examine whether omitted items from these measures were applicable to these ethnic groups. As seen in prior IPQ-RH research for other disease contexts (Figueiras & Alves, 2007) and breast and cervical cancer (refer to Chapter Five), following Cronbach's analysis 12 items were omitted (e.g., "Breast cancer does not worry me" and "Cervical cancer does not worry me") to increase the reliability of these subscales, leaving 26 items for each measure. Finally, the IPQ-RH causal attributions subscales, psychological attributions and general risk factors, relate to potential causes for both diseases and are scored on the same five-point Likert scale.

Negative affect. The NA subscale of the PANAS assessed the discriminant validity of the Lebanese and Croatian IPQ-RH breast and cervical cancer measures, in relation to negative affective traits, as used in prior IPQ-RH research (Figueiras & Alves, 2007). This subscale assesses the extent to which specific negative emotions are experienced (e.g., afraid, scared and hostile) with Likert scale items (1 = Very slightly or not at all to 5 = Extremely) summed to yield a total score ranging from 10 to 50, with higher scores indicating higher distress levels (Watson, Clark, & Tellegen, 1988). The coefficient alpha for this scale was .77 for Croatian and .80 for Lebanese women in the present study.

Demographics. Participants provided demographic information pertaining to their country of birth, age, marital status, education, income, religion, and the number of years they had lived in Australia.

Statistical Analysis

The confirmatory factor analytic method was employed to examine the model fit and factor structure of the Croatian and Lebanese IPQ-RH breast and cervical cancer measures. A total of eight factor analyses were completed across these IPQ-RH measures (four factor analyses for the breast and cervical cancer items for the consequences, emotional representations, timeline acute/chronic, timeline cyclical, personal control, treatment control and illness coherence dimensions and four factor analyses for the breast and cervical cancer causal attributions items). In order to assess the adequacy of a CFA model to explain the observed covariance matrix, the chi-square (χ^2) goodness-of-fit criterion has previously been used, however, this statistic is affected by sample size and regarded as an overly rigid measure of goodness-of-fit (Bentler, 1990; Tanguma, 2001). As a result, goodness-of-fit was measured with the Mean Square Error of Approximation (RMSEA), which must be close to, or below, .05 (Hu & Bentler, 1999), and the Comparative Fit Index (CFI) and Non-Normed

Fit Index (NNFI), which are required to be above .90 (Bentler, 1990). This procedure has been implemented in prior IPQ-R research (Hagger & Orbell, 2005).

For the breast and cervical cancer identity subscales, the percentage of symptoms endorsed by participants were computed separately, as these subscales are scored on a dichotomous scale. Pearson's correlations were used to test the associations between the IPQ-RH subscales for each measure and the discriminant validity with the NA subscale. To assess test-retest reliability, Cronbach's alpha was computed for the Croatian and Lebanese IPQ-RH measures, and Pearson's correlations were computed between subscales of these measures at both time points. Lastly, independent sample *t*-tests were undertaken to explore between group differences in illness representations for the Croatian and Lebanese IPQ-RH subscales. Bonferroni correction was applied so that the critical *p* value was reduced to .001 to account for the multiple analyses conducted.

Results

For the participants who completed the survey to confirm the factor structure, the mean age for Croatian and Lebanese women was 51 (*SD* = 12.54) and 45 (*SD* = 11.42) years, respectively. The majority of participants were married (45% Croatian, 41.3% Lebanese) or single (44.5%, 42.3% respectively). Most women had completed secondary schooling (87% Croatian, 86.1% Lebanese), with less women completing further education post high school (43% Croatian, 32.9% Lebanese), and all resided in Australia for 12 years or less. Most were Catholic (73% Croatian, 40.8% Lebanese) or Islamic (38.8% Lebanese), had an income in the $20 000-$70 000 per year range (64.7% Croatian, 71.6% Lebanese) and one or more children (66.2% and 70.1%, respectively).

With regards to standardized skewness and kurtosis coefficients, all variables were within the normal +/- 3 range (Onwuegbuzie & Daniel, 2002), ranging from -1.70 for consequences to 2.94 for timeline cyclical. Among those who completed the test-retest

reliability survey, the majority were Catholic (71.2% Croatian, 38.6% Lebanese) or Islamic (36.1% Lebanese), and married (42.3% Croatian, 38.7% Lebanese) or single (47.5%, 38.7% respectively). A higher percentage of women had completed secondary schooling (84.2% Croatian, 79.4% Lebanese), with less attaining qualifications following high school (41.9% Croatian, 35.9% Lebanese). The mean ages were 52.4 (*SD* = 9.87) and 46.3 (*SD* = 10.63) years, for Croatian and Lebanese women respectively. Further, the majority of women had an annual income of $20 000-$70 000 per year (68.2% Croatian, 66.5% Lebanese), had at least one child (60.3% Croatian, 66.8% Lebanese) and all women had been living in Australia for up to 9 years.

Confirmation of Model Fit

Using Analysis of Moment Structures (AMOS) software, the initial CFAs for the Lebanese and Croatian IPQ-RH breast cancer items did not produce satisfactory seven factor models in accordance with goodness-of-fit criteria. An iterative approach (Hagger & Orbell, 2005; Bollen, 1989) was employed to remove two items from each model ("Breast cancer makes me feel angry" and "I expect breast cancer to last for the rest of one's life"), due to obtaining factors loadings below .40 (Ford, McCallum, & Tait, 1986) and contributing to high standardized residuals in the models, leaving a total of 24 items for each model. The final analyses revealed good seven-factor (illness coherence, emotional representations, timeline acute/chronic, consequences, timeline cyclical, personal control and treatment control) models for the Croatian (CFI = .931, NNFI = .920, RMSEA = .045) and Lebanese (CFI = .956, NNFI = .949, RMSEA = .033) breast cancer items. Most factor loadings were high across both measures, and reliabilities were above the acceptable .60 level (Bagozzi & Kimmel, 1995), ranging from .66 for timeline cyclical to .78 for consequences for the Croatian IPQ-RH measure, and .67 for the consequences to .78 for the emotional representations for the Lebanese IPQ-RH measure (refer to Table 1).

Table 1

Factor Loadings and Reliabilities of IPQ-RH Breast Cancer Items

	SFL	
	C	**L**
Emotional representations *(C α = .73) (L α = .78)*		
When I think about breast cancer I get upset.	**.62**	**.64**
I get depressed when I think about breast cancer.	**.73**	**.66**
Breast cancer makes me afraid.	**.72**	**.70**
Thinking about having breast cancer makes me feel anxious.	**.66**	**.72**
Personal control *(C α = .77) (L α = .75)*		
The course of breast cancer depends on me.	**.67**	**.76**
I have the power to influence breast cancer.	**.75**	**.66**
What I do can determine whether breast cancer gets better or worse.	**.79**	**.68**
Illness coherence *(C α = .72) (L α = .73)*		
The symptoms of breast cancer are puzzling to me. (r)	**.69**	**.74**
Breast cancer is a mystery to me. (r)	**.75**	**.70**
I don't understand breast cancer. (r)	**.71**	**.62**
Timeline cyclical *(C α = .66) (L α = .70)*		
The symptoms come and go in cycles.	**.58**	**.78**
Breast cancer is very unpredictable.	**.72**	**.58**
Breast cancer goes through cycles in which it gets worse and better.	**.65**	**.61**

	SFL	
	C	**L**
Consequences *(C α = .78) (L α = .67)*		
Breast cancer has serious financial consequences.	**.76**	**.61**
Breast cancer strongly affects the way the patient sees themselves.	**.61**	**.54**
Breast cancer causes difficulties to those close to the patient.	**.70**	**.63**
Breast cancer is very serious.	**.73**	**.67**
Treatment control *(C α = .72) (L α = .70)*		
The negative effects of breast cancer can be prevented (avoided) by treatment.	**.70**	**.75**
The treatment can control breast cancer.	**.71**	**.71**
The treatment will be effective in curing breast cancer.	**.69**	**.57**
Timeline acute/chronic *(C α = .76) (L α = .72)*		
Breast cancer will last a short time. (r)	**.75**	**.75**
Breast cancer will last for a long time.	**.63**	**.63**
Breast cancer will pass quickly. (r)	**.71**	**.57**
Breast cancer is likely to be permanent.	**.53**	**.55**

Note. SFL = Standardized factor loading; α = Cronbach's alpha; C = Croatian; L = Lebanese; r = reverse scored.

The factor loadings for the Croatian and Lebanese IPQ-RH cervical cancer items are presented in Table 2. There were 26 items entered into both analyses, with each model demonstrating good fit to the observed covariance matrix (Croatian CFI = .930, NNFI = .920, RMSEA = .042; Lebanese CFI = .982, NNFI = .979, RMSEA = .019). Seven-factor models were produced for each language-specific measure, with five indicators for timeline acute/chronic and emotional representations, four indicators for consequences, and three

Table 2

Factor Loadings and Reliabilities of IPQ-RH Cervical Cancer Items

	SFL	
	C	**L**
Emotional representations *(C α = .73) (L α = .75)*		
When I think about cervical cancer I get upset.	**.65**	**.59**
I get depressed when I think about cervical cancer.	**.71**	**.66**
Cervical cancer makes me afraid.	**.54**	**.70**
Thinking about having cervical cancer makes me feel anxious.	**.51**	**.58**
Cervical cancer makes me feel angry.	**.62**	**.62**
Personal control *(C α = .64) (L α = .71)*		
The course of cervical cancer depends on me.	**.60**	**.68**
I have the power to influence cervical cancer.	**.69**	**.77**
What I do can determine whether cervical cancer gets better or worse.	**.66**	**.65**
Timeline cyclical *(C α = .74) (L α = .70)*		
The symptoms come and go in cycles.	**.70**	**.56**
Cervical cancer is very unpredictable.	**.81**	**.69**
Cervical cancer goes through cycles in which it gets worse and better.	**.70**	**.70**
Illness coherence *(C α = .76) (L α = .70)*		
The symptoms of cervical cancer are puzzling to me. (r)	**.65**	**.68**
Cervical cancer is a mystery to me. (r)	**.66**	**.63**
I don't understand cervical cancer. (r)	**.85**	**.66**

	SFL	
	C	**L**
Consequences *(C α = .70) (L α = .73)*		
Cervical cancer has serious financial consequences.	**.61**	**.54**
Cervical cancer strongly affects the way the patient sees themselves.	**.59**	**.59**
Cervical cancer causes difficulties to those close to the patient.	**.66**	**.79**
Cervical cancer is very serious.	**.69**	**.65**
Treatment control *(C α = .78) (L α = .75)*		
The negative effects of cervical cancer can be prevented (avoided) by treatment.	**.80**	**.79**
The treatment can control cervical cancer.	**.65**	**.61**
The treatment will be effective in curing cervical cancer.	**.75**	**.71**
Timeline acute/chronic *(C α = .82) (L α = .74)*		
Cervical cancer will last a short time. (r)	**.68**	**.70**
Cervical cancer will last for a long time.	**.68**	**.64**
Cervical cancer will pass quickly. (r)	**.74**	**.73**
I expect cervical cancer to last the rest of one's life.	**.67**	**.57**
Cervical cancer is likely to be permanent.	**.69**	**.52**

Note. SFL = Standardized factor loading; α = Cronbach's alpha; C = Croatian; L = Lebanese; r = reverse scored.

indicators each for the illness coherence, timeline cyclical, personal and treatment control factors. The factor loadings and reliabilities are presented in Table 2. All reliabilities and factor loadings were well above acceptable levels (Bagozzi & Kimmel, 1995; Ford et al., 1986).

Table 3

Factor Loadings and Reliabilities of Breast and Cervical Cancer Causal Attributions

	SFL			SFL	
	C	**L**		**C**	**L**
Breast					
Psychological attributions *(C α = .79) (L α = .86)*			***General risk factors*** *(C α = .88) (L α = .92)*		
Stress or worry	**.79**	**.67**	Alcohol	**.69**	**.82**
Mental attitude	**.77**	**.13**	Chance or bad luck	**.68**	**.81**
Person's personality	**.56**	**.63**	Poor medical care	**.77**	**.88**
Person's own behaviour	**.69**	**.88**	Ageing	**.71**	**.84**
			Heredity	**.55**	**.71**
			Hormonal	**.74**	**.77**
			Altered immunity	**.73**	**.75**
Cervical					
Psychological attributions *(C α = .88) (L α = .87)*			***General risk factors*** *(C α = .85) (L α = .86)*		
Family problems	**.72**	**.80**	Alcohol	**.67**	**.61**
Mental attitude	**.77**	**.76**	Pollution	**.64**	**.67**
Person's personality	**.80**	**.71**	Poor medical care	**.66**	**.76**
Person's own behaviour	**.67**	**.67**	Ageing	**.65**	**.70**
Stress or worry	**.82**	**.81**	Heredity	**.63**	**.60**
			Smoking	**.67**	**.68**
			Altered Immunity	**.55**	**.68**
			Chance or bad luck	**.68**	**.64**

Note. SFL = Standardized factor loading; α = Cronbach's alpha; C = Croatian; L = Lebanese.

For the breast cancer causal attribution subscales, the initial models did not demonstrate good model fit across both language measures. As a result, variables were excluded (germ or virus, diet, pollution, family problems, accident or injury, emotional state, smoking and overwork) that caused model misspecification by achieving low factor loadings or large standardized residuals. The final two-factor (psychological attributions and general

risk factors) models demonstrated good fit across all incremental indices (Croatian CFI = .969, NNFI = .960, RMSEA = .054; Lebanese CFI = .981, NNFI = .975, RMSEA = .055), and the factor loadings are shown in Table 3. The reliabilities were .79 and .88 for Croatian, and .86 and .92 for Lebanese psychological attributions and general risk factors subscales, respectively. The most endorsed cause was hereditary across both diseases for both ethnic groups.

