TOBACCO EXPOSURE AND BREAST CANCER: PERSPECTIVES OF YOUNG WOMEN

by

Erin Christine Ptolemy

BSW, The University of British Columbia Okanagan, 2008
BA, The University of Saskatchewan, 2006

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SOCIAL WORK

in

The College of Graduate Studies

THE UNIVERSITY OF BRITISH COLUMBIA
(Okanagan)

November, 2011

ABSTRACT

Based on available evidence researchers have concluded that young women who smoke or have regular long-term exposure to secondhand smoke (SHS) have an increased risk of developing premenopausal breast cancer. To date there have been few efforts aimed at raising awareness among young women about this modifiable risk factor for breast cancer. The aim of this research was to further knowledge about young women aged 15 to 24 as an audience for messaging about tobacco smoke and breast cancer. Young women (n=121) responded to an online survey examining perceived importance of and interest in risk and risk reduction information, as well as potential barriers and strategies to messaging related to tobacco smoke and breast cancer risk. Participants ranged in age from 15 to 24 years, with the average age of participants being 21 years (SD= 2.21). The findings indicate that in general young women were interested in information about tobacco exposure as a risk factor for breast cancer. Most participants identified that information about smoking and SHS is important to them at this stage of their life, and most participants reported that they were interested in learning about how to reduce their risk for tobacco-related breast cancer. Age was found to be an important factor influencing young women's perceptions, with young adults holding more favourable attitudes towards information about breast cancer and smoking than teens. Potential barriers to messaging that young women identified include lack of motivation to find this information, not thinking about the long-term consequences of their actions, and beliefs that breast cancer is "something older women get". Messaging strategies participants perceived as effective included providing young women with facts and personal stories of breast cancer, hearing about this information from peers, and targeting all smokers who place young women at risk for breast cancer with

public awareness messages about smoking and breast cancer. These findings have important implications for future research, health messaging, policy development, and practice.

PREFACE

This research was approved by the UBC Okanagan Behavioural Research Ethics Board on April 25, 2007. Ethics certificate #H07-00489.

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ACKNOWLEDGEMENTS

Thank you to all of the participants of this study; without them this study would not have been possible. Thank you to the organizations that assisted in recruiting participants. I would also like to acknowledge the following CIHR Strategic Training Programs for their financial and training support: the Strategic Training Program in Tobacco Research (STPTR), Psychosocial Oncology Research Training (PORT), and the Integrated Mentorship Program in Addictions Research Training (IMPART). Thank you to the BC Child and Youth Health Research Network for providing me a student internship in child and youth health research, allowing me to train closely with researchers in the field. Thank you also to various funding opportunities through UBC Okanagan that I have benefitted from including the Bill Tymchuk Memorial Cancer Research Award, the Graduate Fellowship Award, and the Bryce Carnine Memorial Prize.

Thank you to my co-supervisors, Dr. Joan Bottorff and Dr. Edward Taylor, and Dr. Shirley Chau for your wisdom, expertise, and continual support throughout this process. A special thank you to the Institute for Healthy Living and Chronic Disease Prevention at UBC Okanagan. The training opportunities and support that I have received though my involvement with the Institute over the years has been invaluable.

Lastly, I would like to acknowledge my family and friends who have contributed to this work in more ways than they know. A special thanks to my husband, Eric, whose love and support provided me the strength to complete this process, and who always provided a welcome distraction.

1 INTRODUCTION

1.1 Statement of the problem

Smoking and secondhand smoke (SHS)[1] exposure among young women[2] is a significant health concern because it elevates risk for many tobacco-related diseases later in life. Smoking is the single most preventable cause of death worldwide (Leung et al., 2007; Young, Leatherdale, Sloan, Krieger, & Barisic, 2009); the World Health Organization estimates that about half of long-term smokers will die as a result of their smoking (World Health Organization, 1999). Smoking has been identified as a cause for over 15 types of cancer and is a contributing factor to many other chronic diseases (Collishaw et al., 2009; International Agency for Research on Cancer, 2004; US Department of Health and Human Services, 2006). Smoking has a wide-ranging impact on health. It harms nearly every organ in the body, causes a variety of diseases, and reduces one's overall health and wellness (Centers for Disease Control and Prevention, 2008). Exposure to SHS also has adverse health implications with long-term exposure to SHS associated with respiratory problems (California Environmental Protection Agency, 2005a; Jaakkola, Plipari, Jaakkola, & Jaakkola, 2003), lung cancer (Brennan et al., 2004), and cardiovascular disease (Barnoya & Glanz, 2005; California Environmental Protection Agency, 2005b). Recent studies have shown that exposure to tobacco smoke (active smoking or SHS) in childhood and adolescence may result in a near doubling of risk for premenopausal breast cancer (California Environmental Protection Agency, 2005b; Collishaw et al., 2009; Johnson, 2005b). Based on a review of epidemiological and toxicological studies, a Canadian Expert Panel of researchers have concluded that the evidence is consistent with a causal link between active smoking and pre- and post-menopausal breast cancer and for long-term regular exposure to SHS

[1] Also referred to as 'environmental tobacco smoke' (ETS), 'involuntary smoking', or 'passive smoking'
[2] Defined as women aged 50 and younger (Baucom, Porter, Kirby, Gremore, & Keefe, 2006)

and premenopausal breast cancer (Collishaw et al., 2009). Although causal mechanisms are as yet unclear, epidemiological and toxicological studies demonstrate that breast tissue in its growth stage and during first pregnancy is sensitive to carcinogens in tobacco smoke (Innes & Byers, 2001; Lash & Aschengrau, 1999; Okasha, McCarron, Gunnell, & Smith, 2003).

Increased tobacco control measures in recent decades have reduced the overall prevalence of smoking and SHS exposure in Canada. However rates of SHS exposure among youth are still high, with 34% of Canadian Tobacco Use Monitoring Survey (CTUMS) respondents reporting that they were exposed to SHS -at least once a week and another 11% reporting daily exposure to SHS (Health Canada, 2008). Smoking in the home still occurs; with 13% of Canadians reporting that at least one person smokes in their home (Health Canada, 2008). Recent CTUMS data show that smoking among Canadian youth has plateaued with 18% males and 13% of females aged 15 to 19 being smokers (Health Canada, 2008). However, older age of smoking onset among young adult women is becoming a trend; 2008 CTUMS data show that 23% of Canadian females aged 20 to 24 are smokers (Health Canada, 2008). This demonstrates that adolescence and young adulthood is a critical period when the majority of tobacco experimentation and uptake occurs, and emphasizes the importance of understanding young women's perceptions of smoking and SHS exposure during this critical time period. Because most other established risk factors for breast cancer are not amenable to modification, reducing tobacco exposure may offer one of the few opportunities to prevent and reduce breast cancer incidence. To date there have been few efforts aimed at raising awareness among young women about this modifiable risk factor for breast cancer (Haines et al., 2010).

1.2 Study aims and overview

Evidence of the relationship between the development of breast cancer and both active and passive smoke exposure among young women makes this an extremely important and timely issue, and provides a new opportunity to engage young women in tobacco control interventions. A better understanding is needed of young women's responses to this new risk information and their preferences for receiving interventions. Before young women change their tobacco behaviours (active smoking or SHS exposure), they need to become motivated to do so. Examination of the Health Action Process Approach (HAPA) model provides insight about the motivational processes of behavioural intent formation and how to motivate young women to reduce their tobacco exposure. Sociodemographic (i.e., age, SES, ethnicity, education) and background characteristics (i.e., smoking status, frequency of SHS exposure, family history of breast cancer) were added to the model to ensure consideration of young women's social contexts. The aims of this master's thesis study were to: 1) describe young women's attitudes[3] toward information about tobacco exposure as a risk factor for breast cancer; 2) identify predictors of behavioural intent in the motivational phase of the adapted HAPA model; and 3) describe young women's perceived barriers and preferred messaging strategies about tobacco exposure as a risk factor for breast cancer.

This thesis will begin with a detailed review of the literature pertaining to premenopausal breast cancer rates in Canada and the implications of early breast cancer for young women. Breast cancer risk factors, including tobacco exposure, will be outlined. Young women's exposure to tobacco (active smoking and SHS) is detailed, and how social workers and other helping professions can become involved tobacco control and cancer prevention will be

[3] Attitudes are defined as: 1) perceived importance of risk information, 2) interest in risk information, 3) interest in risk reduction information

highlighted. Current tobacco reduction and breast cancer messaging efforts will be discussed. Research questions and hypotheses derived from the discussion of the literature will be presented. This will be followed by the study methods.

2 LITERATURE REVIEW

2.1 Breast cancer in Canada

Breast cancer is the most commonly diagnosed female cancer in the world, accounting for 22% of all new female cancer diagnoses (International Agency for Research on Cancer, 2004). Canadian female breast cancer rates are amongst the highest in the world with other westernized nations (i.e., United States, Australia, and Northern Europe) having similar incidence rates (Canadia-n Cancer Society, 2007; Cancer Care Ontario, 2006; International Agency for Research on Cancer, 2004). In Canada, 1 in 9 women will be diagnosed with breast cancer in their lifetime and 1 in 27 will die from it (Canadian Cancer Society, 2007). While breast cancer incidence and mortality rates among Canadian women of all ages have fallen in recent decades, breast cancer is the most common cancer in women under 50 years of age (Figure 1) and is the most common cancer cause of death of women under age 50 (Figure 2).

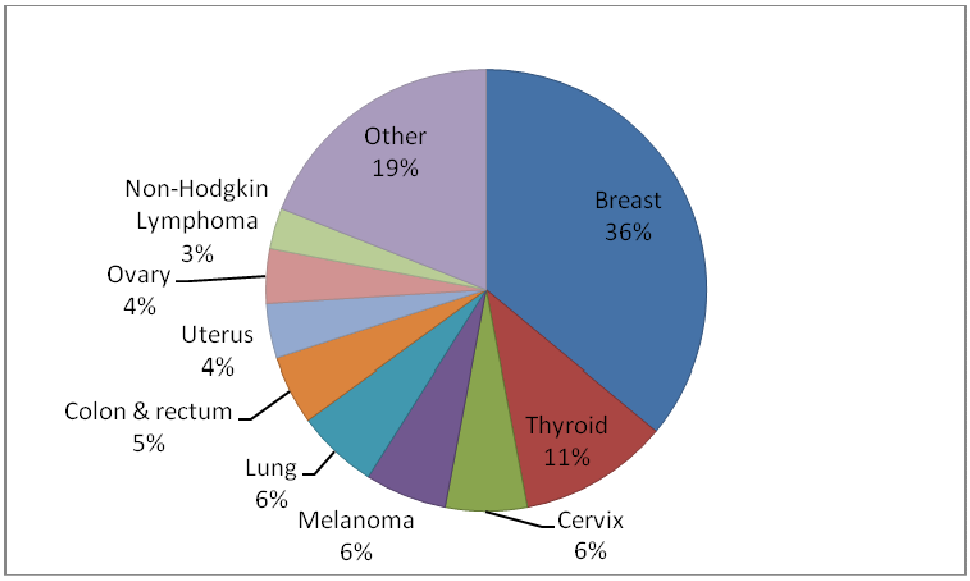

Figure 1. Leading types of cancer among Canadian women ages 20-49, percentage of new cases (Canadian Cancer Society, 2007).

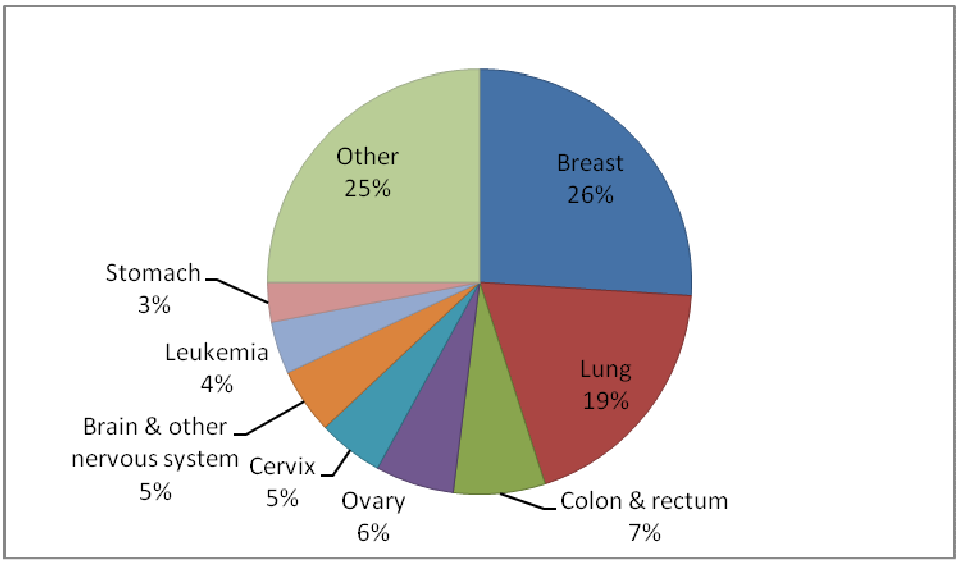

Figure 2. Leading causes of cancer mortality among Canadian women ages 20-49, percentage of deaths (Canadian Cancer Society, 2007).

Breast cancer awareness and prevention programs have been successful in promoting awareness of certain risk factors for breast cancer (i.e., heredity) and early detection via clinical breast exams, self breast exams, and other screening programs (i.e., mammography) (Silk et al., 2006). This awareness, combined with advances in adjuvant therapies, has resulted in increased likelihood of long-term survival after a breast cancer diagnosis (Baucom, Porter, Kirby, Gremore, Keefe (2006), Canadian Cancer Society, 2007; Montazeri, 2008). Breast cancer occurring before menopause profoundly affects women's health, wellness, and overall quality of life, the effects of which can persist long after the initial diagnosis and treatment (Baucom et al., 2006; Bloom, Stewart, Chang, & Banks, 2004; Montazeri, 2008).

2.2 Implications of premenopausal breast cancer

Premenopausal breast cancer is defined as breast cancer occurring in women 50 years of age and younger (Baucom et al., 2006; Wenzel et al., 1999). This age cut-off is supported in epidemiologic literature and is concurrent with the general age of menopause onset. The incidence rate of premenopausal breast cancer is less than that of postmenopausal breast cancer;

however women with premenopausal breast cancer tend to have poorer prognostic features that lead to higher recurrence rates and higher relative mortality rates (Yankaskas, 2005). Because many women under age 50 do not receive routine mammograms and the density of young breast tissue makes screening difficult, breast cancer in young women may be detected at a later stage (Bloom, Stewart, Chang, Banks, 2004, Yankaskas, 2005). Premenopausal breast cancer is generally more aggressive than later breast cancers and requires treatments that are more toxic than those received by older women (Baucom et al., 2006; Bloom et al., 2004).

There are age-related implications of having breast cancer, and it is important to understand the unique needs and challenges that young women face when diagnosed with breast cancer before age 50. Younger women experience significantly greater losses in physical and social function, and mental health (Avis, Crawford, & Manuel, 2005; Baucom et al., 2006; Ganz, Greendale, Petersen, Kahn, & Bower, 2003; Kroenke et al., 2004). Premenopausal breast cancer comes with increased risk of infertility and early menopause (Ganz et al., 2003; Partridge et al., 2004). The physical side effects of treatment usually differ for young women than from older women with lymphedema, menopause, infertility, menstrual changes, and weight gain tending to persist long-term for young women (Avis et al., 2005; Baucom et al., 2006; Bloom et al., 2004; Ganz, Rowland, Desmond, Meyerowitz, & Wyatt, 1998; Kroenke et al., 2004; Montazeri, 2008). Evidence demonstrates that, compared to older women, young women with breast cancer have a lower quality of life that persists years after initial diagnosis (Avis et al., 2005). An unexpected cancer diagnosis at a young age can "lead to a more profound sense of relative deprivation among younger persons- that the disease has forfeited their future" (Mor, Allen, & Malin, 1994, p.2125), and is highly disruptive to young couples, families, and expected life plans (Ganz et al., 2003). It is estimated that one-third to one-half of women with breast cancer experience

psychological distress that impacts functioning over time (Avis et al., 2005; Bloom et al., 2004; Ganz et al., 2003). Young women often report feelings of loss of control, depression, anxiety, and low self-esteem (Partridge et al., 2004). Many women in this age demographic are developing and/or peaking in their professional careers, and are likely to be less financially secure than older women (Baucom et al., 2006; Bloom et al., 2004; Maunsell et al., 2004). Developmentally, many women 50 years of age and under are married or in committed relationships, and may have children at home (Baucom et al., 2006; Bloom et al., 2004). Sexuality and body image are central components of young women's lives that are particularly impacted by an early breast cancer diagnosis (Bloom et al., 2004; Fobair et al., 2006; Ganz et al., 1998; Ganz et al., 2003; Wenzel et al., 1999). As many as 50% of young women affected by early breast cancer report changes in sexual desire, inability to enjoy sex, difficulty in reaching orgasm, anxiety about performance, and pain during intercourse (Fobair et al., 2006; Wenzel et al., 1999). Young women often experience negative body image in relation to sexuality and relationships, perceived loss of femininity and body integrity, and concerns about appearance particularly if there is any evidence of treatment (i.e., mastectomy scars) (Fobair et al., 2006). Efforts to reduce the incidence of premenopausal breast cancer are the most effective way of reducing morbidity and mortality among women under the age of 50 associated with breast cancer.

2.3 Risk factors for breast cancer

Factors known to increase risk of breast cancer include modifiable behaviours and non-modifiable characteristics. Non-modifiable risk factors are those that cannot be changed or controlled. Modifiable risk factors are those which can be potentially changed or controlled. Modifiable risk factors for breast cancer are of particular importance to health researchers and

healthcare professionals as they are behaviours that can be targeted with tailored interventions to reduce one's breast cancer risk. The risk factors for breast cancer for women of all ages are shown in Table 1 (Canadian Cancer Society, 2007; Cancer Care Ontario, 2006).

Table 1. Risk factors for breast cancer.

Reproductive/hormonal	Lifestyle	Other
• Fewer births • Later age at first full-term pregnancy • Did not breastfeed • Early age at menarche • Irregular menses • Late menopause • Use of exogenous hormones	• Smoking • Exposure to secondhand smoke • Obesity • Poor nutrition • Physical inactivity • Alcohol consumption	• Family history of breast cancer • BRCA1 or BRCA2 mutations • Exposure to ionizing radiation • Benign breast disease

Non-modifiable characteristics include heredity factors (i.e., BRCA 1 and BRCA 2 mutations, family history of breast cancer) and reproductive/hormonal factors (i.e., fewer births, early age at menarche, irregular menses, not breastfeeding, later age at first full-term pregnancy) (Canadian Cancer Society, 2007; Cancer Care Ontario, 2006). Reproductive/hormonal factors are thought to increase a woman's lifetime exposure to estrogens and contribute to increased breast cancer risk (Collishaw et al., 2009; Kelsey, 1993). Modifiable factors include obesity, physical inactivity, regular alcohol consumption (Collaborative Group on Hormonal Factors in Breast Cancer, 2002), and exposure to tobacco (active smoking and SHS).

2.3.1 Tobacco exposure is a risk factor for breast cancer

Based on epidemiological and toxicological studies, as well as an understanding of biological mechanisms, a Canadian Expert Panel of researchers recently concluded that evidence is consistent with a causal relationship between active smoking and pre- and postmenopausal breast cancer (Collishaw et al., 2009). The Panel also concluded that regular long-term exposure to SHS increases a woman's risk of developing premenopausal breast cancer by 68 to 120% (California Environmental Protection Agency, 2005b; Collishaw et al., 2009; Johnson, 2005b).

Toxicology. There are more than 170 toxic substances in tobacco smoke including carbon monoxide, nicotine, benzene, tar, nickel, benz(a)pyrene, formaldehyde, and nitrogen oxides (Hecht, 2002; Hoffman & Hecht, 1989). Of these toxic substances there are at least 20 identified human carcinogens in tobacco smoke, including benzo[a]pyrene, dibenzo[al]pyrene, polycyclic aromatic hydrocarbons, nitrosoodiethylamine, N-nitrosoodi-n-butyl-amine, 4-aminobiphenyl, benzene, and isoprene (Hecht, 2002; International Agency for Research on Cancer, 2004). Different types of smoke have similar chemical compounds but differing toxicities, with evidence demonstrating that sidestream smoke is three to four times more toxic than mainstream smoke (Collishaw et al., 2009; Schick & Glanz, 2006). Sidestream smoke is the smoke produced by an idling cigarette. Mainstream smoke is the smoke directly inhaled through the cigarette by the smoker. Secondhand smoke is the combination of sidestream smoke, mainstream smoke, and aged smoke (Leatherdale, Smith, & Ahmed, 2008).

Biological mechanisms. Although direct causal mechanisms are as yet unknown, there is sufficient biological evidence to demonstrate that exposure to carcinogens in tobacco smoke can lead to breast cancer (Collishaw et al., 2009; Morabia, 2002). The time between onset of puberty and first full-term pregnancy is a critical period of increased risk of breast cancer in relation to tobacco exposure because this is a period of rapid breast cell proliferation. Breast tissue does not become fully differentiated until after a full-term pregnancy and until this time is particularly sensitive to carcinogens in tobacco smoke (Young et al., 2009). Tobacco smoke contains over a dozen fat-soluble compounds that are known to induce mammary tumours in rats (Collishaw et al., 2009). Some of the carcinogenic components of tobacco smoke reach the breast and are secreted into breast milk. Electrophilic metabolites of tobacco compounds bind to DNA and form DNA adducts that can be detected in normal and cancerous breast tissue from women who are

current or former smokers, or who are passively exposed to tobacco smoke (Hecht, 2002). Cigarette smoking is inversely related to obesity, which is a demonstrated risk factor for postmenopausal breast cancer (International Agency for Research on Cancer, 2004). Antiestrogenic effects of smoking may also override potential carcinogenic effects of tobacco smoke (Collishaw et al., 2009; Hecht, 2002). However the bulk of the evidence suggests that exposure to tobacco smoke causes more harm than good, and therefore precautions should be taken to avoid exposure to SHS and smoking during this developmental period.

2.4 Young women's tobacco exposure

2.4.1 Active smoking

Tobacco control efforts in recent decades have reduced the prevalence of active smoking among Canadian youth, yet a substantial proportion of females aged 15-24 are smokers. While males across all age groups report higher prevalence of smoking than females, 15% of female youth aged 15 to 19 smoke and 23% aged 20 to 24 smoke (Health Canada, 2008). This dramatic increase in prevalence rate during early adulthood is a result of gendered patterns of tobacco use that influence when and why females smoke. Females start smoking at an earlier age and maintain or increase consumption for different reasons than males, including using cigarettes to suppress appetite and control weight, to deal with stress and suppress negative emotions, increase self-esteem, project a particular image to peers, and to foster a sense of independence and control over life (Gilbert, 2005; Seguire & Chalmers, 2000). Regular adolescent female smokers are more likely to be from disadvantaged backgrounds (i.e., lower socioeconomic status) (Valentich, 1994). Initiation of smoking during the early teenage years (prior to age 16) is a common occurrence in this demographic group (Backinger, Fagan, Matthews, & Grana, 2003; Kaplan & Weiler, 1997; Seguire & Chalmers, 2000), which increases risk for premenopausal

breast cancer. While many regular smokers begin smoking before the age of 18 (US Department of Health and Human Services, 2006), a trend is emerging that challenges this assumption. Hammond (2005) reported that one fifth of young adult Canadian smokers tried their first cigarette after the age of 18. Young adulthood is a period of significant life transition, which includes changes in social networks, living location, roommates, and school and work settings (Hammond, 2005). Young adult females have increased susceptibility to smoking during this period, and many smokers' average daily consumption increases to the level of an average adult smoker (BC Women's Health Research Network, 2007b; Hammond, 2005). This is reflected in current Canadian smoking prevalence rates among young women, and demonstrates that adolescence and early adulthood are critical periods in which to intervene with tobacco control efforts targeted to young women.

2.4.2 Passive smoking

The extent of SHS exposure among Canadian youth is likely underestimated (Leatherdale et al., 2008), however lifetime assessments of SHS exposure among women in Western countries suggest that 80 to 95% of women are exposed to SHS in residential and/or occupational settings (Collishaw et al., 2009). CTUMS data show that youth in Canada are exposed to SHS on a regular basis, with 34% of youth reporting SHS exposure at least once a week and 11% of youth reporting daily exposure (Health Canada, 2008). Smoking still exists in the home; 23% of non-smoking youth and 50% of smoking youth are exposed to SHS in their homes on a daily basis. Twenty-six percent of youth are exposed to SHS in a vehicle at least once a week (Leatherdale et al., 2008). Rates of SHS exposure are higher for females than males (Leatherdale et al., 2008), with gendered social roles likely contributing to women's elevated rate of exposure and making it more difficult for them to request that others not smoke around them (BC Women's Health

Research Network, 2007a; Bottorff et al., 2010). Service-industry jobs are predominantly held by women, and until recently indoor public smoking bans were put in place women were frequently exposed to SHS in their workplace (BC Women's Health Research Network, 2007a). In addition to being exposed to SHS more frequently than males, evidence is emerging that women may be more susceptible to the negative health effects of SHS exposure than men (BC Women's Health Research Network, 2007a; Leatherdale et al., 2008). Women are at higher risk for SHS-related cardiovascular disease, breast cancer, respiratory tract problems, and lung cancer than men (BC Women's Health Research Network, 2007a). There is a growing need for programs and policies to protect young women from SHS (Bottorff et al., 2010; Leatherdale et al., 2008).