Similarly, the initial Croatian and Lebanese cervical cancer casual attributions models were not adequate. Items responsible for model misspecification were excluded (overwork, germ or virus, accident or injury, emotional state and diet). The final analyses revealed two models that were a good fit to the observed covariance matrix (Croatian CFI = .968, NNFI = .961, RMSEA = .051; Lebanese CFI = .975, NNFI = .970, RMSEA = .044). Item reliabilities were high, .88 and .87 for the psychological attributions, and .85 and .86 for the general risk factors, for Croatian and Lebanese subscales, respectively.

For the identity subscales, the most endorsed breast cancer symptoms were fatigue and pain for Croatian (79% and 76.5% respectively) and Lebanese (66.2% and 75.6% respectively) women. Pain (59%) and discharge (65%) were the highest rated cervical cancer symptoms for Croatian women, and breathlessness (64.2%) and dizziness (59.7%) for Lebanese women. The internal reliabilities were satisfactory, .77 and .76 for the Croatian, and .71 and .73 for the Lebanese IPQ-RH breast and cervical measures, respectively. Correlations between IPQ-RH breast and cervical cancer subscales and the NA subscale are shown in Table 4. There were strong positive correlations between most of the illness perceptions. Both measures demonstrated good discriminant validity as few IPQ-RH constructs were associated with the NA subscale of the PANAS (Figueiras & Alves, 2007).

Table 4

Correlations between IPQ-RH Breast and Cervical Cancer Subscales and the PANAS

Scales	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Croatian											
1. Identity	-	***-.07***	***-.13***	***- .04***	***-.01***	***-.20***	***-.14***	***-.06***	***.02***	***-.04***	***.01***
2. Timeline acute/chronic	-.02	-	***.35***	***.22***	***.23***	***.23***	***.28***	***.32***	***.04***	***.13***	***.06***
3. Consequences	.01	.39**	-	***.36***	***.22***	***.25***	***.27***	***.24***	***.01***	***.03***	***.03***
4. Personal control	.10	.32**	.23**	-	***.23***	***.22***	***.24***	***.20***	***.01***	***.08****	***.04***
5. Treatment control	.04	.25**	.28**	.45**	-	***.24***	***.21***	***.22***	***.09****	***-.01***	***.06***
6. Illness coherence	.04	.06	.13	.38**	.46**	-	***.23***	***.17***	***-.01***	***.01***	***.01***
7. Timeline cyclical	.04	.14**	.24**	.34**	.43**	.53**	-	***.20***	***.08***	***.01***	***.02***
8. Emotional representations	.10	.16*	.14*	.37**	.48**	.45**	.43**	-	***-.01***	***-.11***	***.01***
9. Psychological attributions	.05	-.07	.02	.10	.04	.04	-.07	-.09	-	***-.45***	***.09****
10. General risk factors	.09	.05	.09	-.16*	-.07	-.12	-.10	-.13	-.32**	-	***-.01****
11. PANAS Negative Affect	.01	-.02	-.07	-.09	-.04	-.04	-.15*	-.14*	-.08	.02	-
Lebanese											
1. Identity	-	***-.10***	***-.03***	***-.13***	***-.02***	***-.04***	***.19***	***-.06***	***.07***	***.02***	***-.05***
2. Timeline acute/chronic	.09	-	***.38***	***.35***	***.36***	***.30***	***.31***	***.38***	***.08***	***.15****	***.02***
3. Consequences	.12	.29**	-	***.26***	***.19***	***.20***	***.14****	***.23***	***.05***	***.03***	***.01***
4. Personal control	.16*	.40**	.18**	-	***.27***	***.27***	***.25****	***.24***	***-.03***	***.07***	***.06***
5. Treatment control	.10	.32**	.09	.32**	-	***.21***	***.15****	***.19***	***.05***	***.07***	***.05***
6. Illness coherence	.11	.18*	.14*	.32**	.34**	-	***.12***	***.15****	***-.05***	***.04***	***.03***
7. Timeline cyclical	.10	.22**	.10	.21**	.39**	.46**	-	***.15****	***-.02***	***.06***	***-.03***
8. Emotional representations	.06	.19**	.18**	.17*	.35**	.29**	.35**	-	***.01***	***.14***	***.04***
9. Psychological attributions	-.23**	.04	.01	-.01	-.04	-.05	-.05	.05	-	***-.27***	***.08***
10. General risk factors	-.09	-.08	-.09	-.07	-.01	-.01	-.08	-.08	.01	-	***-.02***
11. PANAS Negative Affect	.03	-.06	-.01	-.05	-.15*	-.13	.14*	-.05	.05	.07	-

Note. Italicized and bolded correlations are IPQ-RH cervical cancer illness perceptions.

*** p< .01, * p< .05.*

Illness perceptions were also compared between the Croatian and Lebanese IPQ-RH subscales. The breast cancer subscales that significantly differed were identity (Croatian M = 10.79, SD = 3.78; Lebanese M = 9.18, SD = 3.50) $t(399) = 4.42$, $p < .0005$; and psychological

Table 5

Internal Consistency and Test-Retest Reliability of IPQ-RH Constructs

	Croatian					
	Breast			Cervical		
	Item consistency	Test	Retest	Item consistency	Test	Retest
Identity	.83**	.74	.81	.81**	.92	.81
Timeline acute/chronic	.87**	.70	.79	.83**	.76	.65
Timeline cyclical	.85**	.81	.79	.73**	.88	.76
Consequences	.40*	.73	.72	.73**	.72	.80
Personal control	.78**	.72	.77	.58**	.73	.78
Treatment control	.55**	.84	.91	.71**	.88	.81
Emotional representations	.81**	.75	.83	.70**	.78	.71
Illness coherence	.89**	.80	.76	.85**	.86	.65
Psychological attributions	.44**	.71	.62	.75**	.88	.63
General risk factors	.69**	.66	.66	.78**	.85	.65
	Lebanese					
	Breast			**Cervical**		
	Item consistency	**Test**	**Retest**	**Item consistency**	**Test**	**Retest**
Identity	.92**	.75	.80	.89**	.79	.74
Timeline acute/chronic	.81**	.68	.64	.82**	.78	.80
Timeline cyclical	.80**	.73	.77	.59**	.65	.77
Consequences	.84**	.82	.88	.77**	.65	.78
Personal control	.90**	.80	.72	.59**	.70	.69
Treatment control	.85**	.81	.75	.63**	.83	.71
Emotional representations	.63**	.71	.68	.77**	.71	.73
Illness coherence	.86**	.68	.62	.51**	.77	.72
Psychological attributions	.85**	.88	.87	.86**	.85	.75
General risk factors	.93**	.77	.80	.90**	.80	.75

*** p< .01, * p< .05*

attributions (Croatian M = 14.70, SD = 4.49; Lebanese M =11.32, SD =5.63) $t(399) = 6.64$, $p < .0005$. The IPQ-RH cervical cancer subscale of timeline cyclical (Croatian M = 10.95, SD = 3.38; Lebanese M = 9.83, SD = 3.67) $t(399) = 3.16$, $p = .001$ was also significantly different across the measures.

Test-Retest Reliability

The IPQ-RH subscales demonstrated satisfactory stability over a three week period for all measures; with all correlations achieving statistical significance and ranging from .40 to .93 (see Table 5). These correlations are above the minimum level of .29 obtained in prior IPQ-RH research (Figueiras & Alves, 2007) for significant correlations. The test-retest reliabilities are shown in Table 5.

Discussion

The current study aimed to develop empirically-validated Croatian and Lebanese versions of the IPQ-RH for breast and cervical cancer, and compared these illness perceptions between Croatian- and Lebanese-born women living in Australia. First, we predicted that the *a priori* structures of the IPQ-RH subscales would sufficiently describe the covariances among items from the IPQ-RH responses of Croatian and Lebanese women. Second, we anticipated that satisfactory reliabilities and discriminant validity would be obtained across all IPQ-RH measures.

Results from the CFAs support the theoretically-developed illness perceptions, in relation to the CSM (Figueiras & Alves, 2007), for healthy Croatian and Lebanese populations. Seven-factor models were produced for the Lebanese and Croatian breast and cervical cancer items, and two-factor models for the Croatian and Lebanese breast and cervical cancer causal attributions. Previous researchers have obtained similar findings for the IPQ-RH measures for breast and cervical cancer (refer to Chapter Five), and in other disease

contexts (Figueiras & Alves, 2007). Thus, the IPQ-RH subscales adequately explained the covariances among IPQ-RH items.

The test-retest reliabilities of the adapted Croatian and Lebanese versions of the IPQ-RH demonstrated satisfactory stability over a three week period, for both cancer types. Further empirical support was provided for the IPQ-RH measures, in that the illness perceptions were largely distinguishable from negative affect, with very weak correlations between the IPQ-RH breast and cervical cancer dimensions and the PANAS for each language version. Hence, support is provided for the robustness of the factor structure of the IPQ-RH measures in the breast and cervical cancer contexts, as well as demonstrating good psychometric properties of the Croatian and Lebanese IPQ-RH measures.

Consistent with prior research (refer to Chapter Five; Figueiras & Alves, 2007), strong associations were found between most of the IPQ-RH breast and cervical cancer illness perceptions across both language versions, namely timeline acute/chronic, timeline cyclical, consequences, personal control, treatment control, illness coherence and emotional representations. Stronger emotional representations were positively associated with consequences, more acute/chronic and cyclical timelines, control beliefs and illness coherence across all measures and both illnesses.

In developing the adapted versions of the IPQ-RH, two breast cancer items were removed from the Croatian and Lebanese IPQ-RH breast cancer measures, however, no items were removed from the IPQ-RH cervical cancer measures. Specifically, one emotional representations item (‘Breast cancer makes me feel angry) and one timeline acute/chronic item (‘I expect breast cancer to last the rest of one’s life’) contributed to model misspecification and subsequently were not relevant to breast cancer among Croatian and Lebanese women, but were important for cervical cancer. The finding that rest of one’s life and anger were relevant to the participants in relation to cervical cancer is consistent with

studies examining women's responses to HPV infection, and other cervical cancer precursor conditions, that report strong feelings of anger towards these illnesses (Daley et al., 2010) and the sexually transmitted aspect of these conditions (Ashing-Giwa et al., 2004).

Similarly, a number of breast and cervical cancer causal attributions were removed across all IPQ-RH measures due to contributing to lack of goodness-of-fit across the CFA models. Of the items omitted, an unexpected result was the exclusion of germ or virus for cervical cancer, as the human papillomavirus (HPV) is a known cause of cervical cancer (Cancer Council Australia, 2009b). Limited knowledge pertaining to the risk factors of cervical cancer (Pitts & Clarke, 2002) is a possible reason for this finding, and if risk factors are not well known among Croatian and Lebanese women, this could potentially limit their uptake of cervical cancer control behaviours. This appears to be the case among other ethnic groups, including Malaysian women living in Malaysia (Wong, Wong, Low, Khoo, & Shuib, 2009) and Chinese-Australian women (Kwok & Sullivan, 2006a). A direction for future research is to examine the association between illness perceptions and HPV vaccine and Pap smear use among these ethnic groups.

Consistent with previous findings on commonly endorsed symptoms for breast and cervical cancer (Cancer Council Australia, 2012a; Das, Jeba, & George, 2005; Hagger & Orbell, 2005; Stone, Richards, A'Hern, & Hardy, 2005), Croatian women reported that fatigue and pain were the most serious symptoms for breast cancer, and pain and discharge for cervical cancer. Similarly, pain and fatigue were the most reported serious symptoms for breast cancer among Lebanese women; however, breathlessness and dizziness were most endorsed for cervical cancer, which is contrary to prior research (Hagger & Orbell, 2005), as these symptoms are rarely evident in the cervical cancer context. Differences in illness perceptions may influence the likelihood for women in each immigrant group to undertake cancer control behaviours. Specifically, Lebanese women may incorrectly interpret

symptoms of breathlessness and dizziness, typically associated with respiratory or cardiovascular conditions (McSweeney et al., 2003), as being indicative of cervical cancer. Conversely, a focus on symptoms not usually experienced with cervical cancer could lead to some Lebanese immigrants missing early signs and symptoms of cervical cancer, should cancer be present.

Comparing across ethnic groups, Croatian women were more likely to report identity (symptoms) and psychological attributions (causes) as being important for breast cancer than Lebanese women. These differing views may influence these women's ability to recognise early symptoms of breast cancer, and may affect their ability to avoid risk factors (Grunfeld, Ramirez, Hunter, & Richards, 2002; Leventhal et al., 1997). Additionally, Croatian women cited cyclical timelines as being more salient in relation to cervical cancer than Lebanese women. That is, Croatian women tend to believe that cervical cancer is more unpredictable and recurring than their Lebanese counterparts. These divergent opinions relating to cervical cancer could impact on these women's ability to partake in cervical cancer control behaviours. Future research should address all of these issues by assessing breast and cervical cancer illness perceptions and their relation to cancer control.

Limitation of the Study

In interpreting the present results, one limitation that must be highlighted is that participants were born in Croatia and Lebanon but resided in Australia. Therefore, these results may not be generalisable to Croatian and Lebanese women living in their home countries. Future research should ascertain whether these measures are applicable among Croatian and Lebanese women resident in their home countries and whether these women hold similar illness representations to Australian residents.