2.5 Prevention efforts targeted to young women

2.5.1 Messages specific to tobacco as a risk factor for breast cancer

To date there are few smoking prevention or intervention efforts that have included attempts to raise awareness about tobacco exposure as a risk factor for breast cancer (Bottorff et al., 2006; Bottorff et al., 2010; Haines et al., 2010). As part of a larger study, Haines et al. (2010) conducted a search of breast cancer messages targeting young women in Canada, the United States, the United Kingdom, and Australia. There were only two messages that included any reference to smoking or SHS as a risk factor for breast cancer (Haines et al., 2010). Focus group research reveals that young women are interested in receiving more information about this risk factor for breast cancer (Bottorff et al., 2010). There remains an urgent need for information targeted to young women about how tobacco contributes to breast cancer risk, and steps for women to take to reduce their risk for developing the disease.

2.5.2 Active smoking

Anti-smoking advertisements have been effective in reducing smoking rates for the general public (Rhodes, Roskos-Ewoldsen, Eno, & Monahan, 2009) and are particularly effective with adolescents when used as part of larger campaigns (i.e., series of graphic warning labels on cigarettes, billboards, magazine ads) (Sabbane, Lowrey, & Chebat, 2009). Unfortunately messages specifically targeting young adults are not common, and the effectiveness of individual ads targeted to youth has been questioned. It is suggested that current anti-smoking campaigns do not offer youth incentives not to smoke nor any positive reinforcement to encourage youth to change their smoking behaviours (Gilbert, 2005). These campaigns set a norm of health conduct (i.e., smoking is unhealthy and should not be done) which youth often resist by actively initiating or continuing to smoke (Biener, Ji, Gilpin, & Albers, 2004; Rhodes et al., 2009). School-based prevention and intervention programs are efficacious in the short-term by delaying smoking initiation, enhancing anti-smoking attitudes, and teaching skills to resist social pressures (Backinger et al., 2003). However school-based interventions do not appear to have long-term effects for adolescent and young adult females (Backinger et al., 2003; Seguire & Chalmers, 2000). In particular, anti-smoking campaigns that espouse the medical effects of smoking may backfire when targeting young women (Gilbert, 2005). Smoking is a part of young female smokers' identities and is used to serve a function in their daily lives (Gilbert, 2005). Smoking prevention and intervention programs must be holistic in nature and acknowledge the function that smoking serves for young women, as well as the multiple social, psychological, biological, and environmental influences that impact their lives (Backinger et al., 2003; Seguire & Chalmers, 2000). Mass media has been effective in targeting youth, particularly youth at high risk for regular smoking (Anderson, Chad, & Spink, 2005).

Seguire and Chalmers (2000) suggest that successfully targeting women via mass media is achieved by focusing on certain subpopulations (i.e., children, pre-teens), understanding their preferences and smoking behaviours, and illustrating ways in which they can change their behaviours. Recommendations for media messages to increase youths' awareness of their particular health risks include using, optimistic and non-judgmental approach (Gilbert, 2005) and incorporating immediate, short-term, and long-term effects of smoking in a thought-provoking and believable message (Biener et al., 2004; Goldman & Glantz, 1998). Multi-modal programming has been demonstrated to have durable success in reducing youth tobacco prevalence, and combines components of school and community-based interventions (Anderson et al., 2005; Backinger et al., 2003; Unger, Boley Cruz, Schuster, Flora, & Anderson Johnson, 2001). Multi-modal programming can include media advocacy, family communications, product sales deterrents, and anti-tobacco activities (Backinger et al., 2003; Biener et al., 2004).

2.5.3 Secondhand smoke

In comparison to the plethora of research on anti-smoking messages and campaigns, the issue of SHS exposure has not been as well explored. There is scant literature about the relationship between SHS messaging and youth attitudes and behaviour change (Halpern-Felsher & Rubinstein, 2005). Often SHS messaging is done in conjunction with active smoking and it is therefore difficult to identify which aspects of SHS messages and campaigns appeal to young women (Evans et al., 2006; Halpern-Felsher & Rubinstein, 2005). Like smoking, tobacco exposure behaviours are "inextricably tied to the socio-cultural, socio-structural, and socio-economic context in which people find themselves" (Gilbert, 2005, p.232). A major challenge is to develop messages that appeal to the context of young women's daily lives and convey information about the health risks of SHS (Evans et al., 2006). Most youth are bothered by SHS

exposure but are too timid to speak out about it to smoking friends and family (Health Canada, 2006). Thus widespread SHS awareness messages and campaigns have been recommended to change public attitudes and health behaviour among all smokers to prevent young women's SHS exposure (Evans et al., 2006).The majority of youth receive messages about the health effects of SHS exposure via the media (television, newspapers, magazines) (Kennedy & Bero, 1999; Kurtz, Kurtz, Johnson, & Copper, 2001). The aim of SHS messages is to convince smokers that they are harming others around them (Goldman & Glantz, 1998); a technique that is effective with youth and can deter initiation of smoking (Halpern-Felsher & Rubinstein, 2005; Pechmann, Zhao, Goldberg, & Thomas Reibling, 2003; Song, Glantz, & Halpern-Felsher, 2009).

Denormalization of smoking and SHS exposure has also been suggested to be a powerful strategy for targeting adolescent smoking, and most SHS messages attempt to denormalize smoking by portraying the effects of smoking on nonsmokers to motivate smokers to quit (Goldman & Glantz, 1998). It has been suggested that effectiveness of media messages to increase awareness of health risks associated with SHS could be enhanced by emphasizing the benefit of smoke-free environments, lending support for smoke-free policies in the community, and supplementing school and based community programs with SHS prevention objectives (Li et al., 2003; Niederdeppe, Fiore, & Smith, 2008). Pechmann et al. (2003) suggest that SHS exposure messages should stress risk vulnerability, not severity, when attempting to target youth and to couple it with a true-life story. However, recommendations for SHS messages for youth have not taken into account gender influences that may impact receptivity, nor the need for gender-specific messages (e.g., as is required to increase awareness about tobacco smoke and breast cancer risk).

2.5.4 Breast cancer messages

Media is the primary source by which adolescent females receive the bulk of their health-related messages, including information about breast cancer prevention, detection, and treatment (Smith et al., 2009). Unfortunately media coverage of breast cancer often contributes to young women's uncertainty and misconceptions about the causes of breast cancer, risk factors, preventative actions, and credible sources of information (Haines et al., 2010; Volkman & Silk, 2008). Biological risk factors receive privileged media coverage compared to modifiable environmental risk factors (Atkin, Smith, McFeters, & Ferguson, 2008; Smith et al., 2009; Terre, 2009). This may contribute to young women's perceptions of breast cancer risk reduction as irrelevant and distal in nature, thereby decreasing the chance of risk reduction behaviours being taken up (Smith et al., 2009; Terre, 2009; Volkman & Silk, 2008). In the absence of an immediate threat to their health, youth often have difficulty relating their current lifestyle practices to their future adult health status (Anderson et al., 2005; Volkman & Silk, 2008). There are challenges, therefore, in increasing awareness breast-cancer related issues among young women.

Evidence shows that even modest population level changes toward healthy behaviours can make a significant improvement in cancer prevention and control (Terre, 2009). Messaging strategies that have potential to position breast cancer risk as salient to young women include addressing myths about breast cancer, providing basic information about how to reduce risk and increase overall health, and use casual and familiar language (Silk et al., 2006).

2.5.5 Messaging summary

Messages that motivate young women toward prevention behaviours are valuable because they reduce the occurrence of disease later in life and contribute to women's overall

health and wellness (Silk et al., 2006; Smith et al., 2009). How health messages are communicated to the target audience determines the salience and impact of the messages (Peters et al., 2005). It is, therefore, critical to identify mechanisms underlying behavioural change for a target audience and base health messages on formative research. Mounting evidence supports a media-based, multimodal approach that addresses a variety of factors relevant to young women (Lantz et al., 2000; Terre, 2009). For messages to have an effect the target population must be exposed to, pay attention to, like, comprehend, and take action on the message (Peters et al., 2006). Media messages delivered through various information channels have the greatest potential to reach intended audiences. Health-oriented individuals tend to utilize active channels that require effort to retrieve the information they need (i.e., newspapers, internet). Less health-conscious individuals can be reached through passive information channels such as television and radio (Atkin et al., 2008; Smith et al., 2009). Messages that use actors that adolescents find appealing and attractive have been found to capture young women's attention and lead to an increased likelihood of engagement in risk reduction behaviours (Shadel, Fryer, & Tharp-Taylor, 2009). Messages that minimize persuasiveness and stress freedom of choice and control over one's own body have also been recommended for adolescents to support desires to begin to make their own choices in life (Grandpre, Alvaro, Burgoon, Miller, & Hall, 2003).

2.6 Conceptual framework

2.6.1 Models of health behaviour change

Several models and theories of behaviour change have been developed to guide research and health promotion practice. Health behaviour change theories, such as the Health Belief Model or Protection Motivation Theory, are considered *continuum models*. Continuum models identify variables that influence behavioural action and combine them in a prediction equation

(Weinstein, Rothman, & Sutton, 1998). The value generated represents the probability that person will act and places the person on a continuum of action likelihood. Interventions based on continuum models focus on increasing relevant action-related variables (Lippke & Zieglemann, 20008). Drawbacks of continuum models include the assumption that action-influencing variables are combined in a linear fashion and sequenced the same way for everyone with no individual variability (Schwarzer, 2008b; Weinstein et al., 1998). Interventions based on continuum models generally tend to be one-size-fits-all (Lippke & Zieglemann, 20008), and that behaviour is an outcome of a conscious intention (Schwarzer, 2008a). Individuals vary greatly in terms of background, experiences, and cognitive processes, and the assumption of predictable linearity toward action seems implicitly incorrect.

Stage theories/models of behaviour propose that people progress through different phases/stages toward behaviour change, and that there are specific cognitive factors in each stage that contribute to an individual's progress toward a behavioural goal (Armitage & Conner, 2000; DeBarr, 2004). Persons at different stages are qualitatively different with respect to risk perceptions, cognitions, barriers, and action tendencies (Armitage & Conner, 2000; Schwarzer, 2008a). It is necessary that messages and interventions are tailored to match the various stages of behaviour change and people's needs within each stage to increase young women's intent to adopt risk reduction behaviours (i.e., quitting/reducing smoking, eliminating/reducing SHS exposure). Evidence demonstrates that individuals pay more attention to personally relevant information, process it more intensively, and show better memory and recall (Armitage & Conner, 2000; DeBarr, 2004; Wiedemann, 2009). The Health Action Process Approach (HAPA) model can be used as an intervention planning tool in a wide variety of health-enhancing and health-protective behaviours (Schwarzer et al., 2003).

It is quite common that people do not behave in accordance with their intentions. Qualitative differences between people at this transition period are likely responsible for failing to translate intention into action (Schulz, Sniehotta, Mallach, Wiedemann, & Schwarzer, 2009; Sutton, 2008). HAPA is a multi-stage model that is unique among continuum and stage models of health behaviour change in that it bridges the *intention-behaviour gap;* that is when intentions are not sufficient enough to fully explain behaviour (Schulz et al., 2009). For the purposes of the present study, the focus will be on the motivational phase of the HAPA model. The intentional construct of the model will be explored to understand the influence of sociodemographic factors, background factors, and risk perceptions of smoking and SHS on formation of behavioural intent. Survey findings will be analyzed through the lens of the HAPA model and frame evidence-based recommendations for facilitating intention formation and action in young women's tobacco exposure behaviours.

2.6.2 The Health Action Process Approach

The Health Action Process Approach (HAPA) is a multi-stage, social cognitive model of health behaviour. This approach suggests that the adoption, initiation, and maintenance of health behaviours progress through two phases: a preintentional motivational phase and postintentional volition phase (Armitage & Conner, 2000; Schwarzer et al., 2003; Schwarzer, 2008a). The motivational phase culminates in the development of behavioural intentions, which are implemented into actual behaviours via volitional processes of planning and action (Schwarzer et al., 2003; Wiedemann, 2009). The volitional phase involves the processes of implementing intent into action (Schwarzer et al., 2003).

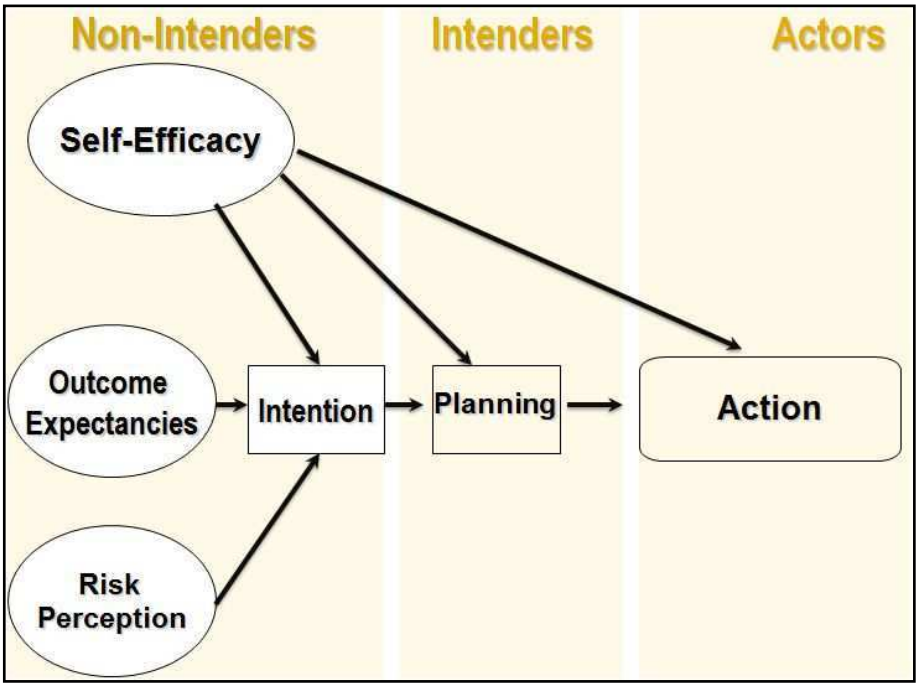

Figure 3. The Health Action Process Approach (Schwarzer, 2008).