The current study provides evidence for the validation of IPQ-RH measures for Croatian and Lebanese populations. This study was conducted specifically to apply these

measures to the breast and cervical cancer contexts; however, with minor modifications these measures can be empirically validated with the robust CFA approach across a broad range of disease contexts for the Croatian and Arabic languages. Given that many items are similarly-worded across the IPQ-RH subscales, irrespective of the disease context, the main item stem could be retained in these language versions, substituting the relevant disease type. Confirmation of the factor structure of these non-English IPQ-RH versions further supports the applicability and generalisability of the self-regulation model (Leventhal et al., 1980), and the IPQ measures across different languages. Furthermore, differences found across some illness perceptions between both ethnic groups suggest that certain illness perceptions may be culturally specific.

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Chapter Seven: Illness Representations and the Enactment of Breast and Cervical Cancer Control Behaviours among Ethnically Diverse Women

Study One identified relatively few psychosocial factors that were associated with the use of cancer control behaviours among Lebanese-, Croatian- and Australian-born women (refer to Chapters Three and Four), suggesting the need for a more comprehensive approach to examining breast and cervical cancer-related cognitive and affective factors and their association with cancer control enactment among these ethnic groups. The illness representations entailed in the CSM have been found to underlie the use of various health protective behaviours (Leventhal, Diefenbach, & Leventhal, 1992), including cancer control measures (Savage & Clarke, 2001), hence this model provides a comprehensive scaffold on which further investigations in the present context can be undertaken.

The previous study assessed the factorial and discriminant validity of Croatian and Lebanese versions of the Revised Illness Perception Questionnaire (IPQ-RH) for breast and cervical cancer. Validated versions of this measure were not previously available in these languages. Consistent with the original IPQ-RH (Figueiras & Alves, 2007) and the English-language versions of the IPQ-RH breast and cervical cancer measures (refer to Chapter Five), empirical validation was obtained for the factor structure for each measure. Thus, empirically-validated IPQ-RH measures using the vigorous confirmatory factor analytic approach have now been developed for breast and cervical cancer for both English-speaking populations and Croatian and Lebanese populations. The following study will utilize these validated IPQ-RH measures to assess and compare whether illness representations are linked with the use of breast and cervical cancer control measures among these immigrant and English-speaking populations.

Abstract

Introduction: The use of breast and cervical cancer control behaviours differs among women living in Australia, particularly among Croatian- and Lebanese-born immigrant women, and Australian-born women. Illness perceptions, in accordance with self-regulation theory, may account for apparent differences in health service usage among these populations. The current study assessed breast and cervical cancer illness perceptions associated with breast and cervical cancer control behaviours among women from these ethnic groups.

Method: Croatian, Arabic and English language versions of the Revised Illness Perception Questionnaire for Healthy People (IPQ-RH) for breast and cervical cancer were administered to Croatian- (n = 200), Lebanese- (n = 201), and Australian-born (n = 201) women, respectively, living in Australia. These participants were also recruited for Study Two (refer to Chapters Five and Six); however, participants recruited for the purposes of test-retest reliability analyses for Study Two were excluded from this study. Self-reported cancer control behaviours (BSE, CBE, mammogram, Pap smear and HPV vaccine use) and demographics were also assessed.

Results: Lebanese women reported significantly lower use of BSE and mammography than Croatian and Australian women. Binary logistic regression analyses demonstrated that a higher number of breast and cervical cancer general risk factors were associated with BSE and Pap smear use respectively, while negative emotional representations were positively related to mammography uptake. More cyclical timeframes were associated with Pap smear and HPV vaccine uptake and higher identity scores were linked with HPV vaccine use. Additionally, Australian women were less likely to have a mammogram as the level of personal control increased.

Conclusion: Targeted health interventions are needed for Croatian, Lebanese and Australian women that address the illness perceptions associated with cancer control behaviours, in

order to increase the likelihood of these ethnic groups enacting these measures. Implications of the study's findings and recommendations for future research are discussed.

Keywords: Breast cancer; cervical cancer; illness perceptions; self-regulation theory; ethnic groups; health behaviours

Breast cancer is the leading cancer among women worldwide, comprising 23% of all newly diagnosed cancers in females. The incidence of cervical cancer is less widespread; however, it is still ranked as the third most common cancer in women, accounting for 10% of female cancer cases throughout the world (Ferlay et al., 2010). Although incidence rates vary from country to country (Ferlay et al., 2010), both diseases are major health threats to women (Youl, Baade & Meng, 2012). In Australia, the chance of a woman being diagnosed with breast cancer prior to the age of 75 is one in 11, and one in 204 for cervical cancer (Tracey, Kerr, Dobrovic, & Currow, 2010). A key element of cervical cancer is that if detected early and in the pre-cancerous phase, it is largely preventable (Byrd et al., 2012).

The use of breast and cervical cancer control measures can lead to early detection and improved survival rates for these diseases (National Breast and Ovarian Cancer Centre, 2009a; Sankaranarayanan, Thara, Esmy, & Basu, 2008). Australian guidelines currently recommend that women carry out self-examination of their breasts and attend biennial mammograms (target age group for mammography screening is 50 to 69 years of age). Women who are not attending regular mammography screening may gain benefit from regular clinical breast examinations (CBE) (National Breast and Ovarian Cancer Centre, 2009a). In relation to cervical cancer control, it is recommended that women aged 18 to 70 undertake a biennial Pap smear to detect cervical cancer. In addition, vaccines that provide protection against the human papilloma virus (HPV), a known cause of cervical cancer, are available to women (Cancer Council Australia, 2009b; refer to Chapter One for a more comprehensive rationale). Unfortunately, these preventive health measures are not utilized by all Australian women in the target age groups (e.g., BreastScreen Victoria, 2006; BreastScreen Victoria, 2004; Public Health Division, 2001; Siahpush & Singh, 2002). Therefore, it is vital to determine the reasons underlying variable use of these measures in the Australian population.

The Common Sense Model (CSM) of self-regulation provides a theoretical framework of psychosocial factors that are likely to underlie an individual's decision to engage in preventive health behaviours. The key constructs in this model are illness representations comprising of cognitions and emotions that integrate with existing health-related schemata to enable people to make sense of illnesses (Leventhal, Meyer, & Nerenz, 1980; Leventhal et al., 1992). The Illness Perception Questionnaire (IPQ) and the Revised Illness Perception Questionnaire (IPQ-R) are most frequently used to assess these illness representations (refer to Chapter One for a detailed rationale of IPQ measures). According to the CSM, illness representations operate in a parallel processing framework whereby both cognitive and emotional processes are triggered in the development of health behaviours (Leventhal, Leventhal & Cameron, 2001). As a result, the study of illness representations in the likely enactment of health protective behaviours can inform future health promotion initiatives (refer to Chapter One for a detailed rationale of CSM).

Among healthy women in the general population, illness representations have been associated with intentions to adopt or uptake of health protective behaviours for some illnesses, including AIDS, tuberculosis (Figueiras & Alves, 2007) and skin cancer (Cameron, 2008; Figueiras & Alves, 2007). Specifically, illness coherence, psychological attributions and emotional representations have been associated with intentions to adopt preventive behaviours for all of these diseases (Figueiras & Alves, 2007).

Similarly, few studies (Anagnostopoulos et al., 2012; Moore, 2008; Savage & Clarke, 2001; Savage & Clarke, 1998) have assessed the role of illness representations in the breast and cervical cancer control contexts among illness-free women. However, more negative emotional representations were associated with reduced mammography use (Anagnostopoulos et al., 2012; Savage & Clarke, 2001), while a higher endorsement of symptoms (identity), causes (causal) and treatment control beliefs were related to a decreased

likelihood of obtaining a recent mammogram and Pap smear (Savage & Clarke, 2001). In relation to HPV vaccine uptake, weaker treatment control beliefs and higher levels of illness coherence and identity were associated with the use of this cancer control behaviour (Moore, 2008).

Moreover, illness representations are likely to be pivotal in the enactment of self-examinations and CBE. Women need to be *breast aware* by familiarizing themselves with the look and feel of their breasts to accurately recognize breast cancer symptoms between screening appointments for mammograms (Grunfeld, Ramirez, Hunter, & Richards, 2002) and consult with their doctor if they notice any irregular changes (National Breast and Ovarian Cancer Centre, 2009a), possibly for a CBE. However, in Australia, almost 25% of breast cancers are diagnosed in younger women outside of the target screening age group for mammography (Australian Institute of Health and Welfare, 2010b). Hence, it is equally vital for younger women to identify breast cancer symptoms through being *breast aware* (Grunfeld et al., 2002) and consulting with their doctor if they notice any unusual breast changes (National Breast and Ovarian Cancer Centre, 2009a), potentially for a CBE. As a result, carrying out regular self-examinations and CBE are linked in with identifying symptoms (identity dimension) of breast cancer.

Regardless of age, all women need to be equally aware of the risk factors (causal dimension) for developing this disease (Grunfeld et al, 2002). Studies utilizing an IPQ measure demonstrate that healthy women hold stronger beliefs pertaining to the role of chance (Buick & Petrie, 2002; Buick, 1997) and genetics (Buick & Petrie, 2002) as causes of breast cancer than breast cancer patients. Utilizing the health belief model, researchers have found that women who undertake a breast self-examination (BSE) report a higher mean level of knowledge of the general risk factors for breast cancer (e.g., age, family history of breast cancer and alcohol use) (Parsa, Kandiah, Mohd Zulkefli, & Rahman, 2008) than women who

rarely or never carry out this behaviour (Parsa, Kandiah, & Parsa, 2011; Parsa et al., 2008). However, women who endorse stress (psychological attribution) as a cause of breast cancer are less likely to have a BSE (e.g., Payne, 1991). An aim of the current study, then, is to assess the role of all CSM illness representations in the enactment of BSE, and in the uptake of CBE, mammography, Pap smear and the HPV vaccine among ethnically diverse Australian women.

Unfortunately, the limited research on cancer-related illness representations and cancer control behaviours has focused primarily on healthy individuals in the general population (Anagnostopoulos et al., 2012; Cameron, 2008; Figueiras & Alves, 2007; Moore, 2008; Savage & Clarke, 2001; Savage & Clarke, 1998), and in line with prior suggestions (Cameron, 2008), it is imperative to expand the research in this area to more diverse ethnic groups. Illness perceptions are likely to be involved in the variable use of breast and cervical cancer control measures among certain ethnic groups in the Australian context. Most of the limited data suggests that Croatian- and Lebanese-born women are not utilizing breast (BreastScreen NSW, 2003, as cited in South East Health, 2006; BreastScreen Victoria, 2004) and cervical (NSW Cervical Screening Program, 2000; Public Health Division, 2001) cancer control behaviours adequately, even less so than Australian-born women (BreastScreen Victoria, 2006; Public Health Division, 2001). Further, more recent research suggests that Lebanese women utilize BSE and mammograms significantly less than Croatian and Australian women (refer to Chapter Three).

Psychosocial factors (i.e., breast cancer worry and perceived efficacy of cervical cancer control measures) have previously been associated with the use of cancer control measures (i.e., BSE, CBE and HPV vaccine) among Lebanese, Croatian and Australian women. When compared to the former groups, Lebanese women report significantly higher levels of pain for BSE and CBE use (refer to Chapter Three). However, only limited

cognitive and affective factors were related to cancer control usage among these women. Hence, there is a need to assess the role of broader psychosocial factors, namely CSM illness perceptions, in their enactment of cancer control behaviours. It is anticipated that these more comprehensive cognitive and affective constructs will be associated with cancer control use among diverse ethnic groups in Australia.

Consequently, the need arose to develop measures to assess CSM breast and cervical cancer illness representations among asymptomatic Croatian, Lebanese and Australian women. Figueiras and Alves (2007) altered the IPQ-R items, and developed the Revised Illness Perception Questionnaire for Healthy People (IPQ-RH) comprising of ten illness perception subscales (identity, illness coherence, emotional representations, timeline acute/chronic, timeline cyclical, consequences, personal control, treatment control, and the causal subscales psychological attributions and general risk factors) (refer to Chapters One, Five and Six). However, empirically validated versions of this measure were not available for breast and cervical cancer. Thus, Croatian-, Lebanese- and English-language versions of the IPQ-RH for breast and cervical cancer were empirically validated with the unparalleled standard in factor analytic research, confirmatory factor analysis (Hu & Bentler, 1999) (refer to Chapters Five and Six). Utilizing the Croatian and Lebanese validated IPQ-RH measures, preliminary findings demonstrated that Lebanese women reported significantly lower identity and psychological attributions scores for breast cancer and significantly lower mean cyclical timelines for cervical cancer than Croatian women (refer to Chapter Six). Hence, Lebanese women consider the timelines for cervical cancer to occur in a less cyclic manner and endorse fewer symptoms and psychological causes of breast cancer than Croatian women. Comparisons have not been made between Australian women and these ethnic groups, and this is another goal of the current research.

Furthermore, prior research has shown that Lebanese ethnicity was associated with never having a BSE (refer to Chapter Three); however, interactions between ethnicity and psychosocial factors as predictors of BSE and other cancer control behaviours (CBE, mammogram, Pap smear and HPV vaccine) were not tested due to the sample size. Ethnic moderation is an area of increasing research, with several studies demonstrating moderation across both worry (Kudadjie-Gyamfi, Consedine, Magai, Gillespie, & Pierre-Louis 2005) and coping (Kudadjie-Gyamfi, Consedine, & Magai, 2006; Kudadjie-Gyamfi, & Magai, 2008; Kudadjie-Gyamfi, Consedine, & Magai, 2010) in cancer screening among White, Hispanic and African American women. Thus, it is possible that there will be interactions between ethnicity and cancer illness perceptions associated with the enactment of these behaviours, as the CSM encapsulates the specific content of health cognitions and emotion relevant to health behaviours (Brownlee, Leventhal, & Leventhal, 2000) and ethnicity was predictive of BSE use (refer to Chapter Three).

Utilizing the CSM framework, the present study will assess and compare the CSM illness perception constructs and test their association with breast and cervical cancer control use among Croatian, Lebanese and Australian women. Based on prior research and CSM predictions, we predicted that there would be significant differences between Lebanese and Australian women in their endorsement of breast and cervical cancer illness perceptions. Second, a higher endorsement of symptoms (identity) and causal beliefs (general risk factors and psychological attributions) for breast cancer would be associated with BSE use. Third, a higher endorsement of symptoms for breast cancer would be associated with CBE enactment. Fourth, more negative emotional representations, a higher level of identity and stronger causal and treatment control beliefs for breast and cervical cancer would be related to a decreased likelihood in obtaining a current mammogram and Pap smear, respectively. Fifth, higher levels of identity and illness coherence, and lower level treatment control beliefs for

cervical cancer would be associated with HPV vaccine uptake. Sixth, there would be significant interactions between ethnicity and cancer illness perceptions associated with the use of cancer control. Finally, we predicted that Croatian and Australian women would be more likely to have undertaken a BSE and recent mammogram than Lebanese women. CBE, Pap smear and HPV vaccine use were also assessed.

Method

Sample and Procedure

Croatian (n = 200), Lebanese (n = 201) and Australian-born (n = 201) women living in Australia participated in the current research. Participants were recruited through community organizations (i.e., family centres and recreational clubs) located in Sydney, Australia. Participants were aged 18 to 66 years and all reported no personal history of breast or cervical cancer. Prior to administering the study questionnaire, all participants indicated no previous history of hysterectomy and reported they were sexually active. Study packages containing consent forms and study questionnaires were provided to all participants. Croatian-, Lebanese- and Australian-born participants chose to complete a study package in Croatian, Arabic and English, respectively, indicating this is their main language spoken at home. The study package was translated into Croatian and Arabic by translators associated with the National Accreditation Authority for Translators and Interpreters (NAATI) and administered to participants born in these countries. Two different NAATI accredited Croatian and Lebanese translators back translated the study packages into English to ensure that the meaning was retained. Approval was provided by the Macquarie University Human Ethics Research Committee for this research.

Measures

Demographics and cancer history. Demographic information relating to ethnicity, age, education, marital status, income, religion and years resident in Australia was obtained

from participants. Participants also reported whether they had a family history of breast and/or cervical cancer, and indicated whether first degree relative/s (i.e., mother, daughter or sister), and/or second degree relative/s (i.e., aunt or grandmother) had been diagnosed with these diseases. Items were scored dichotomously, (0 = No; 1 = Yes).

Cancer control behaviours. In accordance with Study One, participants indicated whether they had ever undertaken a BSE, CBE, had the HPV vaccine and received a mammogram and Pap smear within the last two years. Items were scored dichotomously, (0 = No; 1 = Yes).

Illness perceptions relating to breast and cervical cancer. IPQ-RH measures for breast and cervical cancer in English, Croatian and Arabic assessed illness perceptions among asymptomatic women (refer to Chapters Five and Six). These measures comprise ten subscales, including the identity, personal control, treatment control, consequences, emotional representations, timeline acute/chronic, timeline cyclical, illness coherence and causal (i.e., psychological attributions and general risk factors) subscales, which refer to "breast cancer" or "cervical cancer" (i.e., "Breast cancer is very unpredictable" or ''Cervical cancer is very unpredictable"). Individual items are scored on five-point Likert scales (1 = Strongly disagree to 5 = Strongly agree). For the identity subscale, items are scored dichotomously, (0 = No; 1 = Yes).

Statistical Analysis

In the initial analyses, chi-squared tests and one-way analyses of variance (ANOVA) were used to examine the relationships between ethnicity and the cancer control dependent variables (BSE, CBE, mammogram, Pap smear and HPV vaccine use), demographics (age, education, marital, income, religion and years resident in Australia) and cancer history (family history of breast cancer and family history of cervical cancer) variables. Confirmatory factor analyses (CFA) were undertaken to confirm the factorial equivalence of

the IPQ-RH measures over the English, Croatian and Lebanese groups. Two multivariate analyses of variance (MANOVA) assessed the relationships between ethnicity and the IPQ-RH breast and cervical cancer constructs. Significant multivariate results were followed up by Bonferroni-adjusted comparisons of the groups on each dependent variable (IPQ-RH construct).

Pearson correlations were used to test the associations between breast cancer illness perceptions and breast cancer control measures, and cervical cancer illness perceptions and cervical cancer control behaviours. Five binary logistic regression analyses were completed to test the relationship between IPQ-RH breast cancer illness perceptions and demographics with the breast cancer control measures, and the IPQ-RH cervical cancer illness perceptions and demographics with the cervical cancer control behaviours. Illness perception by ethnicity interactions were also included in all regression analyses (e.g., breast cancer identity*ethnicity interaction for breast cancer control behaviours and cervical cancer identity*ethnicity interaction for cervical cancer control measures). The interactions were investigated to see whether the relationships between the IPQ-RH variables and the dependent variables were different for each ethnic group. A backward elimination procedure was employed to test individual interactions and to eliminate non-significant ($p > .03$) interactions from the models. As seen in prior IPQ research (Moore, 2008), the $p > .03$ criterion was utilized due to the large number of comparisons undertaken. Finally, two additional binary logistic regression analyses were undertaken for mammography use to test the simple slopes for ethnic groups, as an illness perception by ethnicity interaction was obtained. The backward-Wald method was used as all variables examined are included when estimating the parameters of the full model and variable/s with the largest significance are removed from the model (O'Brien, 2007). Hierarchical and simultaneous regression analyses

were not undertaken as these models can be easily misinterpreted for causal inference and are sensitive to model specification errors (O'Brien, 2007).

Results

The standardized skewness and kurtosis coefficients were within the permissible +/- 3 range (Onwuegbuzie & Daniel, 2002), ranging from -1.67 for psychological attributions to 2.58 for illness coherence. Given that all standardized coefficients are within the +/- 3 range, all variables were normally distributed.

The demographics for each ethnic group were previously reported (refer to Chapters Five and Six). Comparisons across all ethnic groups revealed that differences in education $\chi^2(8, N = 602) = 28.96$, $p < .0005$) and income $\chi^2(8, N = 602) = 12.26$, $p = .016$) were statistically significant, with Australian women reporting a significantly higher level of education than Lebanese $\chi^2(4, N = 402) = 18.45$, $p = .001$) and Croatian $\chi^2(4, N = 401) = 14.19$, $p = .007$) women. Australian women also reported a significantly higher income than Lebanese $\chi^2(4, N = 402) = 8.06$, $p = .018$) and Croatian $\chi^2(4, N = 401) = 10.04$, $p = .007$) women. Overall years resident in Australia was statistically significant $F(2, 599) = 1711.20$, $p < .0005$, with Australian women living in Australia for a significantly longer period of time than Croatian (Australian $M = 42.16$, $SD = 11.73$; Croatian $M = 6.28$, $SD = 2.78$) $t(399) = 42.09$, $p < .0005$; and Lebanese (Australian $M = 42.16$, $SD = 11.73$; Lebanese $M = 6.02$, $SD = 2.57$) $t(400) = 42.66$, $p < .0005$ women.

Cancer Control Behaviours and Cancer History by Ethnicity

Table 1 shows the relationships between ethnicity, and cancer control behaviours and cancer history. Australian women were the highest users of BSE, followed by Croatian and Lebanese women, with significantly fewer Lebanese women undertaking BSE than Australian $\chi^2(1, N = 402) = 16.10$ $p < .0005$ and Croatian $\chi^2(1, N = 401) = 5.52$, $p = .02$ women. Australian women performed a mammogram most frequently, followed by Croatian

and Lebanese women. Significantly fewer Lebanese women utilized this screening behaviour than Croatian $\chi^2(1, N = 197) = 4.01, p = .05$) and Australian $\chi^2(1, N = 193) = 9.79, p = .01$) women.

Table 1

Cancer Control and Cancer History by Ethnicity

Variables			**Croatia** (*n*=200)	**Lebanon** (*n*=201)	**Australia** (*n*=201)	**Total** (*n*=602)	**Total χ^2**
BSE		*Yes*	57.5%	45.3%	65.2%	56.0%	**16.09****
CBE		*Yes*	47.5%	40.3%	46.3%	44.7%	**2.41**
Mammogram every two years	*50-66 yrs*	*Yes*	59.3%	45.0%	67.3%	57.2%	**9.98****
Pap Smear every two years		*Yes*	46.5%	48.2%	51.3%	48.7%	**1.91**
Vaccine	*18-45 yrs*	*Yes*	63.2%	56.7%	61.5%	60.5%	**.92**
Family history of breast cancer		*Yes*	14.0%	13.9%	12.4%	13.4%	**.27**
Family history of cervical cancer		*Yes*	9.5%	10.9%	12.9%	11.1%	**1.21**

Note. Mammography screening was assessed among women aged 50 to 66 years (n = 290) in accordance with the target age group for this screening measure in Australia. Women 45 years of age and younger (n = 301) were included in the vaccine variable as the HPV vaccines Gardasil® and Cervarix® are generally administered to Australian women in this age group. *** p< .01, * p< .05.*

Breast and Cervical Cancer IPQ-RH Model Comparisons

Analysis of Moment Structures (AMOS) software was utilized to compare and test the equivalence of IPQ-RH models across the different ethnic groups and disease types using a method that progressively constrained more parameters to be equal across the groups. The initial unconstrained model was fitted to all groups, but parameters such as factor loadings, factor variances, covariances and the residuals of the observed variables were estimated

Table 2

Model Comparisons for English, Croatian and Lebanese IPQ-RH Measures

Models	CFI	NNFI	RMSEA	df	χ^2
Breast					
IPQ-RH breast cancer items *(*Seven factors)					
Unconstrained	.936	.925	.026		
Measurement weights	.937	.930	.025	34	27.02
Structural covariances	.937	.934	.024	76	68.04
Measurement residuals	.922	.923	.026	124	181.77**
IPQ-RH breast cancer causal attributions *(*Two factors)					
Unconstrained	.976	.969	.032		
Measurement weights	.973	.970	.031	22	30.83
Structural covariances	.968	.966	.034	24	48.57**
Measurement residuals	.952	.955	.039	46	122.82**
Cervical					
IPQ-RH cervical cancer items *(*Seven factors)					
Unconstrained	.938	.930	.023		
Measurement weights	.940	.935	.022	38	29.11
Structural covariances	.937	.934	.022	80	85.72
Measurement residuals	.903	.904	.027	132	283.50**
IPQ-RH cervical cancer causal attributions *(*Two factors)					
Unconstrained	.966	.958	.030		
Measurement weights	.966	.963	.028	26	25.00
Structural covariances	.960	.957	.031	28	45.99**
Measurement residuals	.955	.957	.031	54	87.99**

Note. Seven factors refers to the CFA for personal control, treatment control, consequences, emotional representations, timeline acute/chronic, timeline cyclical, and illness coherence IPQ-RH subscales. Two factors refers to the CFA for the causal IPQ-RH subscales, psychological attributions and general risk factors. IPQ-RH breast and cervical cancer identity subscales were not included as these subscales are scored dichotomously.

** $p < .01$.

separately for each group. In later models, all these parameters were constrained to be equal for all groups. The models tested are described in Table 2. When assuming the unconstrained models to be correct for the seven factor breast and cervical cancer models, model comparisons revealed no significant change in the chi-square (χ^2) results until error variances were constrained to be the same (refer to Table 2). For the two factor breast and cervical cancer casual attributions models, the χ^2 results for structural covariances and measurement residuals were significant when assuming the unconstrained models to be correct (refer to Table 2). However, the χ^2 statistic is influenced by sample size (Tanguma, 2001), and the incremental indices of goodness-of-fit, Comparative Fit Index (CFI), Non-Normed Fit Index (NNFI) and Root Mean Square Error of Approximation (RMSEA) remained high and stable across all models (refer to Table 2). Further, as previously reported, the internal reliabilities were satisfactory across all subscales for the IPQ-RH measures (refer to Chapters Five and Six).