The *motivational phase* consists of non-intenders[4]; those persons who have not yet set a goal to act (Wiedemann, 2009). In this phase risk perception, outcome expectancies, and self-efficacy foster goal setting (Wiedemann, 2009). A minimum level of risk awareness must exist before a person begins to weigh the positive versus negative outcome expectancies of engaging in risk reduction behaviour. Perceiving more beneficial outcomes than negative outcomes results in a greater intent to engage in behaviour (Schwarzer et al., 2003). Simultaneously, the person considers their ability to effectively perform these behaviours (Schwarzer et al., 2003).The end of the motivational phase occurs when a person develops behavioural intention (Schwarzer et al., 2003). Intentions comprise a person's motivation toward a desired behaviour or goal, and are a good predictor of subsequent behaviour (Schwarzer et al., 2003). The *volitional phase* of the model consists of two sub-stages and marks the beginning of behavioural action processes. The

[4] Also known as 'pre-intenders'

intention stage comprises intenders; those persons motivated to change but not yet acting on this. Intent must be transformed into action by planning; providing strategic instructions about how to perform the desired behaviour (Schwarzer, 2008a). Action and coping planning and self-efficacy foster progress through the action stage. Lastly, the *action stage* consists of actors; people who already perform the behaviour and are now in maintenance (Schwarzer, 2008a). Relapse prevention is an important element to incorporate in this stage of behaviour change.

2.6.3 Adapted HAPA model

The HAPA model neglects sociodemographic factors and other potentially important background factors in development of behavioural intent and action. The HAPA model implicitly assumes a high degree of universality; that is, health behaviour can be predicted solely on socio-cognitive variables regardless of the participant's age, gender, and ethnocultural background (Chow & Mullan, 2010; McBride et al., 2008). However it is important to understand that health behaviours occur within a broader social context. Demographic variables are important influencing factors when assessing risk perceptions, self-efficacy, and outcome expectations (Mehrotra, Noar, Zimmerman, & Palmgreen, 2009; Savage, 1993). The HAPA model has been adapted to include the effects of age, gender, education, and ethnicity on motivational processes of risk perceptions, outcome expectancies, and self-efficacy (see Figure 4). Tobacco exposure (i.e., smoking status and exposure to SHS) and family history of breast cancer have also been incorporated into the HAPA model as background factors. Research has demonstrated differences in risk perception among smoking and non-smoking adolescents (Halpern-Felsher & Rubinstein, 2005) as well as those who have experiences of a family member with breast cancer.

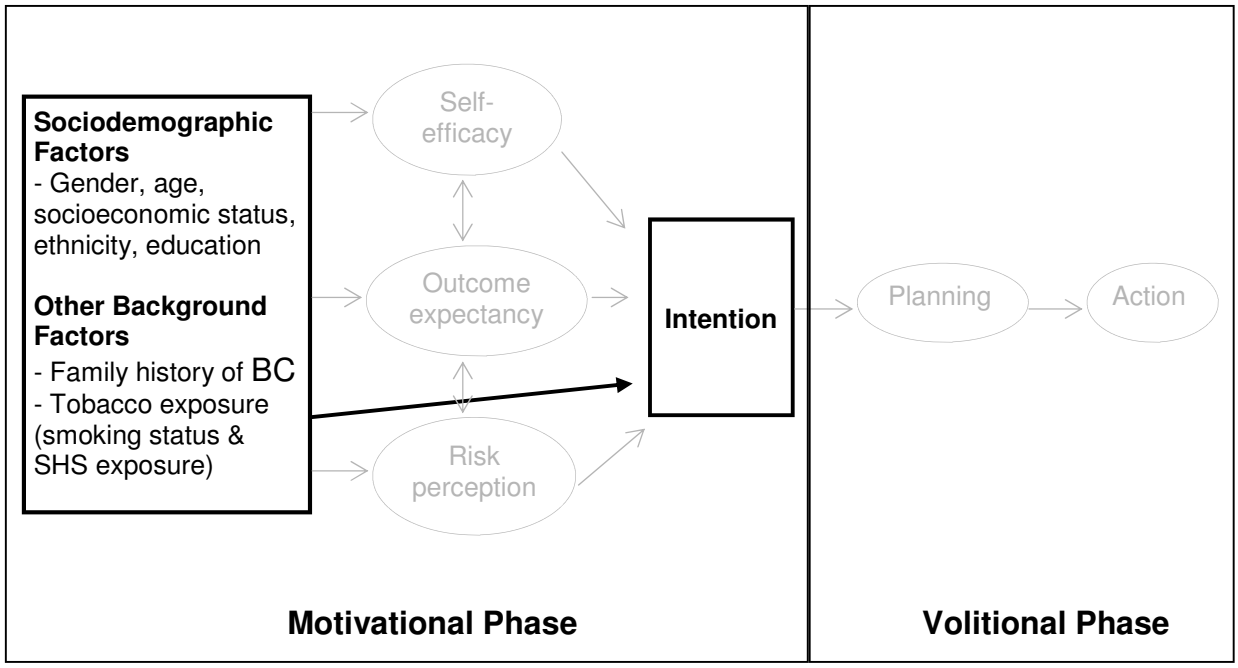

Figure 4. Adapted HAPA model

2.7 Research questions

Adolescence and young adulthood is a period of increased vulnerability to tobacco-related breast cancer, and is also a period when health promotion campaigns have the greatest opportunity to influence tobacco uptake (Bottorff et al., 2010). Young women should understand that evidence suggests that the relationship between tobacco exposure and premenopausal breast cancer is consistent with causality (Collishaw et al., 2009). There is a need to promote awareness of this information among young women and the benefits of reducing their risk for breast cancer. Development of health messages about this modifiable risk factor for breast cancer is now a pressing priority. Little is known about young women's perceptions about breast cancer and how they respond to information about tobacco smoke as a risk factor for breast cancer. The following aims and questions will expand knowledge about young women as a target audience for health messaging about this risk factor for breast cancer, and guide interventions to promote health-protective behaviours.

Aim 1: Describe young women's attitudes toward information about tobacco exposure as a risk factor for breast cancer.

- **Research Question 1:** How important do young women perceive information about smoking and SHS as risk factors for breast cancer?
- **Research Question 2:** Among young women who perceive this information to be important, what reasons do they provide?
- **Research Question 3:** How interested are young women in information about smoking and SHS as risk factors for breast cancer?
- **Research Question 4:** What is the proportion of young women who express interest in information about how to reduce their risk for premenopausal breast cancer?
- **Research Question 5:** How important do young women perceive information about reducing their chances of getting breast cancer?
- **Research Question 6:** Is there a relationship between level of interest in this risk information related to tobacco exposure and breast cancer, and background factors (age, socioeconomic status, education, current smoking status, current exposure to secondhand smoke, family history of breast cancer)?

Aim 2: Identify predictors of behavioural intent in the motivational phase of the adapted HAPA model.

- **Research Question 7:** What proportion of young women report intentions to change their exposure to tobacco based on information provided about smoking, SHS, and breast cancer?
- **Research Question 8:** Do background factors (i.e., age, socioeconomic status, education, ethnicity, current smoking status, exposure to SHS, family history of breast cancer)

predict intention to change tobacco exposure behaviours following receipt of risk information regarding smoking, SHS and breast cancer?

Aim 3: Describe young women's perceived barriers and preferred messaging strategies about tobacco exposure as a risk factor for breast cancer.

- **Research Question 9:** What are young women's perceived barriers to raising awareness about tobacco exposure as a risk factor for breast cancer?
- **Research Question 10:** What do young women identify as preferred messaging strategies to raise awareness about tobacco exposure as a risk factor for breast cancer?

This is an exploratory study examining factors which characterize young women as a target audience for health messaging about tobacco-related breast cancer risk. This issue has been minimally investigated among young women in Canada (Bottorff et al., 2010).

3 METHODS

3.1 Study Design

This investigation used a cross-sectional, descriptive design using an online self-report questionnaire. Ethical approval for research involving human participants was obtained from the Office of Research Services at the University of British Columbia. This study was a secondary analysis of a previously collected survey data. The purpose of the original study was to survey young women to validate and extend findings from a focus group study regarding young women's level of interest in information about tobacco exposure as a risk factor for premenopausal breast cancer. The survey provided a useful data set to meet the requirement of a master's thesis, and provided continuity as this writer was involved in the development of the original survey as part of an undergraduate research internship.

3.2 The Smoking and Breast Cancer Messages for Young Women Survey

Development of the 'Smoking and Breast Cancer Messages for Young Women' survey (Appendix A) was guided by a comprehensive review of previous empirical and theoretical work in this area as well as by previously developed instruments [i.e., 2007 Canadian Tobacco Use Monitoring Survey (Statistics Canada, 2007b), 2007 Canadian Community Health Survey (Statistics Canada, 2007a), 2004 BC Youth Survey on Smoking and Health II (Johnson et al., 2004), The University of Waterloo Tobacco Use Survey (2004), Parent Action on Drugs 'Check It Out' survey (2006) (Parent Action on Drugs, 2006), and DEX focus group questionnaire (Bottorff et al., 2010)]. The primary objectives of the survey were to develop a better understanding of young women as a target audience for messaging regarding the risks of tobacco and breast cancer and develop recommendations for tailored health messages directed at reducing young women's risk of breast cancer. The 63-item online survey was divided into the

categories of: sociodemographics, background factors, importance of risk information, interest in risk information, interest in risk reduction information, intention to reduce tobacco exposure, barriers to raising awareness, and strategies for raising awareness. Depending on skip patterns, participants could answer from 38 – 53 questions.

The online data tool used for the survey, SurveyMonkey, was located in the USA and thus subject to the US Patriot Act. Participants' responses were not be linked to IP addresses; however due to UBC Ethics criteria participants had to agree to conditions of participation and give consent by clicking 'I accept'.

3.3 Sampling and recruitment procedures

A convenience sample of volunteers was recruited for the survey. Young women, smokers and non-smokers, aged 15-24 were eligible to take part in the survey. This age demographic was selected due to it being the population most at risk for smoking in Canada (Health Canada, 2008), and to ensure the sample included participants representing the differing stages of adolescent and young adult psychosocial development. For the purpose of this study, 15-19 year olds will be referred to as 'teens' and 20-24 year olds as 'young adults'.

Letters of introduction (Appendix B) were sent to nine stakeholder organizations identified as addressing tobacco smoke as a risk factor for breast cancer in their programming, explaining the purpose of the survey and expectations of participants, as well as attaching a journal article (Johnson, 2005a) detailing the issue. Stakeholders were asked to assist with recruitment by: a) placing a URL link to the survey be placed on their webpage; and b) distributing an e-mail with the survey's URL link to their listservs, and/or distribute the link via their organization's social networking pages (i.e., Facebook, MySpace). The online survey was promoted through media announcements and articles on the project in newsletters (e.g.,

Canadian Breast Cancer Network) and magazines targeting teens and young women (e.g., Seventeen, Cosmo Girl), and a webpage for the project. Lastly, participants from a previous qualitative study on the topic (Bottorff et al., 2010) were invited to participate in the online survey and were encouraged to forward the survey's URL to friends who may be interested in participating. Recruitment of study participants took place from September 2008 – July 2009. One hundred seventy-two participants began the survey, of which there were 131 eligible participants. Data from 10 participants were discarded due to lack of responses. The survey was completed by 121 eligible participants (70% completion rate). There were no incentives provided for participation.

3.4 Measures

3.4.1 Sociodemographic and background factors

Sociodemographic factors included age, education level, and ethnicity. The first three digits of participants' postal codes (Forward Sortation Area) were collected to track distribution of the sample. *Background factors* included family history of breast cancer and tobacco exposure. Tobacco exposure included both ***SHS exposure*** and ***smoking behaviour. SHS exposure*** items assessed frequency of SHS exposure. Participants were asked to identify how often in the past month, excluding their own smoking, they were exposed to SHS; participants could respond every day, almost every day, at least once a week, and at least once a month. ***Smoking behaviour*** items measured current smoking status of participants. For the purposes of the current study, current smokers were defined as those who have smoked in the past 30 days and who have smoked at least 100 cigarettes in her lifetime. Former smokers are defined as not having smoked in the past 30 days but having smoked at least 100 cigarettes in her lifetime.