Breast and Cervical Cancer Illness Perceptions by Ethnicity

The univariate results obtained in the MANOVA analyses of the relationships between ethnicity and illness perceptions are presented in Table 3. Separate multivariate analyses were carried out for the breast and cervical cancer illness perceptions, respectively. The mean scores were around the middle of the possible scoring ranges across all illness perceptions for each ethnic group (refer to Table 3). There was a significant multivariate main effect for ethnicity and breast cancer illness perceptions, $F(19, 1180) = 5.09$, $p < .0005$; Wilk's $\lambda = 0.847$, MES = .08 (MES, the multivariate effect size, is equal to [1 - Wilks' Lambda]/k, where k = the number of discriminant functions). Significant univariate main effects for ethnicity were obtained for identity $F(2, 599) = 9.35$, $p < .0005$; MES = .03, timeline cyclical $F(2, 599) = 3.51$, $p = .01$; MES = .01, and psychological attributions $F(2, 599) = 26.21$, $p < .0005$; MES = .08. Bonferroni-adjusted comparisons revealed that

Table 3

Illness Perceptions among Ethnic Groups

Variables		Croatia (*n*=200)	Lebanon (*n*=201)	Australia (*n*=201)	Total *F* *df* (2,600)
Breast	*Scoring Range*		*Mean & SD*		
Identity	(0-17)	11.79 (3.78) [a]	9.18 (3.50) [b]	9.98 (3.87) [a b]	**9.35***
Timeline acute/chronic	(4-20)	12.34 (4.35) [a]	11.95 (4.35) [a]	12.33 (4.17) [a]	**.550**
Timeline cyclical	(3-15)	8.72 (3.12) [a b]	8.10 (3.27) [a]	9.12 (3.30) [b]	**3.51***
Consequences	(4-20)	11.55 (4.34) [a]	11.63 (4.07) [a]	11.62 (4.48) [a]	**.023**
Personal control	(3-15)	8.21 (3.25) [a]	8.69 (3.56) [a]	8.91 (3.52) [a]	**2.14**
Treatment control	(3-15)	8.80 (3.36) [a]	8.88 (3.41) [a]	9.32 (3.65) [a]	**1.32**
Illness coherence	(3-15)	8.72 (3.17) [a]	9.14 (3.39) [a]	9.16 (3.38) [a]	**1.10**
Emotional representations	(4-20)	12.68 (3.84) [a]	12.43 (4.67) [a]	12.40 (4.25) [a]	**2.01**
Psychological attributions	(4-20)	14.70 (4.50) [a]	11.32 (5.63) [b]	14.23 (5.01) [a]	**26.21***
General risk factors	(7-35)	19.91 (7.91) [a]	20.15 (9.28) [a]	18.83 (8.53) [a]	**1.35**
Cervical	*Scoring Range*		*Mean & SD*		
Identity	(0-20)	10.02 (4.25) [a]	10.34(4.03) [a]	9.80 (3.99) [a]	**8.92**
Timeline acute/chronic	(5-25)	16.51 (5.73) [a]	15.97 (5.20) [a]	16.61 (5.86) [a]	**2.12**
Timeline cyclical	(3-15)	10.95 (3.38) [a]	9.83 (3.67) [b]	10.99 (3.51) [a]	**6.95***
Consequences	(4-20)	13.30 (4.15) [a]	12.70 (4.44) [a]	13.27 (4.33) [a]	**1.24**
Personal control	(3-15)	9.51 (3.04) [a]	9.39 (3.46) [a]	9.58 (2.99) [a]	**1.74**
Treatment control	(3-15)	9.69 (3.83) [a]	9.18 (4.00) [a]	9.87 (3.98) [a]	**1.64**
Illness coherence	(3-15)	10.13 (3.17) [a b]	9.37 (3.58) [a]	10.40 (3.69) [b]	**4.35***
Emotional representations	(5-25)	15.75 (4.50) [a]	15.66 (5.15) [a]	16.50 (4.77) [a]	**1.85**
Psychological attributions	(5-25)	16.23 (5.37) [a]	15.43 (5.32) [a]	16.19 (5.30) [a]	**1.43**
General risk factors	(8-40)	21.66 (8.16) [a]	22.96 (8.55) [a]	21.59 (8.25) [a]	**1.72**

Note. Means sharing a common superscript are not significantly different from each other. 11% of participants scored 15 and above on the breast cancer emotional representations subscale and were not screening adherent.

*** p< .01, * p< .05.*

Lebanese women had significantly lower mean scores for psychological attributions ($p <$ .0005) and timeline cyclical ($p = .03$) than Australian women and significantly lower mean scores for identity ($p < .0005$) and psychological attributions ($p < .0005$) than Croatian women (refer to Table 3 for means and standard deviations). Similarly, there was a significant multivariate main effect for ethnicity and cervical cancer illness perceptions, $F(19, 1180) = 1.39$, $p < .0005$; Wilk's $\lambda = 0.955$, MES = .02. Significant univariate main effects for ethnicity were obtained for timeline cyclical $F(2,599) = 6.95$, $p = .001$; MES = .02, and

Table 4

Binary Logistic Regression Results for BSE and CBE

Variables						**95% C.I. for Exp**	
	B	**S.E.**	**df**	**Exp (B) OR**	**Wald**	**Lower**	**Upper**
BSE							
Breast cancer general risk factors	.02	.01	1	1.02*	4.83	1.00	1.04
Religion			5		9.55		
Protestant vs no religion	-.48	.43	1	.62	1.28	.26	1.43
Catholic vs no religion	-1.13	.39	1	.32*	8.45	.15	.69
Muslim vs no religion	-1.15	.48	1	.32*	5.64	.12	.82
Orthodox vs no religion	-1.15	.49	1	.31*	5.67	.12	.82
Other religion vs no religion	-.85	.44	1	.43	3.80	.18	1.01
CBE							
Religion			5		9.79		
Protestant vs no religion	-.36	.48	1	.70	.860	.33	1.49
Catholic vs no religion	-.81	.33	1	.44*	5.37	.22	.88
Muslim vs no religion	-1.04	.46	1	.35*	5.16	.14	.87
Orthodox vs no religion	-1.09	.46	1	.34*	5.70	.14	.82
Other religion vs no religion	-1.08	.41	1	.34**	7.02	.15	.76

Note. Statistics provided for significant variables only. Reference category for religion is no religion.

*** p< .01, * p< .05.*

illness coherence $F(2, 599) = 4.35$, $p < .0005$; MES = .01 (refer to Table 3). Significant pairwise differences were also obtained between the ethnic groups. Specifically, Lebanese women had significantly lower mean scores for illness coherence ($p = .01$) and timeline cyclical ($p = .001$) than Australian women and a significantly lower mean score for timeline cyclical ($p = .01$) than Croatian women (refer to Table 3 for means and standard deviations).

Factors associated with Cancer Control Behaviours

Pearson correlations were used to test the associations between illness perceptions and cancer control. The timeline cyclical cervical cancer dimension was positively associated with Pap smear ($r = .09$, $p = .03$) and HPV vaccine ($r = .14$, $p = .02$) use, and a non-significant positive association between breast cancer general risk factors and BSE use was obtained ($r = .07$, $p = .07$). As the analysis called for the sets of IPQ-RH variables to be entered simultaneously in the binary logistic regression analyses, preliminary tests of multicollinearity were carried out. Variance inflation factors were below 5 (O'Brien, 2007), ranging from 1.03 to 1.58, and tolerance levels were higher than .20 (O'Brien, 2007), ranging from .63 to .97. These results indicated that multicollinearity was not likely to distort the results of the regression analyses.

Binary logistic regression analyses (using backward elimination with the Wald chi-squared criterion) were undertaken with cancer control behaviours, coded 1 for performing, and 0 for not performing, as the dependent variables. The nominal alpha was set at .03. The significant results of the final step for the backward elimination models are reported in Tables 4 to 6. Only demographic variables were entered as covariates in the analyses and subsequently controlled for. These variables were not subject to the backward elimination procedure. As interactions between all illness perceptions and ethnicity were assessed, all

Table 5

Binary Logistic Regression Results for Mammography

Variables	B	S.E.	df	Exp (B) OR	Wald	95% C.I. for Exp Lower	Upper
Mammogram ***(Target age group 50-66 years)***							
Breast cancer emotional representations	.10	.04	1	1.11*	5.97	1.02	1.20
Breast cancer personal control	-.19	.07	1	.83**	6.45	.72	.96
Country of birth*breast cancer personal control			2		10.73**		
Croatian vs Australian*breast cancer personal control	.30	.10	1	1.36**	9.71	1.12	1.64
Lebanese vs Australian*breast cancer personal control	.24	.10	1	1.28*	5.65	1.04	1.56
Religion			5		10.98		
Protestant vs no religion	.41	.66	1	1.51	.39	.42	5.47
Catholic vs no religion	-.79	.55	1	.45	2.10	.16	1.32
Muslim vs no religion	-.79	.74	1	.46	1.13	.11	1.94
Orthodox vs no religion	-.53	.69	1	.59	.59	.15	2.28
Other religion vs no religion	-1.59	.63	1	.21*	6.34	.06	.70

Note. Statistics provided for significant variables only. Reference categories are Australian for ethnicity and no religion for religion. Two additional regression analyses were completed to investigate the simple slopes with the reference category for ethnicity changed (Croatian and then Lebanese). No further significant results were obtained.

*** p< .01,* p< .05.*

breast and cervical cancer illness perceptions were also entered into the analyses for breast and cervical cancer control behaviours, respectively. Thus, 19 variables were entered into each regression analysis. The interaction terms were tested and considered for backward elimination before considering the other variables.

Variables predicting BSE. The final BSE model demonstrated good overall model fit (Hosmer-Lemeshow test $\chi^2(8, N = 602) = 6.67$, $p = .571$), Nagelkerke $R^2 = .49$ (refer to Table 4). A higher number of breast cancer general risk factors were associated with an increased likelihood of having a BSE (odds ratio (*OR*) = 1.02). Overall religion was not

related to BSE uptake, however, Catholic (*OR* = .32), Muslim (*OR* = .32) and Orthodox (*OR* = .31) women were less likely to have a BSE than women of no religious affiliation.

Variables predicting CBE. No breast cancer illness perceptions predicted this behaviour. The Hosmer-Lemeshow test was $\chi^2(8, N = 602) = 6.86$, $p = .555$), suggesting a satisfactory model, Nagelkerke $R^2 = .27$ (see Table 4). Overall religion did not predict this behaviour, however, Catholic (*OR* = .44), Muslim (*OR* = .35), Orthodox (*OR* = .34) and other religion (*OR* = .34) women were less likely to have a CBE than non-religious women.

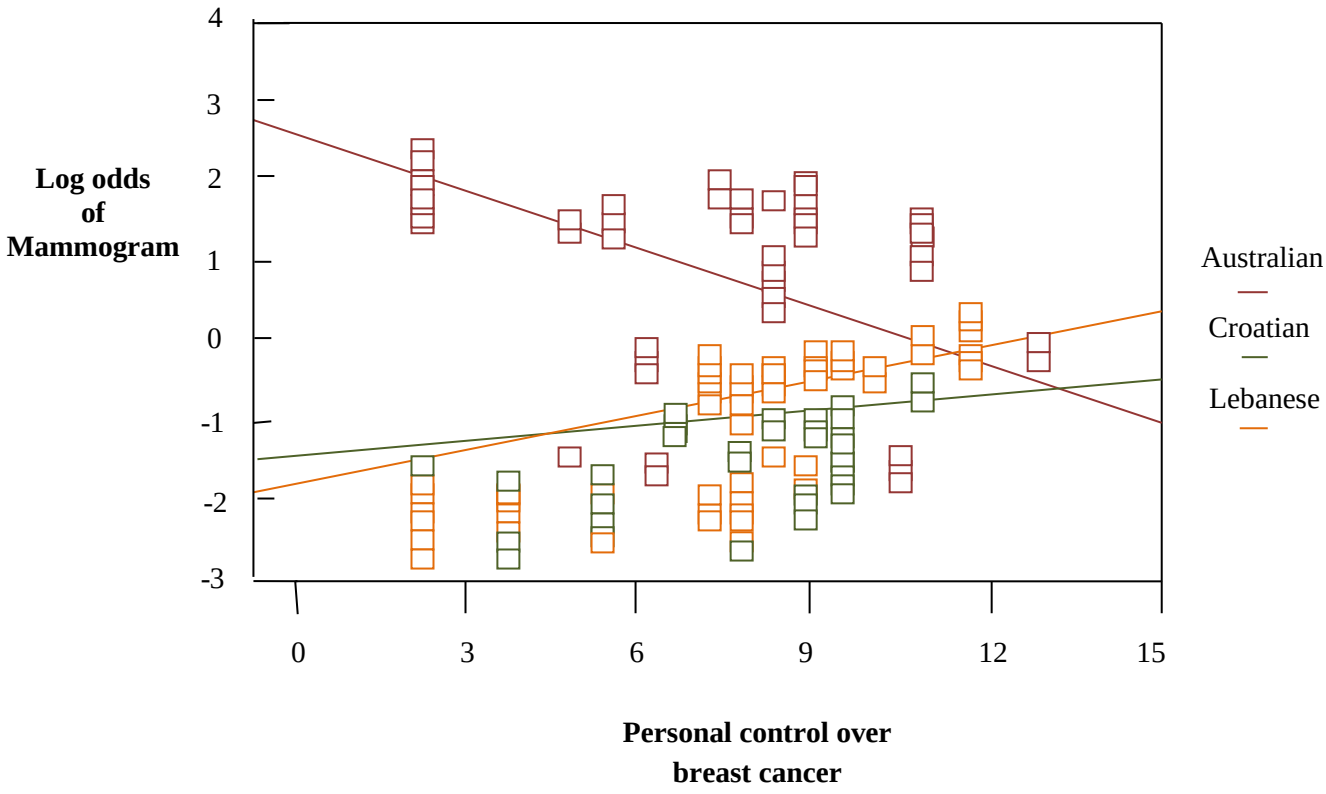
Variables predicting mammogram. The results of the mammography analysis for women 50 to 66 years of age are presented in Table 5. The Hosmer-Lemeshow test was non-significant, $\chi^2(8, N = 301) = 6.48$, $p = .59$), Nagelkerke $R^2 = .29$. More negative breast cancer emotional representations were associated with greater odds of undertaking a mammogram (*OR* = 1.11). Women classified as other religion were less likely to have a mammogram than non-religious women (*OR* = .21). There was a significant interaction between country of birth and personal control over breast cancer (Wald 10.73, $p = .005$). Investigation of this interaction using tests of simple slopes (Jaccard, 2001) showed that while the likelihood of Croatian and Lebanese women having a mammogram in the last two years increased slightly (but non-significantly) with increases in personal control over breast cancer (*OR* = 1.12, $p = .135$ and *OR* = 1.06, $p = .473$ respectively), for Australian women the likelihood of such checks decreased significantly with increases in personal control over breast cancer (*OR* = .83, $p = .011$). This is depicted in Figure 1, which shows predicted log odds of mammography from personal control over breast cancer by ethnicity.

Comparisons between the three groups at the mean of personal control over breast cancer and one SD below and above the mean showed that at higher levels of personal control over breast cancer, both Croatian and Lebanese women were more likely to have a

mammogram than Australian women, although none of the pairwise comparisons were significant (*One SD below mean:* Croatian vs Australian *OR* = 1.07, *p* = .966; Lebanese vs

Figure 1

Interaction between Personal Control over Breast Cancer and Ethnicity



Australian *OR* = .70, *p* = .812; *Mean level:* Croatian vs Australian OR = 3.00, *p* = .462; Lebanese vs Australian *OR* = 1.59, *p* = .756; *One SD above mean:* Croatian vs Australian *OR* = 8.42, *p* = .171; Lebanese vs Australian *OR* = 3.65, *p* = .404).

Variables predicting Pap smear. The results for Pap smear use are shown in Table 6. More acute cyclical timelines (*OR* = 1.06) and a higher number of general risk factors (*OR* = 1.03) for cervical cancer increased the likelihood of obtaining a Pap smear within the last two years. The Hosmer-Lemeshow test was $\chi^2(8, N = 602) = 14.92$, $p = .492$), indicating good model fit, Nagelkerke $R^2 = .32$.

Table 6

Binary Logistic Regression Results for Pap Smear and HPV Vaccine

Variables	B	S.E.	df	Exp (B) OR	Wald	95% C.I. for Exp Lower	Upper
Pap Smear							
Cervical cancer timeline cyclical	.06	.03	1	1.06*	4.74	1.01	1.12
Cervical cancer general risk factors	.03	.01	1	1.03*	4.48	1.00	1.05
HPV Vaccine							
Cervical cancer timeline cyclical	.12	.04	1	1.12**	7.54	1.03	1.22
Cervical cancer identity	.10	.03	1	1.10**	7.74	1.03	1.18

Note. Statistics provided for significant variables only.

*** p< .01, * p< .05.*

Variables predicting HPV vaccine. The final HPV vaccine model had satisfactory model fit (Hosmer-Lemeshow test $\chi^2(8, N = 290) = 5.49$, $p = .713$), Nagelkerke $R^2 = .25$. A higher level of identity (*OR* = 1.10) and more cyclical timelines (*OR* = 1.12) for cervical cancer were associated with higher odds in receiving the HPV vaccine (see Table 6).

Discussion

The current study examined and compared breast and cervical cancer illness perceptions among immigrant and Australian-born women and assessed the relationships between illness perceptions and cancer control behaviours. This is the first study to assess the role of illness perceptions in the enactment of cancer control behaviours among Croatian, Lebanese and Australian women living in Australia.

Illness Perceptions among the Ethnic Groups

In relation to IPQ-RH model comparisons, the incremental indices of goodness-of-fit were stable across the seven and two factor breast and cervical cancer IPQ-RH models in Croatian, Arabic and English. Hence, these findings provide support for the strength and

adequacy of the IPQ-RH measures to assess illness perceptions among Croatian, Lebanese and Australian women.

As predicted and consistent with prior research on ethnic differences in psychosocial factors related to cancer (refer to Chapter Three), there were significant differences between Lebanese and Australian women across some of the illness perceptions. Specifically, Lebanese women reported significantly lower cyclical timelines and illness coherence for cervical cancer and a lower endorsement of psychological attributions and cyclical timelines for breast cancer than Australian women. Comparable with prior research findings (refer to Chapter Six), Bonferroni-adjusted comparisons revealed that Croatian women endorsed a higher number of breast cancer symptoms (identity) and psychological attributions and more cyclical timelines for cervical cancer than Lebanese women. In relation to the psychological attributions finding, prior research has demonstrated that there is no direct cause-and-effect relationship between psychosocial factors (e.g., stress) and cancer development (Dalton, Boesen, Ross, Schapiro, & Johansen, 2002; Garssen, 2004), so it appears that Australian and Croatian women have a less accurate understanding of the risk factors for breast cancer, as these women were more likely to endorse psychological causes for this disease than Lebanese women. However, the lower levels of illness coherence and cyclical timelines for cervical cancer and lower endorsement of symptoms and cyclical timelines for breast cancer amongst Lebanese women suggests that these women may have a poorer understanding of cervical cancer and its origins (i.e., sexually-transmitted virus for most cervical cancer cases), poorer awareness of the symptomology of breast cancer and the disease progression for both cancer types, highlighting the need for targeted health messages to address Lebanese women's beliefs pertaining to these diseases.

Illness Perceptions associated with Breast Cancer Control Behaviours

The current study findings provide partial support for the second study hypothesis, in that a higher endorsement of breast cancer general risk factors were positively associated with having a BSE. Hence, not only has the endorsement of general risk factors of breast cancer been higher among asymptomatic women than breast cancer patients, as seen in prior CSM studies (Buick, 1997; Buick & Petrie, 2002), but a greater awareness of these risk factors was associated with BSE uptake in the present study. Although the current study did not assess BSE frequency as there are no specific guidelines for self-examination frequency in Australia (e.g., National Breast and Ovarian Cancer Centre, 2009a), prior research has demonstrated that regular BSE users are more likely to have a higher mean level of knowledge of breast cancer risk factors than infrequent and non-users of BSE (Parsa, Kandiah, & Parsa, 2011; Parsa et al., 2008).

Conversely, identity and psychological attributions (psychological causes) were not associated with carrying out a BSE. This lack of association may be attributed to the fact that in this study the range of breast symptoms was somewhat limited as the symptoms checklist used was analogous with prior IPQ research (e.g., hard or tender growths in body) (Rees, Cull, Sutton, & Fry, 2004) and did not include symptoms such as bloody discharge from the nipple, nipple retraction (Parsa et al., 2008) and changes in breast size (Cancer Council Australia, 2012a; Parsa et al., 2008), that have been previously found among BSE users (Parsa, Kandiah, & Parsa, 2011). Future research in this area should incorporate this wider range of symptoms in any investigations utilizing the identity subscale of the English, Croatian and Lebanese IPQ-RH breast cancer measures. It is also important to ascertain whether the inclusion of further symptoms leads to a greater likelihood of identity being related to BSE uptake among Croatian, Lebanese and Australian populations. Moreover, although empirical evidence suggests that there is no direct cause-and-effect relationship

between psychological risk factors and cancer (Dalton et al., 2002; Garssen, 2004), stress is the only endorsed causative factor of breast cancer that has generally been associated with BSE use among women (e.g., Payne, 1991), rather than the remaining factors contained in the psychological attributions subscale (e.g., person's personality and person's own behaviour). This may explain why psychological attributions were not predictive of BSE uptake in the present study.

The fact that no relationships were evident between illness perceptions and CBE uptake may be largely attributable to the emerging view of this measure as a clinically less efficacious tool for reducing the number of deaths from breast cancer (Barton, Harris, & Fletcher, 1999; Humphrey, Helfand, Chan, & Woolf, 2002). In Australia, the National Breast and Ovarian Cancer Centre (2009a) advises that regular CBE may be beneficial for women who are not attending routine mammography screening. However, other Australian guidelines suggest that CBE is not recommended as a routine cancer control measure for breast cancer (Cancer Council Australia, 2009a). Hence, this disparity in Australian guidelines pertaining to CBE may explain why no illness perceptions were associated with enacting a CBE, as fewer women utilized this measure than the remaining breast cancer control measures.

Contrary to prediction and prior research (Anagnostopoulos et al., 2012; Savage & Clarke, 2001), more negative emotional representations, a higher level of identity and weaker causal and treatment control beliefs were not associated with lack of adherence to mammography. There are two possible reasons for this finding. First, Savage and Clarke (2001) utilized an illness perception measure that comprised a limited number of treatment control, causal, identity and emotional representation items that loaded onto one factor via exploratory factor analysis, rather than an empirically validated measure comprised of a number of subscales such as an IPQ measure. It is possible that the measure developed in

their study did not tap into all of the features of these illness perceptions. Second, Anagnostopoulos et al. (2012) utilized the IPQ-R measure and found that more negative emotional representations were associated with never having a mammogram in the ever versus never analysis; however, emotional representations was not associated with *recent* mammography use in their study and almost one quarter of their study participants were 70 years of age or over, suggesting that their sample was not comparable with that of the present study, but also beyond the sampling age of women targeted for regular mammographic screening. The current study assessed illness perceptions associated with *recent* mammography compliance among women 50 to 66 years.

Although, consistent with prior research linking emotional representations with intentions to adopt health-protective behaviours for AIDS, tuberculosis and skin cancer (Figueiras & Alves, 2007), more negative emotional representations were associated with mammography uptake for women in the present study. In a published review on cancer fear and anxiety in the cancer screening context (Consedine, Magai, Krivoshekova, Ryzewicz, & Neuget, 2004b), it was suggested that fear of cancer in general increases the likelihood of undertaking a mammogram, however, fear of a positive result or fear of the screening processes generally deters screening. Thus, many of the participants in the current study may have been experiencing a fear of cancer in general and distress (i.e., other emotional representations contained in this measure, including feeling depressed and upset when thinking about breast cancer) that increased their likelihood of obtaining a recent mammogram. Of particular concern though is that a small proportion of women experienced *intense* negative emotional representations (11% scored 15 and above on the emotional representations subscale for breast cancer) and were not screening adherent. As a result, cognitive interventions may be required for these women, including cognitive restructuring to address maladaptive thoughts and anxiety reduction techniques (i.e., stress inoculation and

relaxation training) that aim to reduce their negative feelings. This may lead to an increased likelihood of these women performing a mammogram.

Religious affiliation was related to BSE, CBE and mammography adherence. Specifically, women with no religious affiliation were more likely to have had a BSE and CBE than Catholic, Muslim and Orthodox women, and were more likely to have had a CBE and mammogram than women classified as other religion. Indeed, religiosity is often linked with poorer use of breast cancer control measures among other ethnic groups, including Israeli (Shmueli & Tamir, 2007) and African American (Banning, 2011) women. Given the current study finding, it is important that health promotion initiatives target religious Croatian, Lebanese and Australian women by encouraging them to understand the importance of regular breast screening. Moreover, as seen among other ethnic groups (e.g., Egyptian women; Coughlin & Ekwueme, 2009), it may also be beneficial to engage the support and involvement of the leaders of the religious communities to set an example and to further encourage the women's screening participation. Health professionals need to reinforce this message to these women when they are hesitant about obtaining a CBE and mammogram.

Ethnicity, Illness Perceptions and Breast Cancer Control Behaviours

As predicted, there was a significant ethnicity by illness perception interaction associated with cancer control use. Specifically, Australian women with lower levels of personal control over breast cancer were more likely to have undergone a mammogram, and conversely at higher levels of personal control Australian women were less likely than Croatian and Lebanese women to have had a mammogram. Therefore in light of this interaction effect, interventions designed to increase breast cancer screening practices should take into account the differential effect that beliefs about personal control have for these respective ethnic groups. Specifically, for Croatian and Lebanese women increasing their perceptions of personal control is likely to lead to greater adherence, whereas for Australian

women interventions would need to address their sense of invulnerability towards breast cancer to increase mammography use.

Illness Perceptions associated with Cervical Cancer Control Behaviours

In contrast to a prior study's findings (Savage & Clarke, 2001), a higher level of identity, weaker treatment control and causal beliefs, and more negative emotional representations were not associated with a decreased likelihood of women receiving a Pap smear within the last two years. There are several potential reasons for this result. First, as mentioned earlier, Savage and Clarke (2001) utilized a measure that incorporated limited items to assess these illness perception constructs, rather than a validated measure comprising of subscales pertaining to each illness perception dimension (e.g., identity subscale). Second, rather than recruiting a sample of ethnically diverse Australian women, most of the participants in the Savage and Clarke (2001) study (78%) were Australian-born (Savage & Clarke, 2001). Taken together, these reasons may explain the disparity in findings between their study and the current research.

In the current study, more cyclical timelines and a higher endorsement of general risk factors for cervical cancer were positively associated with obtaining a recent Pap smear. Overall, these women possess an adequate understanding of the timelines and generic risk factors of cervical cancer which subsequently increased their chances of having a Pap smear. A directive for future research is to develop interventions aimed at further improving their understanding of risk factors and timelines associated with cervical cancer, so as to maintain and increase the odds of these women obtaining a Pap smear at the recommended two-yearly intervals. These interventions are urgently needed for Croatian, Lebanese and Australian women who possess weaker beliefs across these dimensions and do not receive a regular Pap smear, as these women are clearly at increased risk of developing cervical cancer.

In partial support for the study hypothesis, a higher level of identity was positively associated with receiving the HPV vaccine. Prior research supports this finding for HPV vaccine uptake in the Australian context (Moore, 2008). However, contrary to that study's findings (Moore, 2008), a higher level of illness coherence and weaker treatment control beliefs for cervical cancer were not associated with HPV vaccine uptake. A possible reason for this result is that the former study comprised of a relatively unrepresentative sample of the target Australian population for HPV vaccination (i.e., from 18 to 26 years of age). The present study assessed a broader age range of Australian and immigrant women (i.e., from 18 to 45 years of age) and was thus more representative, and the findings more generalisable. In the current study and comparable with predictors of Pap smear use, more cyclical timelines for cervical cancer were related to an increased likelihood of women having received the HPV vaccine. Consequently, a collective approach is recommended to further improve women's understanding of the symptoms, timelines and risk factors for cervical cancer, in order to increase their chances of using the recommended cervical cancer control measures, namely Pap smears and the HPV vaccine. In order to educate women on these health protective practices, it is possible that information pamphlets could be developed in these languages that focus on providing health information which addresses these illness perceptions and the need to undertake cancer control behaviours in accordance with national guidelines.