Never smokers were those who have smoked fewer than 100 cigarettes in her lifetime and have not smoked in the past 30 days.

Prior to proceeding with the survey, participants were asked to read a page with cancer risk factor information such definitions of modifiable and non-modifiable cancer risk factors. This was done to ensure that participants were provided specific information about tobacco exposure (active smoking and SHS) as a risk factor for breast cancer, and to communicate that this risk factor is a modifiable one in their lives.

3.4.2 Importance of risk information

After participants were provided information about tobacco as a risk factor for breast cancer, they were asked to indicate how important this information was to them at this stage in their life. On separate items for smoking and SHS, participants ranked their perceived importance of information on a scale from 1 (not at all important) to 5 (very important). If participants responded that SHS information was important to them, they were asked to specify reasons why. Answer options included: I have a relative who has/had breast cancer; I am frequently around other people who smoke; I try to be as healthy as I can; this information supports my choice to avoid exposure to SHS; and, this information supports my choice to reduce my exposure to SHS. Similarly, if participants responded that information about smoking as a risk factor was important to them, they were asked to specify reasons why. Answer options included: I have a relative who has/had breast cancer; I smoke cigarettes; I try to be as healthy as I can; this information supports my choice not to smoke; and, this information supports my choice to reduce my smoking.

3.4.3 Interest in risk information

Interest in tobacco risk information was measured by two items. Participants were asked to indicate how interested they would be in learning about the relationship between SHS and early breast cancer on a scale of 1 (not at all interested) to 5 (very interested). Using the same response scale, participants were asked to indicate how interested they would be in learning more about the relationship between smoking and early breast cancer.

3.4.4 Interest in risk reduction information

Participant interest in risk reduction behaviour[5] was measured by the following four items. Participants were asked 'if we were able to show you easy and effective ways to eliminate or reduce your exposure to SHS, and which would reduce your risk for early breast cancer, would you be interested in having this information?' Similarly, participants were asked 'if we were able to show you easy and effective ways to quit or reduce your smoking, and which would reduce your risk for early breast cancer, would you be interested in having this information?' Answer options to both questions was 'yes' or 'no.' Thirdly, using a 5-point response scale (1= not at all important to 5 =very important) participants were asked to indicate how important it was to them to have specific information about these risk factors (smoking and SHS) for breast cancer. Lastly, participants were asked to rate how important they think it is for young women their age to know about how to reduce their chance of getting breast cancer. They responded on a scale from 1 (not at all important) to 5 (very important).

3.4.5 Intention to reduce tobacco exposure

Intention to reduce tobacco exposure was measured for both smoking and SHS. The question to assess intent to reduce SHS exposure was as follows: 'Recent studies have shown

[5] Risk reduction behavior is defined as quitting/reducing cigarette smoking, and eliminating/reducing exposure to secondhand smoke.

that about 20% of new early breast cancer cases every year in Canada are related to SHS, and that exposure to SHS early in life may put you at higher risk for developing early breast cancer. Would having this information make you consider reducing your exposure to SHS?' Response options were 'yes' or 'no.' The question to assess intent to reduce smoking exposure was: 'Recent studies have shown that about 25% of new early breast cancer cases every year in Canada can be attributed to smoking, and that smoking early in life may put you at higher risk for developing early breast cancer. Would having this information make you consider changing your smoking behaviours?' Response options were 'yes' or 'no.'

3.4.6 Barriers to raising awareness

Participants were asked to identify barriers to raising awareness about the relationship between smoking, SHS, and premenopausal breast cancer by selecting any statements which applied to them. Options included: 'there's too much negativity and exaggeration in these kinds of campaigns', young women in my age group don't think about the "long term"', 'there are more important things to be concerned about like school, my social life, and my future', and 'breast cancer campaigns are not interesting to young women of my age'.

3.4.7 Strategies for raising awareness

Participants were asked to rate the effectiveness of each of the following in raising awareness about the link between tobacco exposure and breast cancer: hearing about it from teachers, using TV ads, using celebrity endorsements, and hearing about it from a breast cancer survivor. A 5-point Likert scale (1="not at all effective" to 5= "very effective") was used. There was an open-ended question for women to specify any other ways they deemed effective or ineffective.

3.5 Analysis

All analyses for this study were conducted using SPSS Version 18.0 (Predictive Analysis Software [PASW], 2009). Prior to data analysis, univariate descriptive statistics was used to screen the data and ensure values were in the expected range. Due to the sample size (n=121), probability of error for all analyses was set at $p < .05$. Missing numbers were excluded from the analysis.

For the purposes of analysis, respondent age was collapsed into two groups: teens (15-19 years of age) and young adults (20-24 years of age). These age groupings were used to represent differing stages of adolescent and young adult psychosocial development. Data related to ethnicity was re-coded into two groups: 'majority' (i.e. Caucasian) and 'minority' (i.e., Aboriginal, Korean, Asian, other). Due to low reported numbers, ex-smokers (i.e., have not smoked within past 12 months) were classified as "non smokers". Lastly, based on median split, response variables were collapsed for analysis into 'important' and/or 'interested' (i.e. 4, 5) and 'not important' and/or 'not interested' (i.e., 1, 2, 3).

Descriptive statistics (i.e., frequencies, percentages, and means) were calculated for the variables in all study research questions. Summary statistics for the distribution of the socio-demographic characteristics and background factors were also calculated.

Chi square. Bivariate analyses of categorical data were conducted using chi-square analysis, a nonparametric test. This test is a test of association between categorical variables (Bluman, 2004). It can also be used to test differences between two or more actual samples. In the present study, chi-square was the most appropriate method to analyze dichotomous variables, and was used in all study questions to determine relationships between relevant measures, key sociodemographic variables (i.e., age, education, ethnicity) and background factors (family

history of breast cancer, and tobacco exposure behaviours including smoking status, exposure to SHS). A probability of error threshold for these analyses was set at $p<0.05$.

4 RESULTS

This chapter provides a report of the major findings. The chapter begins with a description of the sample characteristics. No findings are provided for the respondents who declared themselves as members of a minority group because the number of individuals in this group was extremely small (n=13). When collapsed into a single minority group no difference was found when compared to the majority sample. Table 2 provides a description of ethnic membership within the sample. Outcomes are detailed for each of the research questions.

4.1 Sample description

A total of 172 of participants began the survey. Survey responses were excluded from three respondents who were males, 21 respondents because they were over 24 years of age, and 27 respondents who only completed the first section of survey. Thus the final sample for analysis includes 121 eligible participants; a 70% completion rate. Postal code data revealed that the majority of participants were from British Columbia (54.5%, n= 66). Remaining participants were from Saskatchewan (15.7%, n=19), Alberta (9.1%, n=11), Ontario (5.8%, n=7), New Brunswick (3.3%, n=4), and Prince Edward Island (1.7%, n=2). Incomplete postal code data resulted in geographic location unable to be determined for 12 participants (9.9%).

Participants ranged in age from 15 to 24 years, with the average age of participants being 21 years (SD= 2.21). Less than one third of the sample was in the 15 to 19 year age group. The sample was predominantly Caucasian (87%, n=105). One participant identified as Aboriginal, one as Korean, two as South Asian, and one as South East Asian. Ten participants reported 'other' (i.e., Latin American, Black, and Iranian) (8.3%). Ethnicity data was missing for one participant. Most participants had completed some post-secondary education (i.e., college/tech school/university) (57%, n=69), 26% (n=31) of the participants reported completion of post-

secondary education, and 17.4% (n=21) of the participants were in high school or had completed high school. With respect to experiences related to breast cancer, 24.8% (n=30) of the participants identified they have a close relative who has been diagnosed with breast cancer.

Respondents were also asked about their exposure to tobacco smoke. A large proportion of the participants (44.6%, n=54) reported they have been exposed to SHS at least once a week, 28.9% (n=35) were exposed every day or almost every day, and 26.4% (n=32) were exposed to SHS at least once a month. In relation to smoking status, 38.8% (n=47) of participants identified as current smokers, and 57.8% (n=70) considered themselves non-smokers. A further four participants (3.3%) reported they were ex-smokers.

Table 2. Characteristics of the sample (n=121).

Characteristic	N	%
Age		
15 to 19	27	22.3
20 to 24	94	77.7
Ethnicity (1 missing)		
Caucasian	105	87
Aboriginal	1	0.08
Korean	1	0.08
South Asian	2	0.16
South East Asian	1	0.08
Other	10	8.3
Education		
High School	21	17.4
Completed some post-secondary	69	57
Completed post-secondary	31	26
Family history of breast cancer		
Yes	30	24.8
No	91	75.2
SHS Exposure		
Daily or almost daily	35	28.9
Once a week	54	44.6
Once a month	32	26.4
Smoking status		
Current smoker	47	38.8
Non-smoker	70	57.8
Former smoker	4	3.3

Note: Percentages within categories may not total 100 because of missing data

4.2 Findings related to research questions

Aim 1: Describe young women's attitudes[6] toward information about tobacco exposure as a risk factor for breast cancer.

Research Question 1.1: How important do young women perceive information about smoking and SHS as risk factors for breast cancer?

Most participants indicated that information about both smoking (61%, n=71) and SHS (67.8%, n=82) as risk factors for breast cancer were important to them at this stage in their life. Young adults were significantly more likely than teens to perceive smoking information as important (χ^2= 6.690, n= 117, p=.035). Table 3 indicates that there were no other sociodemographic and/or background factors influencing perceived importance of smoking and SHS risk factor information.

[6] Attitudes are defined as: 1) perceived importance of information; 2) interest in information; 3) interest in risk reduction information.

Table 3. SHS and smoking information importance related to sociodemographic and background characteristics.

Variable	SHS info. important		SHS info. not important		Statistics $\chi 2$ (df)	Smoking info. important*		Smoking info. not important*		Statistics $\chi 2$ (df)
	N	%	N	%		N	%	N	%	
Age					0.367 (1)					6.690 (2)
15 to 19	17	14	10	8	p=.544	14	12	10	8.5	**p=.035**
20 to 24	65	54	29	24		57	49	36	31	
Education					0.264 (2)					1.898 (4)
High School	14	11.5	7	5.7	p=.876	11	9	9	8	p=.755
Some post-secondary	48	40	21	17		40	34	26	22	
Completed post-secondary	20	16.5	11	9		20	17	11	9	
Smoking status					2.362 (1)					2.531 (2)
Current smoker	28	23	19	16	p=.124	28	24	16	13.6	p=.282
Non-smoker	54	45	20	16.5		43	37	30	25.6	
SHS exposure					1.347 (2)					.098 (4)
Daily or almost daily	24	20	11	9	p=.510	21	18	13	11	p=.999
Once a week	34	28	20	16.5		31	26	21	18	
Once a month	24	20	8	6.6		19	16	12	10	
Family history of BC					1.102 (1) p=.294					1.297 (2) p=.523
Yes	18	15	12	10		15	13	14	12	
No	64	53	27	22		56	48	32	27	

* 4 cases missing

Note: Percentages within categories may not total 100 because of missing data

Research Question 1.2: Among young women who perceive this information to be important, what reasons do they provide?

Secondhand smoke. Of the five reasons presented that related to knowledge about SHS exposure and breast cancer, the most frequently endorsed reason among participants who perceived that the information on SHS and breast cancer was important was '*I try to be as*

healthy as I can", followed by '*this information supports my choice to avoid exposure to SHS.*'

The least endorsed reason was *'I have a relative who has/had breast cancer.'*

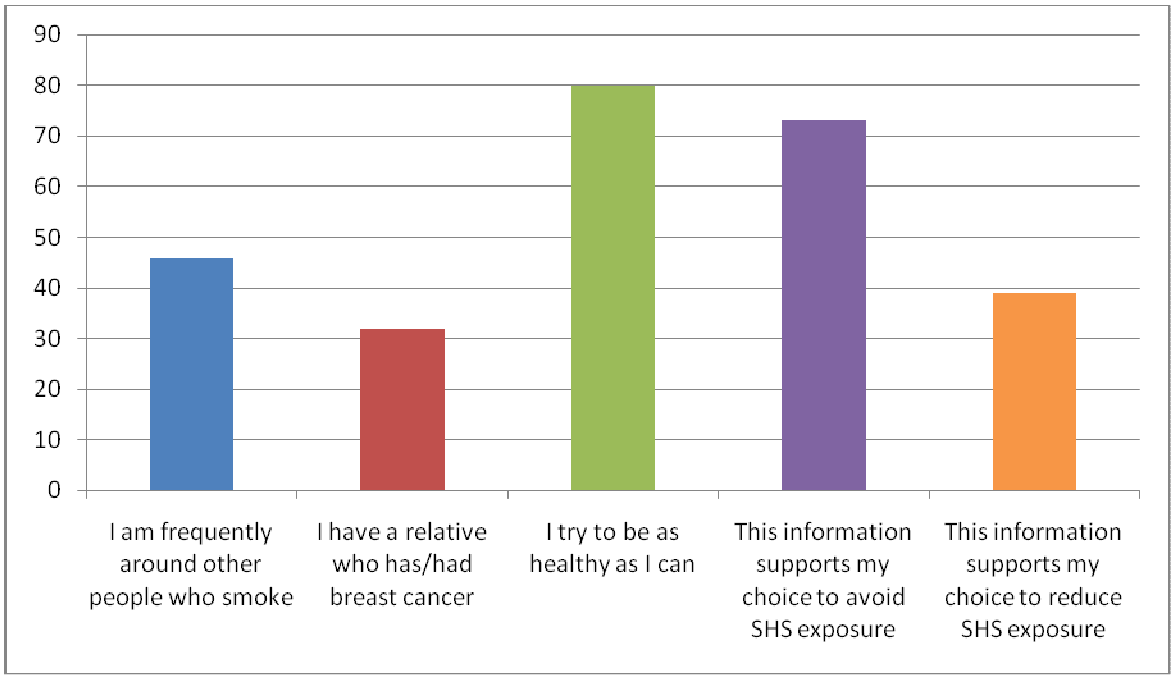

Figure 5. Frequency with which participants endorsed reasons for importance of SHS information

Factors that predicted endorsement to the above reasons related to perceived importance of SHS related to breast cancer were also explored. Women who reported exposure to SHS (i.e., every day, almost every day, at least once a week) (χ^2=23.218, n=117, p=.000) and current smokers (χ^2=21.476, n=117, p=.000) were more likely to endorse the reason *'I am frequently around other people who smoke'* than non-smokers and those exposed to SHS once per month. The reason '*I try to be as healthy as I can be'* was most likely to be endorsed by participants reporting exposure to SHS (i.e., every day, almost every day, and at least once a week) (χ^2=19.983, n=117, p=.001) and non-smokers (χ^2=13.155, n=117, p=.001). Women who reported exposure to SHS (χ^2=10.939, n=117, p=.027) and non-smokers (χ^2=34.307, n=117, p=.000) were more likely to report that *'this information supports my choice to avoid exposure to*

SHS.' The majority (66%) of current smokers reported that this information would not influence their exposure to SHS.