Use of Breast and Cervical Cancer Control Behaviours

As predicted in the final study hypothesis, Lebanese women utilized BSE and recent mammography significantly less than Croatian and Australian women. Utilization rates for both of these cancer control measures are similar to the most up-to-date data among these ethnic groups (refer to Chapter Three). CBE, HPV vaccine and Pap smear rates are also comparable with the most current data on these particular groups (refer to Chapter Three).

Limitations of the Study

There are several limitations to the present study. First, a cross-sectional study design was employed and therefore causal relationships cannot be established. A directive for future research is to utilize a prospective research design to assess the role of breast and cervical cancer illness perceptions in the enactment of cancer control measures for these respective diseases. Second, self-report measures were administered to participants to document their use of cancer control behaviours. Although the use of these measures can lead to inaccurate reports (Anagnostopoulos et al., 2012), they are commonly used in studies assessing factors likely to underlie use of cancer control behaviours (e.g., Anagnostopoulos et al., 2012; Moore, 2008; Savage & Clarke, 2001; Savage & Clarke, 1998). A directive for future research is to validate self-reported use of the HPV vaccine, mammograms and Pap smears with medical records to improve the accuracy of these reports (Anagnostopoulos et al., 2012). Third, the Croatian and Arabic IPQ-RH measures administered in this study may not be applicable to women born and living in Lebanon and Croatia, and further research is needed to evaluate whether these measures are valid tools to assess their illness perceptions related to cancer control use.

In summary, the current study demonstrated that Lebanese women hold weaker beliefs across a number of breast and cervical cancer illness perceptions compared with Australian and Croatian women. Several breast (general risk factors and emotional representations) and cervical (timeline cyclical, general risk factors and identity) cancer illness representations were associated with BSE, mammography, Pap smear and HPV vaccine uptake, respectively, with an ethnicity interaction evident for personal control over breast cancer in relation to recent mammography use. These results suggest that only certain components of the CSM (i.e., control, casual, symptoms and emotions) are related to cancer control use, and as expected, ethnicity plays a vital role in cancer control enactment.

The fact that only some constructs were predictive of cancer control use may be interpreted in validity terms. Specifically, in relation to the IPQ-RH breast and cervical cancer measures and the corresponding translated Arabic and Croatian instruments, there were greater differences in internal reliabilities across constructs that were not predictive of cancer control (e.g., consequences for breast cancer- .67 for Lebanese to .84 for Australian women; illness coherence related to cervical cancer- .66 for Croatian to .82 Australian women), compared to factors that were associated with cancer control (e.g., emotional representations of breast cancer- .73 for Lebanese to .80 for Australian women; cyclical timelines for cervical cancer- .70 for Lebanese to .78 for Australian women) use (Refer to Chapters Six and Seven for all internal reliabilities). Indeed, certain ethnic groups (i.e., Lebanese women) are not familiar with the Likert scales in IPQ measures (Noureddine & Froelicher, 2013). Hence, a lack of ease with the use of these measures by Lebanese and Croatian women may have led to larger discrepancies in internal reliabilities across the measures and the likelihood of only certain factors being associated with cancer control measures.

Moreover, there is also a need to develop targeted interventions to further increase the likelihood of these women enacting these cancer control behaviours. For example, among women who endorse fewer breast cancer general risk factors and are not screening adherent, targeted public health messages are needed in Croatian, Arabic and English to inform them of the risk factors for breast cancer so they can make any necessary modifiable changes, including lifestyle (alcohol) and medical (poor medical care, hormonal and altered immunity) changes to reduce their risk of developing this disease. It is also imperative that these women are informed of the need to carry out screening to further reduce their risk of developing this disease. This study provides further support for self-regulation theory (Leventhal et al. 1980) by demonstrating that illness perceptions exist among these ethnic groups in the breast and

cervical cancer control contexts; however, it clearly highlights that only some of the features of this model are applicable to this vital area of public health import.

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Chapter Eight: Variables Excluded from the Current Dissertation

There were a number of variables omitted from the present research. In relation to the use of cancer control behaviours, participants were asked about the frequency of their BSE and CBE enactment. However, whilst this research was undertaken, specific frequency guidelines pertaining to self-examination of one's breasts (i.e., monthly) and CBE (i.e., yearly) were no longer recommended in Australia (National Breast and Ovarian Cancer Centre, 2009a), so the frequency of BSE and CBE use was subsequently excluded from the present research. In addition, Pearson's correlations tested the associations between predictor (e.g., perceived risk of breast cancer, perceived control and efficacy of breast cancer screening, beliefs about pain and discomfort and breast cancer worry) and the dependent variables of BSE (coded as 1 = monthly BSE) and CBE (coded as 1 = yearly CBE), and 0 for not performing these behaviours. No correlations achieved statistical significance at the .05 level; however, a non-significant positive association between breast cancer worry and BSE use was obtained (r = .06, p = .08). It should be noted that the majority of participants (78%) who reported ever carrying out a BSE undertook self-examination of their breasts on a monthly basis (the remaining 22% enacted this measure every three months or more), thereby suggesting that the terms BSE and self-examination of one's breasts appear to have the same meaning for ethnically diverse Australian women. Likewise, a high proportion of participants (71%) who reported ever having a CBE undertook this behaviour yearly (the remaining 29% carried out this measure every two years or more).

An initial aim of Study One (i.e., Chapters Three and Four) was to develop an objective cancer risk scale containing risk items for cancer, including age at menstruation and alcohol, smoking, hormone replacement therapy (HRT) and oral contraceptive use. Although previous research suggests that all of these variables are risk factors for breast cancer (National Breast and Ovarian Cancer Centre, 2009b) and smoking and oral contraceptive use

are risk factors for cervical cancer (Cancer Council Australia, 2012b), the coefficient alpha for this scale was only 0.34. Hence, these variables were excluded from the present research as a suitable cancer risk scale could not be devised.

There were an extensive number of health-related variables included in Study One, however, most of the variables that were not significantly different by ethnicity nor associated with any of the cancer control behaviours were omitted (refer to Table 1 for means and standard deviations). Some of the prior research studies have demonstrated positive and/or negative relationships between the omitted constructs and cancer control uptake. First, the generalized affective states, depression (Husaini et al., 2001) and stress (Magai et al.,

Table 1

Health Variables Excluded by Ethnicity

Variables		**Croatia** (*n*=72)	**Macedonia** (*n*=35)	**Lebanon** (*n*=92)	**Australia** (*n*=103)	**Total *F*** *df* (3,299)
	Scoring Range		*Mean & SD*			
Cognitive and Affective Factors						
Self-Efficacy (BSE)	(0-4)	2.32 (1.16)	1.77 (1.06)	2.13 (1.36)	2.37 (1.12)	**6.32**
Fatalism Breast	(0-12)	.51(.19)	.52 (.33)	.50 (.36)	.51 (.22)	**.093**
Fatalism Cervical	(0-12)	.54 (.20)	.51 (.29)	.49 (.32)	.51 (.22)	**3.01**
Embarrassment	(0-4)	.98 (.96)	.89 (.93)	.99 (.98)	.95 (1.04)	**1.67**
Depression	(0-28^{+})	16.09 (6.86)	17.13 (7.23)	17.87 (6.92)	16.80 (8.92)	**18.11**
Anxiety	(0-20^{+})	14.39 (7.68)	14.69 (7.22)	13.05 (7.41)	13.40 (6.89)	**9.00**
Stress	(0-34^{+})	17.42 (9.63)	16.26 (8.13)	17.49 (9.16)	17.58 (9.88)	**5.55**
ISE	(0-20^{+})	15.34 (3.29)	15.78 (3.33)	16.49 (4.12)	16.21 (4.03)	**14.29**

Note. ISE stands for Index of Self-Regulation

***p< .01,* p< .05*

2004; Posluszny, McFeeley, Hall, & Baum, 2004) have shown negative associations, while anxiety (Brain et al., 1999) have been positively related to cancer control uptake. However,

other studies have found no relation between cancer control and generalized depression (Aro et al., 1999; Bowen et al., 2003; Lindberg & Wellisch, 2001) and anxiety (Lindberg & Wellisch, 2001). Breast and cervical cancer-specific affects (i.e., depression and anxiety items in the emotional representations subscale of the IPQ-RH) were assessed in Studies Two and Three and possibly provided a better measure of emotional factors likely to underlie cancer control enactment. Second, self-efficacy or confidence in performing a BSE can predict BSE adherence (Champion, 1992; Erblich et al., 2000), while fatalistic beliefs (Schueler et al., 2008) and embarrassment (Cockburn, White, Hirst, & Hill, 1992; Consedine, Magai, & Neugut, 2004a; Magai et al., 2007; Schueler et al., 2008) have been negatively associated with breast and/or cervical cancer control use.

Finally, emotional inhibition has been comprehensively researched in cancer-affected populations (Knott, Turnbull, Olver, & Winefield, 2012) and has been implicated as a possible risk factor for cancer among asymptomatic individuals (Garssen, 2004). Mendolia (2002) developed the Index of Self-Regulation (ISE) to examine repressive coping/self-regulation of emotion. This measure contains the Crowne-Marlowe Social Desirability Scale (MC-SDS) to evaluate defensiveness and the Taylor Manifest Anxiety Scale (TMAS) to evaluate the anxiety components of repressive coping/self-regulation (Consedine, Magai, & Neugut, 2004a). Although this construct has been positively associated with CBE and mammography uptake among ethnically diverse (e.g., immigrant Haitian, Dominican and Eastern European) women (Consedine, Magai, & Neugut, 2004a), it appears that repressive coping/self-regulation is a predictor of screening for only certain ethnic groups. Thus, the MC-SDS and TMAS were excluded from the present research as the ISE was not significantly different by ethnicity nor associated with any of the cancer control behaviours.

Chapter Nine: Conclusions, Implications for Health Promotion and Recommendations for Future Research

The following chapter provides an overview on the key findings of the present research and the implications of these findings. Moreover, the main limitations of the research and recommendations for future research are discussed.

Summary of the Key Findings and Implications for Health Promotion

Breast and cervical cancer control behaviours among the ethnic groups assessed

The use of breast and cervical cancer control measures was assessed among the ethnic groups in Studies One (refer to Chapter Three and Four) and Three (refer to Chapter Seven). In relation to breast and cervical cancer screening, Lebanese women were less likely to have undertaken a BSE and recent mammogram than Croatian and Australian women across both studies, and Macedonian women were less likely to have obtained the HPV vaccine than Australian women in Study One. There were no ethnic differences in CBE and Pap smear uptake; however, in comparison to most prior research studies (Centre for Epidemiology and Research, 2010; Fernbach, 2002; Public Health Division, 2001), Pap smear use was lower for the ethnic groups assessed in the current research. In order to understand some of the reasons associated with the relatively low uptake of these cancer control measures, we investigated a range of psychosocial variables known to be associated with health protective behaviours in general.

Factors associated with cancer control behaviours across the ethnic groups assessed

In relation to ethnic differences in the EHBM, C-SHIP and CSM constructs across the studies, Lebanese women reported significantly higher painful and uncomfortable beliefs pertaining to BSE and CBE, and lower levels of beliefs for certain CSM breast (i.e., identity, psychological attributions and cyclical timelines) and cervical (i.e., cyclical timelines and illness coherence) cancer constructs than Croatian and/or Australian women. In addition,

Macedonian women were more likely to hold stronger beliefs pertaining to several breast (worry, BSE and CBE painful or uncomfortable and perceived risk) and cervical (worry and perceived efficacy and control) cancer psychosocial factors than Lebanese, Australian and/or Croatian women. Hence, while Lebanese women believe breast cancer screening is more painful and uncomfortable, endorse fewer symptoms and risk factors for breast cancer and have less of an understanding of cervical cancer, they appear to believe the progression of both diseases is less unpredictable and cyclical in nature. Moreover, Macedonian women hold stronger beliefs across a number of EHBM and C-SHIP constructs than the other ethnic groups. A directive for future research is to conduct qualitative interviewing in order to ascertain these womens' understanding of the relevant EHBM, C-SHIP and IPQ-RH factors, by probing further into their thought patterns when answering items on the administered measures. Example items may include: (a) What does the term (e.g., perceived risk or treatment control) mean to you, (b) How certain did you feel about the answer you provided? and (c) What were your thoughts when answering this item? Hence, a further examination into the elements of their beliefs/illness perceptions may lead to a greater understanding of why there are ethnic disparities across these constructs, and possibly cancer control use as further elements may be identified that can be incorporated as items in existing measures (e.g., IPQ-RH for Breast/Cervical Cancer) and tested to assess their association with cancer control enactment.

An interesting finding of this research though, was that few of the psychosocial factors that differed between the ethnic groups were found to be associated with use of the health protective behaviours. Specifically, lower breast cancer worry (Study One) and a higher endorsement of general risk factors (e.g., age, family history and alcohol consumption) (Study Three) were associated with BSE and CBE use. In contrast, more negative emotional representations were found to be related to increased mammography use (Study One). These

findings are somewhat contradictory, as on the one hand, low levels of negative affect (i.e., worry) are linked with higher breast screening (BSE and CBE), and on the other, high levels of emotional responses (e.g., depressed and upset about cancer) are linked with higher screening (mammography). However, the key difference between these studies is that the Breast Cancer Worries Scale administered in Study One assesses worry related to breast cancer (Lerman, Daly, Masny, & Balshem, 1994; McInerney-Leo et al., 2004), while the emotional representations subscale of the IPQ-RH administered in Study Three examines a more comprehensive set of affects (i.e., depressed, upset, fear and anxiety) related to this disease (Figueiras & Alves, 2007). Thus, the emotional representations subscale measured a somewhat different emotional experience for this disease than the experience of worry alone *per se* which may explain the disparities in findings between these studies.