Smoking. Of the five reasons presented related to knowledge about active smoking and breast cancer, the most frequently endorsed reason among participants who perceived that the information on smoking and breast cancer was important was *'I try to be as healthy as I can'* followed by '*this information supports my choice not to smoke.'* The least endorsed reason was *'I have a relative who has/had breast cancer.'*

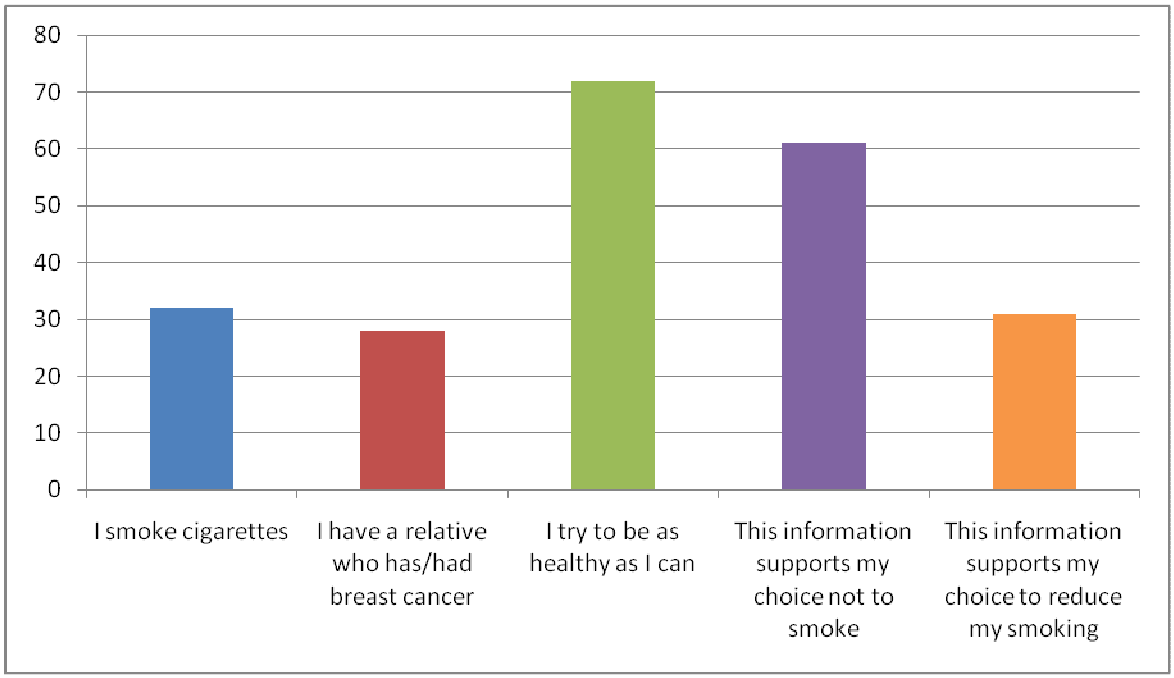

Figure 6. Frequency with which participants endorsed reasons for importance of smoking information

Factors that predicted endorsement to the presented reasons related to perceived importance of knowing about active smoking and breast cancer were explored. Young women with post-secondary training (i.e., some or completed) (χ^2=10.277, n=106, p=.036), women reporting exposure to SHS (χ^2=13.072, n=106, p=.011), and non-smokers (χ^2=8.560, N=106, p=.014) were more likely than those with a high school education to report that this information is important

because *'I try to be as healthy as I can.'* Young women reporting exposure to SHS (χ^2=20.796, n=106, p=.000) and non-smokers (χ^2=56.214, n=106, p=.000) report that *'this information supports my choice not to smoke.'*

Research Question 1.3: How interested are young women in information about smoking and SHS as risk factors for breast cancer?

Fifty five percent (n=66) of participants reported they were interested in the relationship between SHS exposure and breast cancer. Compared to teens, young adults were more likely to report interest in information about smoking and SHS as risk factors for breast cancer (χ^2= 8.521, n=115, p=.014). There were no other sociodemographic and/or background factors that were related to interest in SHS and smoking risk factor information (see Table 4).

Table 4. Interest in SHS and smoking breast cancer risk information related to sociodemographic and background characteristics

Variable	Interest in SHS info. *		No interest in SHS info. *		Statistics $\chi 2$ (df)	Interest in smoking info. **		No interest in smoking info **		Statistics $\chi 2$ (df)
	N	%	N	%		N	%	N	%	
Age					1.295 (2)					8.521 (2)
15 to 19	13	11	13	11	p=.523	9	8	14	12	**p=.014**
20 to 24	53	44.5	40	33		49	43	43	37	
Education					2.082 (4)					2.670 (4)
High School	13	11	8	7	p=.721	11	9.5	9	8	p=.614
Some post-secondary	37	31	30	25		31	27	33	29	
Completed post-secondary	16	13	15	13		16	14	15	13	
Smoking status					1.874 (2)					.336 (2)
Current smoker	22	18	24	20	p=.392	22	19	22	19	p=.845
Non-smoker	44	36	29	24		36	31	35	30	
SHS exposure					2.961 (4)					5.057 (4)
Daily or almost daily	20	16.5	15	12	p=.564	14	12	20	17	p=.282
Once a week	26	21	27	22		24	21	26	22.6	
Once a month	20	16.5	11	9		20	17	11	9.5	
Family history of BC					3.086 (2)					.482 (2)
					p=.214					p=.786
Yes	13	11	17	14		13	11	15	13	
No	53	44.5	36	30		45	39	42	36.5	

* 2 cases missing
** 6 cases missing
Note: Percentages within categories may not total 100 because of missing data

Research Question 1.4: What is the proportion of young women who express interest in information about how to reduce their risk for premenopausal breast cancer?

The majority of participants (n=95, 86%) reported that they were interested in learning about easy and effective ways to eliminate or reduce their exposure to SHS and thus reduce their risk for early breast cancer. Forty three percent (n=48) of smokers reported that they were interested in receiving information about ways to quit or reduce their smoking and thus reduce their risk for early breast cancer.

Research Question 1.5: How important do young women perceive information about reducing their chances of getting breast cancer?

Slightly over half of the participants (56%, n=62) identified that breast cancer risk reduction information was important to them. As indicated in Table 5, young adults were more likely than teens to perceive specific information about reducing the chances of getting breast cancer as important (χ^2=13.02, n=110, p=0.001). There were no other significant sociodemographic and/or background factors associated with perceived importance of risk reduction information (see Table 5).

Table 5. A comparison of sociodemographic and background characteristics affecting importance of specific information regarding smoking and secondhand smoke as risk factors for breast cancer

Variable	SHS & smoking info. important *		SHS & smoking info. not important *		Statistics χ2 (df)
	N	%	N	%	
Age					13.020 (2)
15 to 19	9	8	11	10	**p=.001**
20 to 24	53	48	37	34	
Education					3.723 (4)
High School	8	7	11	10	p=.445
Some post-secondary	36	33	25	23	
Completed post-Secondary	18	16	12	11	
Smoking status					.658 (2)
Current smoker	22	20	20	18	p=.720
Non-smoker	40	36	28	25	
SHS exposure					.592 (4)
Daily or almost daily	18	15	14	11.5	p=.964
Once a week	27	22	21	17	
Once a month	17	14	13	11	
Family history of BC					2.093 (2)
Yes	12	11	15	13.6	p=.351
No	50	45	33	30	

* 11 cases missing

Note: Percentages within categories may not total 100 because of missing data

Participants were also asked to rate how important they think it is for their peers to know about how to reduce their chances of getting breast cancer. Most participants (82%, n= 90) reported that they think this is important. Young adults were more likely than teens to perceive peer knowledge of risk reduction behaviour as important (χ^2=12.574, n=110, p=.002). Although not a significant relationship, those with a family history of breast cancer were more likely to report increased importance of peer risk reduction knowledge than those women without a family history of breast cancer (χ^2=5.525, n=110, p=.063).

Table 6. Sociodemographic and background characteristics affecting perceived importance of peer knowledge of risk reduction techniques

Variable	Risk reduction info. Important *		Risk reduction info. not important *		Statistics $\chi 2$
	N	%	N	%	
Age					12.574 (2)
15 to 19	15	12	5	4	**p=.002**
20 to 24	75	62	15	12	
Education					2.836 (4)
High School	14	13	5	4.5	p=.586
Some post-secondary	51	46	10	9.1	
Completed post-Secondary	25	23	5	4.5	
Smoking status					5.121 (2)
Current smoker	30	27	12	11	p=.077
Non-smoker	60	54.5	8	7	
SHS exposure					1.308 (4)
Daily or almost daily	26	24	6	5.5	p=.860
Once a week	38	34.5	10	9	
Once a month	26	24	4	3.6	
Family history of BC					5.525 (2)
Yes	18	16	9	8	p=.063
No	72	65	11	10	

*11 cases missing
Note: Percentages within categories may not total 100 because of missing data

Research Question 1.6: Is there a relationship between level of interest in this risk information related to tobacco exposure and breast cancer, and background factors (i.e., age, education, current smoking status, current exposure to SHS, family history of breast cancer)?

As indicated in previous research questions, there is a relationship between participant age and most indicators of interest in risk information (i.e., perceived importance and perceived interest in risk information and risk reduction information). There are no overall significant differences between other sociodemographic and/or background factors (i.e., education, current smoking status, SHS exposure, and family history of breast cancer) in level of interest in risk information.

Aim 2: Identify predictors of behavioural intent in the motivational phase of the adapted HAPA model

Research Question 2.1: What proportion of young women report intentions to change their exposure to tobacco based on information provided about smoking, SHS, and breast cancer?

The majority of participants (n=92, 77.3%) identified that information about SHS as a risk factor for breast cancer would lead them to consider reducing their exposure to SHS. Smokers were divided as to whether this information would make lead them consider changing their smoking behaviours, with 43% (n=18) of female smokers reporting that they may consider changing their smoking behaviours after receipt of smoking and breast cancer risk information.

Research Question 2.2: Do background factors (i.e., age, education, ethnicity, current smoking status, exposure to SHS, family history of breast cancer) predict intention to change tobacco exposure behaviours following receipt of risk information regarding smoking, SHS and breast cancer?

Young women in both age groups indicate that receipt of breast cancer risk information related to smoking would not make them consider changing their smoking behaviours (χ^2=9.773, n=115, p=.008). Non-smokers also identified that their smoking behaviours would not change following receipt of this risk information (χ^2=19.443, n=115, p=.000). According to chi-square analysis, no other background factors (i.e., education, ethnicity, exposure to SHS, family history of breast cancer) predicted intention to change tobacco exposure behaviours following receipt of risk information.

Aim 3: Describe young women's perceived barriers and preferred messaging strategies about tobacco exposure as a risk factor for breast cancer.

Research Question 3.1: What are young women's perceived barriers to raising awareness about tobacco exposure as a risk factor for breast cancer?

The frequency of participants who endorsed barriers to messaging is presented in Figure 7. The most frequently endorsed barriers by participants were *'young women aren't motivated to find out this information on their own'* and '*young women in my age group don't think about the long-term'* followed by *'there are so many messages already about smoking and SHS.'* Some participants also identified a number of 'other' barriers, including: "*women my age don't think they will get breast cancer … it is something older women get"*, "*information like this doesn't get released ... or hardly advertised to women"*, and *"high stress lifestyles make it hard to contemplate or plan for smoking cessation"*.