Moreover, although it has been proposed that a fear or worry over a cancer diagnosis is likely to be a barrier to screening (Consedine et al., 2004b), in Study One the mean level of cancer worry was low across all ethnic groups, so it is possible that low levels of fear regarding a cancer diagnosis were experienced, possibly due to prior negative findings when carrying out a BSE and CBE (i.e., no breast lump found) and greater familiarity with these screening measures that led to positive associations with BSE and CBE use. However, given that a wider range of breast cancer-specific affects were assessed in Study Three, a fear of cancer in general may have been experienced which is a likely to be a facilitator to screening (Consedine et al., 2004b). The lack of associations between other breast cancer screening behaviours and cancer worry (no association with mammography) and emotional representations (no association with BSE and CBE) implies that the likely effect of these constructs on screening is behaviour specific for these particular ethnic groups.

Paradoxically, Australian women with a higher level of perceived control over cancer were *less* likely to have a recent mammogram. One possible explanation for this finding is

that Australian women who believe that they have increased personal control over breast cancer may also generally hold the belief that screening for cancer is not important or relevant to them (as they have their own control over cancer); hence, the lower screening adherence of this group. Future investigations are needed to clarify the reasons for this unexpected finding, and to more fully understand this link between perceived control and screening adherence.

Regarding cervical cancer control use, a higher endorsement of general risk factors and symptoms (identity) were positively associated with Pap smear and HPV vaccine use, respectively, and more cyclical timelines was positively associated with both of these behaviours (Study Three). These findings suggest that women who have formed more comprehensive representations or schema about cervical cancer are more likely to engage in these health-protective practices. Whilst this research did not specifically assess all types of knowledge about cervical cancer (e.g., knowledge of screening guidelines), it is also likely that the women who were adherent were more knowledgeable in general about this disease. In addition, lower perceived efficacy of cervical cancer control measures predicted HPV vaccine uptake (Study One). That is, women who did not strongly believe that existing cervical cancer screening (i.e., Pap smear) was effective, or do not trust this cancer control measure were more likely to have taken the additional step of undertaking preventive actions in the form of the HPV vaccination. These results highlight the need to educate women from these ethnic groups on the effectiveness of the HPV vaccine as a preventive measure for cancer detection and to increase their awareness of symptoms, risk factors and timelines associated with cervical cancer via media campaigns that aim to increase the likelihood of future cervical cancer control use.

Aside from the psychosocial factors that were investigated, several demographic variables were found to be predictive of cancer control behaviours. Interestingly, years resident in Australia was positively associated with mammography uptake, but negatively associated with Pap smear use in Study One. In relation to the mammography finding, the overall use of this measure across the ethnic groups was comparable with prior research (BreastScreen NSW, 2003, as cited in South East Health, 2006; BreastScreen Victoria, 2004; BreastScreen Victoria, 2006) and many immigrant women may have been acculturated, as most of the sample completed the English language survey and had lived in Australia for over 20 years. However, Pap smear use was low, when compared to prior research (Centre for Epidemiology and Research, 2010; Fernbach, 2002; Public Health Division, 2001), highlighting the possibility that as recently arrived immigrants these women may have been exposed to health information on cervical cancer screening, which is likely to have led to at least an initial uptake of this cancer control behaviour, but followed by reduced adherence over time. In fact, there are considerably fewer health promotion campaigns targeting the need to enact a biennial Pap smear (e.g., PapScreen Victoria offers the 'Every Woman, Every Two Years' Campaign) than a two-yearly mammogram (e.g., BreastScreen NSW offers the 'Cherry and Pea', 'Take You Away' and 'The Facts' Campaigns). As such, widespread multimedia campaigns are needed to inform women from the ethnic groups assessed of the requirement to enact a regular Pap smear and to provide them with information on where to access this screening service.

Only a few other demographic variables (i.e., religion, age, education and marital status) were related to cancer control use in the current research. In accordance with prior research studies (Banning, 2011; Edwards & Jones, 2000; Gorin & Heck, 2005; Hsia et al., 2000; Madan et al., 2000; Marlow, Waller, & Wardle, 2008; Shmueli & Tamir, 2007), single and religious women were less likely to have had a BSE and CBE than married and non-

religious women, respectively, and religious women were less likely to have obtained a recent mammogram than non-religious women. Age was negatively associated with mammography use, but positively associated with Pap smear uptake, and education was positively related to Pap smear and HPV vaccine use. These findings suggest that it is essential to inform less educated, single, younger (for mammography) and older (for Pap smear) women of the need to undertake the respective cancer control measures. Information pamphlets can be developed in English, Croatian, Arabic and Macedonian advising these women of the necessity to undertake cancer control in accordance with recommended guidelines. As seen in prior research (Coughlin & Ekwueme, 2009), religious leaders can also encourage women to enact breast cancer screening.

Across the theories utilized, models containing the CSM constructs were more predictive of breast and cervical cancer control enactment than models containing the EHBM and C-SHIP psychosocial factors. CSM models explained 25% to 49% of the variance, while EHBM and C-SHIP models accounted for 17% to 29% of the variance in cancer control use. Generally, all of the significant psychosocial variables were equally predictive of cancer control use for each health behaviour model, demonstrating positive (e.g., general risk factors of breast cancer and cyclical timelines of cervical cancer) or negative (breast cancer worry and perceived efficacy of cervical cancer control measures) associations with cancer control uptake. The CSM (Anagnostopoulos et al., 2012), EHBM (Gillibrand & Stevenson, 2006) and C-SHIP (Andrykowski & Pavlik, 2011) variance findings are similar to prior research and provide further support for models containing the CSM constructs to account for a larger proportion of the overall variance in cancer control enactment. Interestingly, breast cancer worry and perceived efficacy of cervical cancer control measures (i.e., C-SHIP and EHBM factors) were negative predictors, whilst the predictive CSM constructs were positively associated with cancer control. Targeted health interventions are required that aim to

incorporate these findings in order increase the likelihood of cancer control use among the ethnic groups assessed in the current research.

Although the use of EHBM, C-SHIP and CSM constructs uncovered that some of these psychosocial factors are associated with cancer control use among diverse ethnic groups, most of the variables were not related to cancer control enactment. These findings highlight the need for future health-related studies to incorporate the most important factors from these health behaviour theories so as to provide a more comprehensive and accurate picture of psychosocial factors that are likely to facilitate or pose as barriers to enactment. The fact that psychosocial factors associated with each cancer control behaviour were largely distinct (except for general risk factors related BSE, CBE and Pap smear use) supports the view that variables predicting cancer control usage differ for different types of cancers (Consedine, 2012; Lee, Consedine, & Spencer, 2007), including breast cancer (Consedine, 2012). Further, it is recommended that qualitative interviews are undertaken with women from the respective ethnic groups to determine whether IPQ-RH items relating to CSM illness perceptions that did not differ by ethnicity and were not related to cancer control use (i.e., treatment control, timeline acute/chronic and consequences) should be incorporated in future studies. These interviews need to explore women's thoughts and the processes behind their answers to these IPQ-RH items (e.g., what were they thinking when completing each IPQ-RH item) and to determine whether these items should be excluded, amended or further items pertaining to these constructs incorporated in the IPQ-RH measures.

Limitations of the Current Research

The cross-sectional nature of the current research is the main limitation as causative relationships between the variables assessed and cancer control behaviours cannot be established. Prior research has shown that certain psychosocial factors, including illness perceptions remain relatively stable (Rutter & Rutter, 2007), however, longitudinal studies

are needed to validate the direction of causality with a strict amount of control The tenets of control should include the temporal ordering of the variables examined to see how certain characteristics (e.g., perceived control over breast cancer) are at time 1 and change at time 2 and how this relates to screening behaviours (e.g., mammography use). In addition, it is necessary to assess the strength of the statistical association between the variables and the theoretical plausibility of the presumed causal relationship/s.

Moreover, it is not known whether participants had received the recommended three doses of the HPV vaccine (i.e., Cervarix or Gardasil). However, a four year follow-up study found that two doses, and possibly even one dose of the Cervarix vaccine provides a similar level of protection against HPV infections (i.e., HPV16/18) as the three-dose regimen (Kreimer et al., 2011). A directive for future research is to examine whether participants from the ethnic groups assessed received one, two or three doses of the HPV vaccine, and to assess and compare the associations between psychosocial/demographic factors and uptake.

Further, Macedonian participants were only recruited for Study One as the sample size procured for this study was small and although the sample was representative of Macedonian women in the Australian population (Australian Bureau of Statistics, 2006), it was not comparable in size with the other ethnic groups. It is recommended that future research recruit Macedonian participants from a wider geographical area (i.e., throughout other Australian states and territories) in order to obtain a larger sample of women from this ethnic group.

Strengths and Recommendations for Future Research

The current research was the first to employ EHBM, C-SHIP and CSM illness representations constructs in order to assess health-related beliefs and affects most relevant to breast and cervical cancer control use in a population of asymptomatic ethnically diverse Australian women. This research also provides current information on the proportion of

women enacting these cancer control measures and identifies the measures that are underused by each ethnic group. The findings add to the dearth of literature currently available on underrepresented Croatian, Lebanese, Macedonian and Australian women in the breast and cervical cancer contexts and provide direction for future health promotion initiatives that aim to increase uptake for these ethnic groups.

Moreover, Study Two was the first study to provide empirical validation for the IPQ-RH breast and cervical cancer measures for both English-speaking and Croatian and Lebanese populations, and Study Three demonstrated associations between some of these constructs and cancer control enactment. It is recommended that future research employ a prospective research design to assess illness perceptions among these ethnically diverse women in order to confirm the direction of causality using a strict amount of control (e.g., carefully tracking the temporal order of variables and assessing the strength of associations) between these constructs and cancer control use. Specifically, a longitudinal study could involve administering this study's questionnaire to women from these ethnic groups and then randomly assigning women to (a) control group that receive no information and (b) information group that receive detailed information about cancer control. At follow-up (6-12 months later) the questionnaire is readministered and cancer control use is assessed at this point in time. This research would not only confirm the direction of causality between illness perceptions and cancer control behaviours, but also establish whether the effects of the manipulation on modifying illness perceptions remain. Further, it would provide solid directives for future health promotion initiatives that are tailored to increase the adoption of breast and cervical cancer control by altering illness perceptions.

There are several health-related factors that were not assessed in the current research that should be incorporated in future research studies among these ethnic groups. First, it is proposed that *cues to action* entailed in the EHBM are employed to assess whether these cues

increase cancer control uptake among these groups. Prior research has shown that such cues can involve physician recommendations (Meissner, Breen, Taubman, Vernon, & Graubard, 2007) and sending regular prompts to women (Craun & Deffenbacher, 1987), including patient reminder letters to attend follow-up breast (mammography) (Kendall & Hailey, 1994) and cervical (Pap smear) (Tseng, Cox, Plane, & Hla, 2001) cancer screening. In particular, the presence or absence of physician recommendations has been linked with breast cancer screening among ethnically diverse women (Consedine, Magai, & Neugut, 2004). Thus, in hindsight it would have been appropriate to assess this variable in the present research. Second, the experience of pain related to HPV vaccine use has only recently been examined and associated with the use of this measure among women in the general population (Vanderpool, Casey, & Crosby, 2011). As a result, it is recommended that the relationship between pain and HPV vaccine uptake is assessed and compared among Croatian, Lebanese, Macedonian and Australian women in future research studies.

Third, the role of knowledge, including awareness of cancer screening measures (Hyacinth, Adekeye, Ibeh, & Osoba, 2012; Phillips & Wilbur, 1995) and knowledge of screening guidelines (Miller & Champion, 1997), and logistic barriers, such as access to cancer control services (Peek & Han, 2004) and perceived difficulty in organizing an appointment (Waller, Bartoszek, Marlow, & Wardle, 2009) have previously been implicated as facilitators or barriers to cancer screening. Hence, it is possible that these factors may be associated with cancer control use among Croatian, Lebanese, Macedonian and Australian women and it is recommended that future research assess these variables among these ethnic groups as it would have been appropriate to assess them in the current research. Lastly, prior research has demonstrated that health variables encompassing the relationships between perceived risk and illness perceptions (e.g., identity risk- the perception of risk associated with symptoms) were related to skin cancer screening enactment (Cameron, 2008), so it is

possible that these variables could predict cancer screening in the breast and cervical cancer contexts as illness perceptions (Anagnostopoulos et al., 2012; Savage & Clarke, 2001) and perceived risk (e.g., Katapodi et al., 2004; Boehner et al., 2003) have independently predicted cancer control use across both of these disease contexts. Thus, it is recommended that the association between these health variables and cancer control behaviours is examined among the immigrant and Australian women in these contexts.

The present research supports the role of the theoretically derived EHBM, C-SHIP and CSM constructs in adopting breast and cervical cancer control among ethnically diverse women living in Australia. Health promotion initiatives and recommendations for interventions to alleviate cognitive and affective barriers and to increase uptake for each control measure have been suggested. It is imperative that recommendations for future research are implemented in order to address gaps in our knowledge regarding factors likely to underlie cancer control enactment among these ethnically diverse women.

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