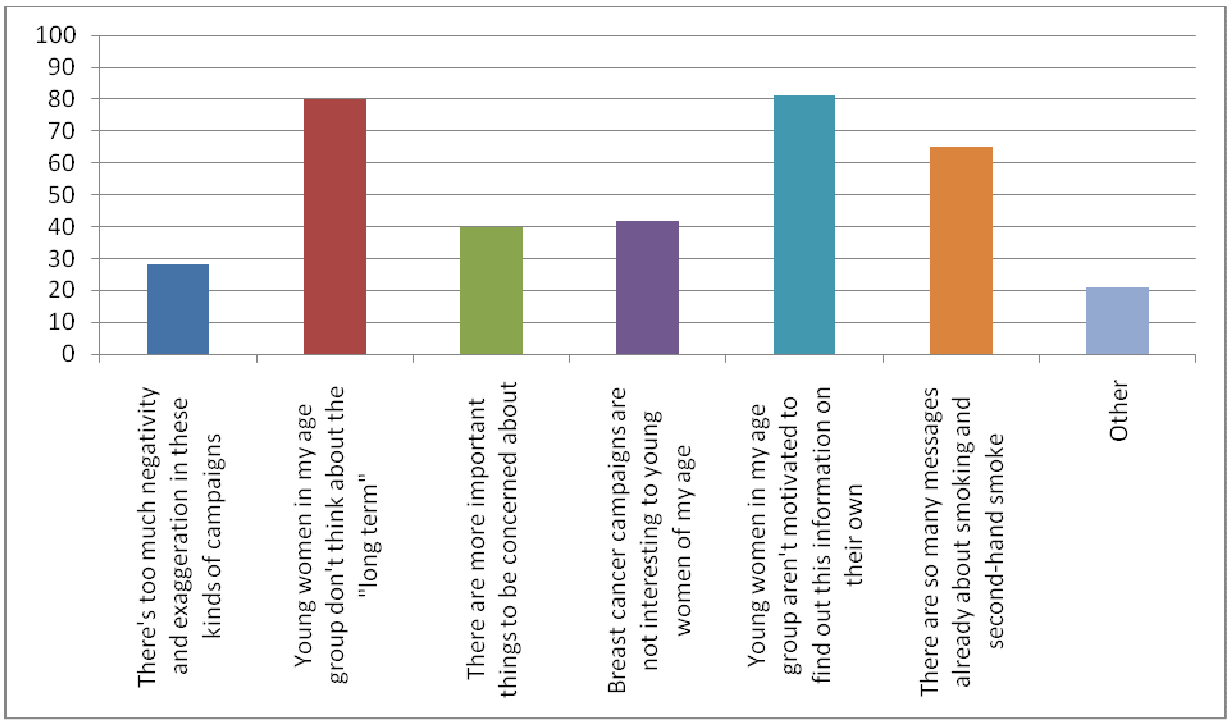

Figure 7. Frequency of participants endorsing perceived barriers to tobacco and breast cancer risk messaging

Factors that predicted endorsement of each of the listed barriers were also examined.

Age. Age was a significant predictor for endorsing a number of the barriers (see Figure 8). Young adults were more likely than teens to endorse the following barriers to messaging: *'there's too much negativity and exaggeration in these kinds of campaigns'* (χ^2=15.121, n=109, p=.001)*;* 'y*oung women in my age group don't think about the long term'* (χ^2=15.118, n=109, p=.001)*; 'there are more important things to be concerned about like school, my social life, and my future'* (χ^2=15.357, n=109, p=.000); 'y*oung women in my age group aren't motivated to find out this information on their own'* (χ^2=17.417, n=109, p=.000); '*breast cancer campaigns are not interesting to young women of my age group'* (χ^2=16.720, n=109, p= .000); and '*there are so many messages already about smoking and SHS'* (χ^2=16.684, n=109, p=.000).

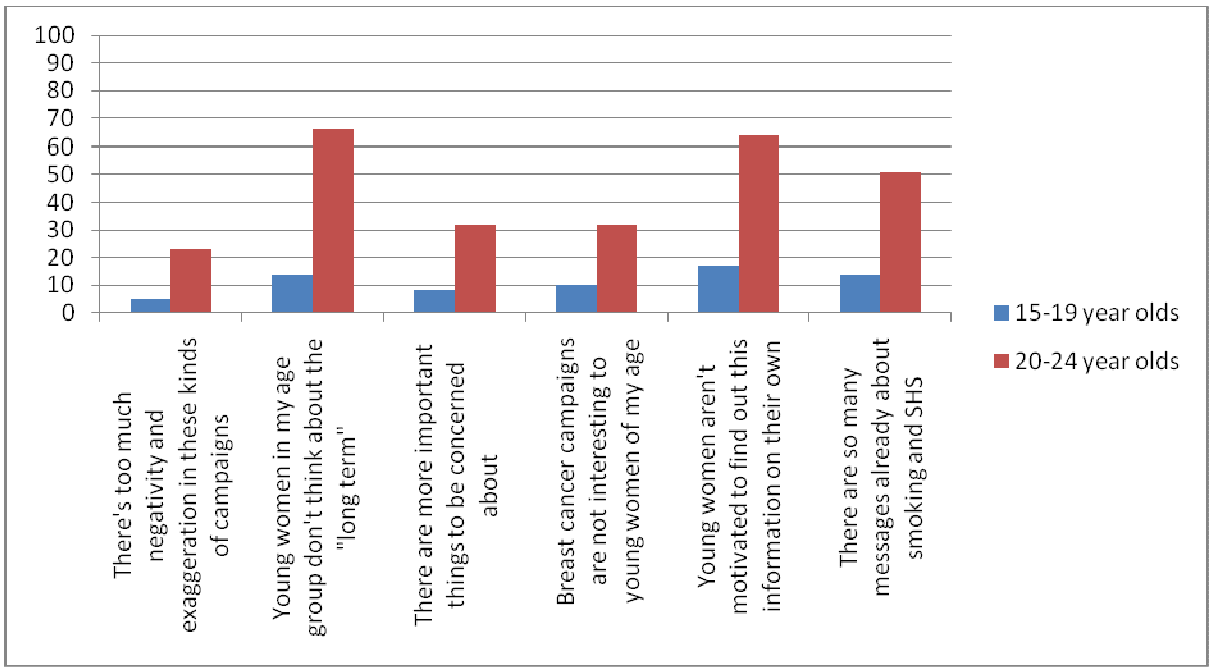

Figure 8. Frequency by age group of participants endorsing perceived barriers to tobacco and breast cancer messaging

Smoking status. Current smokers were more likely than non-smokers/ex-smokers to identify '*there's too much negativity and exaggeration in these kinds of campaigns'* as a barrier to messaging (χ^2=7.849, n=109, p=.020).

Research Question 3.2: What do young women identify as preferred messaging strategies to raise awareness about tobacco exposure as a risk factor for breast cancer?

Perceived effectiveness of the presented messaging strategies is presented in Table 7. Messaging strategies rated as most effective by participants were '*hearing about it from a breast cancer survivor*' and '*hearing about it from peers.'* Those rated as least effective included '*using print ads* ', '*health warnings on cigarette packages*', and '*putting information on internet websites*.'

Table 7. Ratings of the effectiveness of messaging strategies for communicating information about tobacco exposure as a risk factor for breast cancer

Option	Not effective	Somewhat effective	Very effective	Response Count
Hearing about it from teachers	**(55%) 60**	(30%) 33	(15%) 16	109
Hearing about it from peers	(11%) 12	(27.5%) 30	**(61%) 67**	109
Hearing about it from a breast cancer survivor	(2.7%) 3	(15%) 16	**(83%) 90**	109
Hearing about it from mothers	(33%) 36	(29%) 32	**(38%) 41**	109
Including it in a health and education curriculum	(26%) 28	**(38.5%) 42**	(36%) 39	109
Using TV ads	(35%) 38	**(36%) 40**	(29%) 32	110
Using print ads (e.g., brochures & posters)	**(57%) 62**	(27.5%) 30	(16%) 17	109
Putting information on internet websites	**(49%) 54**	(24%) 26	(27%) 30	110
Using messaging campaigns (e.g., t-shirts, ribbons, wristbands)	**(35%) 38**	(33%) 36	(31%) 34	108
Health warnings on cigarette packages	**(54%) 59**	(21%) 23	(25%) 28	110
Using celebrity endorsements	**(40%) 44**	(31%) 34	(28%) 31	109
Using social networking sites (i.e., Facebook)	**(35%) 38**	(33%) 36	(33%) 36	110
Other	-	-	-	8

Note: Bolded cells indicate, per strategy, the rating that received the highest number of responses.

Factors predicting perceptions of the effectiveness of messaging strategies were also examined.

Age. Young adults were more likely than teens to endorse the following messaging strategies as effective: '*hearing about it from a breast cancer survivor'* (χ^2=13.862, n=109, p=.003); '*hearing about it from peers*' (χ^2=12.024, n= 109, p=.007); '*hearing about it from teachers'* (χ^2=13.590, n=109, p=.004); *'including it in a health and education curriculum'* (χ^2=12.388, n=109, p=.006); *'hearing about it from mothers'* (χ^2=12.864, n=109, p=.005); '*using TV ads*' (χ^2=18.288, n=110, p=.000); '*using print ads'* (χ^2=14.689, n=109, p=.002); '*putting information on internet websites'* (χ^2=17.175, n=110, p=.001); '*using messaging campaigns*' (χ^2=18.973, n=108, p=.000); '*health warnings on cigarette packages*' (χ^2=14.217, n=110, p=.003); '*using celebrity endorsements*' (χ^2=10.451, n=109, p=.015); '*spreading the word through social networking sites*' (χ^2=14.455, n=110, p=.002).

Education. Participants who completed post-secondary education and those who had completed some post-secondary education identified '*hearing about it from peers'* as an effective messaging strategy (χ^2=16.098, n=109, p=.013).

4.3 Summary

The study sample was described and the findings were presented in this chapter. The findings highlight young women's interest in tobacco exposure as a risk factor for breast cancer. Perceptions regarding potential barriers to and strategies for messaging that young women described were reported. Key findings from this study, limitations of the study, and recommendations for research, practice and policy will be discussed in the following chapter.

5 DISCUSSION

This study examined factors that are associated with young women aged 15 to 24 years old as a target audience for health messaging about tobacco exposure as a risk factor for premenopausal breast cancer. Understanding young women's perceptions of risk information is crucial to creating effective public health campaigns to reduce women's risk of tobacco-related premenopausal breast cancer. This study extends previous research documenting young women's response to information about the risk between active smoking and secondhand smoke and premenopausal breast cancer (Bottorff et al., 2010; Haines et al., 2010). The findings indicate that young women perceive this information as important and interesting, and are interested in reducing their risk of tobacco-related breast cancer. Several key findings and limitations are discussed in this chapter. A critique of the selected model is presented. Recommendations for research, practice, and policy are also highlighted.

5.1 Summary of findings

Study participants indicated that information about both smoking and SHS as risk factors for breast cancer were important and of interest to them at this stage in their life. Interest in this information was supported by a desire to stay as healthy as possible. Participants were interested in learning about how to reduce their risk for tobacco-related premenopausal breast cancer. Age was found to be an important factor influencing young women's perceptions, with young adults holding more favourable attitudes towards information about breast cancer and smoking than teens. Participants identified several potential barriers to messaging (i.e., 'young women aren't motivated to find out this information on their own' and 'young women in my age group don't think about the long-term') and strategies to messaging (i.e., 'hearing about it from a breast

cancer survivor' and 'hearing about it from peers'). Selected key findings will be discussed in this chapter.

5.2 The HAPA model

The present study was guided by the motivational phase of the HAPA model with the addition of socio-demographic and background factors (i.e., current smoking status, exposure to SHS, and family history of breast cancer) to account for the influence of these factors on motivation. Overall, the results suggest that background factors examined in this study, except for possible influence of age, do not predict intention to change tobacco exposure behaviours following receipt of risk information. This could be because the background factors utilized in the present secondary analysis were not tested with ideal HAPA-specific measures of outcome expectancy and self-efficacy. The adapted HAPA model used in this study addresses common criticisms of the HAPA model. The model is criticized for neglecting the role that emotion may play in health behaviours, and considering social and environmental influences as cognitions rather than factors directly affecting one's behaviour. It is recommended that HAPA-specific constructs be included in future research with the aforementioned background factors to assess the adapted model's potential to enhance our understanding of the motivational stage of health behaviour, and guide efforts to motivate behaviour change.

5.3 Perceived importance of and interest in risk information

Most participants indicated that information about both smoking and SHS as risk factors for breast cancer was important to them at this stage in their life. This finding is supported in previous work by Team Shan, where young women responded to survey questions following a breast cancer public awareness campaign (Team Shan, March 2011). The majority of participants in Team Shan's campaign also indicated that receiving information and education about their

risk for premenopausal breast cancer was important (Bottorff et al., 2010; Team Shan, March 2011). Participants in the present study indicated that this information is important to them because of their desire to be healthy, and therefore the risk information supports efforts to avoid SHS and not to smoke. This interest in staying healthy should be considered when designing health messages. Positive "healthy girl" messages that validate young women's health promotion efforts and worldview have been found to enforce self efficacy and healthy coping skills (Curbow et al., 2007). Others have recommended that tobacco reduction initiatives for young women also include supportive messages for how to deal with stressors and negative emotions without smoking, reinforcement of refusal skills, and ways to withstand social pressures to be exposed to tobacco (Curbow et al., 2007).

The majority of young women in this study also reported that they were interested in the relationship between SHS exposure and breast cancer, and smoking and breast cancer. Expressed interest in this information suggests that there is potential for delivering health messages and programs regarding breast cancer and smoking that are targeted toward young women. Accordingly this represents a potentially important opportunity to reduce risk and decrease the incidence of breast cancer. Participants' relatively high level of interest in breast cancer and tobacco-related risk factors is likely a direct reflection of the prevalent breast cancer awareness campaigns in North America and the consumerism promoted around this disease (Bottorff et al., 2010). Young women who indicated that this information is neither important nor interesting could be influenced by breast cancer campaigns that may be inconsistent and potentially misleading in communicating information about breast health risks (Haines et al., 2010). Researchers report that this may stem from mixed or conflicting health information which overestimates certain breast cancer risk factors while neglecting others, as well as ambiguous

portrayal of risk factors (Atkin et al., 2008; Haines et al., 2010). This inconsistency is thought to contribute to women's general lack of awareness of the nature of breast cancer risk, lower self-efficacy related to reducing one's breast cancer risk, and perceptions that messages are irrelevant (Atkin et al., 2008; Peacey, Steptoe, Davisdottir, Baban, & Wardle, 2006).

Young adults were more likely than teens to perceive risk reduction information as important. This age difference in perceptions may be because breast cancer and its modifiable risk factors (i.e., weight, diet, and physical activity) are usually communicated as distal in nature. Research consistently demonstrates that the salience of messages linking SHS and smoking to future health consequences does not resonate strongly with younger adolescents (Byrne & Mazanov, 2005; Steinberg, 2007). Therefore, messages that emphasize the more immediate effects of tobacco exposure (i.e., early breast cancer, appearance) instead of longer-term effects (i.e., breast cancer in later life, lung cancer) may more effectively engage younger adolescents in attending to prevention messages (Johnson, Jones, & Iverson, 2009; Silk et al., 2006; Volkman & Silk, 2008).

5.4 Importance of and interest in risk reduction

Slightly over half of the participants identified that breast cancer risk reduction information is important to them, with the majority of young women also reporting that they think it is important for their peers to know about how to reduce their chances of getting breast cancer. Most reported that they were interested in having information to reduce their exposure to SHS, and thus reduce their risk for early breast cancer, if the information was presented in a way that gave them options within their current lifestyles. Further, 43% of smokers stated they are interested in information to help them quit/reduce their smoking, if this information was presented in a way that gave them feasible options. These results clearly indicate that young

women are receptive to receiving health-related information that provides them with choices (e.g., specific health promotion strategies) so they can make their own decisions (Johnson et al., 2009). Others have also recommended that such interventions promote self-efficacy by supporting risk-reduction skill building that includes benefits women value (i.e., the new behaviour being marketed should be easy, fun, trendy, and/or fashionable) (Johnson et al., 2009; Volkman & Silk, 2008).

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5.5 Intent to change tobacco exposure

The majority of participants identified that receiving information about SHS as a risk factor for breast cancer may lead them to consider reducing their exposure to SHS. Favourable attitudes toward reducing SHS exposure may be influenced by policies that have extended smoking restrictions to include all public venues, and in doing so have raised community awareness about the health effects of SHS, and made it easier and possibly for more acceptable for people to avoid SHS. However, in some contexts young women may find it difficult to control their exposure to SHS (e.g., if parents smoke in the home). Providing young women with

ways to reduce their exposure to SHS (e.g., what to say to smokers) will be important to enhance their self-efficacy and refusal skills.

Among current smokers, women were divided as to whether information about tobacco smoke and breast cancer would lead them to consider changing their smoking behaviours, with approximately half of smokers reporting that they may consider changing their smoking behaviours after receipt of smoking and breast cancer risk information. Numerous studies have shown that smokers and non-smokers alike are aware of the health implications of smoking (Tilleczek & Hine, 2004). Typically young women who smoke are less concerned with the long-term health risks of smoking than non-smokers (Nichter, Nichter, Vuckovic, Quintero, & Ritenbaugh, 1997), perhaps influencing the ambivalent responses related to intent to change smoking behaviours. There are protective factors that promote preventative health behaviours among young women who smoke. These include personal competence, life and values orientation, high academic competence and aspirations, and being future oriented (Piko, Luszczynska, Gibbons, & Tekozel, 2005). In Piko et al.'s study (2005) approximately half of the smokers indicated that they may consider changing their smoking behaviours, and these participants may be more likely to possess these protective factors than smokers who reported no intent to change.

5.6 Barriers and strategies to messaging

5.6.1 Barriers

The most frequently endorsed barriers to increasing awareness among participants about smoking as a risk factor for early breast cancer were *'young women aren't motivated to find out this information on their own'* and '*young women in my age group don't think about the long-term'* followed by *'there are so many messages already about smoking and SHS'*. These

findings are echoed in Parent Action on Drugs' '*Check it Out'* survey of young women regarding lifestyle risk factors for breast cancer (Parent Action on Drugs, October, 2006). Based on findings from the 'Check it Out' survey, the authors concluded that messaging campaigns need to utilize modalities that young women already access, such as social media (i.e., Facebook) and television, to ensure they are exposed to the message. Indeed, there is accumulating evidence that utilizing a broad range of communication channels strengthens message dissemination (Johnson et al., 2009). Again, messages promoting the short-term effects of tobacco exposure (i.e., appearance, smell of cigarette smoke) rather than long-term effects may be effective in motivating young women to consider their breast health (Byrne & Mazanov, 2005; Johnson et al., 2009; Steinberg, 2007).

Some participants also identified a number of 'other' barriers, including: "*women my age don't think they will get breast cancer … it is something older women get"*, "*information like this doesn't get released ... or hardly advertised to women"*, and *"high stress lifestyles make it hard to contemplate or plan for smoking cessation".* The direct involvement of young women in developing health promotion messages and including their voices has shown promising results when developing messages tailored to this population (Bottorff et al., 2010; Parent Action on Drugs, October, 2006; Team Shan, March 2011). As a result, the input of this study's participants may be helpful in developing age-appropriate messages that will resonate with other young women.

Current smokers were more likely than non-smokers/ex-smokers to identify '*there's too much negativity and exaggeration in these kinds of campaigns'* as a barrier to messaging. Role expectations and social influence are powerful in promoting or inhibiting behaviour change (McBride, Emmons, & Lipkus, 2003). Smokers may be more committed to their role as a smoker

and/or the norm of smoking, and therefore feel a greater sense of obligation to avoid or minimize smoking risk information, thus influencing the uptake of these messages (McBride et al., 2003). However, as Bottorff et al. (2010) found in their focus group study, young women indicated they would be motivated to change their smoking behaviours to protect the health of their friends. Since friends are very important to teens and young women, this may be useful designing messages to motivate changes in smoking behaviours.

5.6.2 Strategies

Participants were asked what would be the best way to raise awareness about the links between SHS, smoking, and premenopausal breast cancer. Strategies young women rated most effective to getting the message out were '*hearing about it from a breast cancer survivor*' and '*hearing about it from peers'*. These findings support previous research, and suggest that these strategies are effective in raising awareness of tobacco as a risk factor for breast cancer (Bottorff et al., 2010; Team Shan, March 2011). Health messaging that represents real women's stories and images could potentially be helpful for young women who hold misconceptions about breast cancer being a disease of older women, or those women who have difficulty recognizing their risk because of their developmental stage and positioning of health risks as future-oriented (Bottorff et al., 2010; Silk et al., 2006; Team Shan, March 2011). Narratives and images also facilitate message recall and comprehension, and provide identification with characters by creating an emotional response (Niederdeppe et al., 2008). Throughout adolescence and into young adulthood, peers become increasingly important influences in the lives of young women (Steinberg, 2007). Therefore, the positioning of peers as a channel through which to transmit health messages may be helpful. Targeting peer groups with this risk information may ultimately lead to changing tobacco-related behaviour of others and altering tobacco-related norms of the

group (Johnson et al., 2009). Interestingly, it was young adults with post-secondary education (i.e., some or completed) who endorsed '*hearing about it from peers'* as an effective messaging strategy. This perhaps reflects their new social context in which the influence of family members is diminishing, while the role peers play simultaneously becomes more important in these young women's daily lives.

Strategies that young women rated as least effective include '*using print ads* ', '*health warnings on cigarette packages*', and '*putting information on internet websites*'. Young women's perceived lack of effectiveness of print materials is echoed in research completed in Team Shan's Breast Cancer Awareness and Education Project (Team Shan, March 2011). Interestingly, young women in Team Shan's 2011 evaluation project reported that they prefer using interactive internet (i.e., Facebook and other social media sites) over print materials, representing a change from their 2008 survey when print materials were preferred to interactive media. Interactive social media as a modality to connect with others and share information has grown increasingly popular among young women in recent years. As recruitment of this study was conducted in 2008-2009, it can be expected that should this survey be conducted again the use of social media may be rated more favourably by participants as a potentially effective messaging strategy.

5.7 Age

There is a relationship between participant age and most indicators of interest in risk information (i.e., perceived importance and perceived interest in risk information and risk reduction information), as well as barriers and strategies to messaging. As such, it is important to consider age when developing tailored messages that target teens and young adults.

While one's socioemotional networks[7] become active during puberty, cognitive control networks[8] develop gradually over a longer period of time (Steinberg, 2007). In particular, the prefrontal cortex, an area involved in critical thinking and decision making, does not fully develop until the mid-twenties (Lopez, Schwartz, Prado, Campo, & Pantin, 2008; Steinberg, 2007). Adolescent brain maturation facilitates the acquisition of more sophisticated cognitive and perceptual understanding of adolescent environments (Lopez et al., 2008). As a result, younger adolescents do not develop the ability to inhibit responses in a consistent manner until late adolescence/early adulthood. In particular, when in the presence of peers or in conditions of emotional arousal, the socioemotional network becomes sufficiently activated to diminish the regulatory effectiveness of the cognitive control networks (Steinberg, 2007). This provides a possible explanation for why adolescents are more vulnerable to peer pressure and engage in risk-taking behaviours, such as smoking and SHS exposure, throughout adolescence. Indeed, Lopez et al. (2008) found that adolescents aged 15-18 years old engaged in more risk taking behaviour than those aged 11-14 (Lopez et al., 2008; Steinberg, 2007). Throughout adolescence, teens are developing their ability to engage in decision making, reason and think logically, and process emotional information (Lopez et al., 2008). Researchers have demonstrated that adolescents overestimate the extent their peers' use substances and engage in risky behaviours, and underestimate consequences to substance abuse, leading to a sense of invulnerability to negative outcomes (Lopez et al., 2008; Steinberg, 2007). Decisions to smoke and/or be exposed to SHS takes place in emotionally charged situations and/or peer pressure environments, further undermining adolescents' ability to make healthy decisions (Lopez et al., 2008; Steinberg, 2007). Given these neurocognitive and social-ecological risks, it may not be reasonable to expect

[7] Networks that are sensitive to social and emotional stimuli (Steinberg, 2007).
[8] Networks that serve executive functions such as planning, self-regulation, and thinking ahead (Steinberg, 2007).

adolescents to make rational decisions about risk behaviours. These developing neurological networks suggest that cognitive messaging to teens may be less effective than to young adults. Social influences such as peers that smoke and parental smoking in the home also strongly influences the decisions of teens and young adults. It is important to consider these social influences when developing health messages, as is discussed later in this paper. The findings of this study provide some directions for developing and disseminating developmentally appropriate messages to young women about their increased risk for premenopausal breast cancer related to tobacco exposure.

5.8 Limitations

Recruitment strategies resulted in a convenience sample of 121 eligible participants who completed the survey. The sample was limited in terms of ethnic, socioeconomic status, and educational diversity, and as such not all levels were well represented. The use of internet-based recruitment and data collection strategies may have been a factor in limiting the diversity of the sample. Media coverage of this study was received at various media outlets in Kelowna, British Columbia, a region in Canada with a predominantly Caucasian, middle-class population. Recruitment ads were distributed by stakeholder agencies with an interest in women's health related to breast cancer and/or tobacco. Therefore participants may have a vested interest in issues related to the focus of the survey and may not be representative of the average 15-24 year old Canadian female.

The server of the online survey data tool used, SurveyMonkey, is located in the USA. UBC privacy policies prohibit collection of identifying information when data is stored out of Canada. Therefore, no identifying information could be collected and incentives for participation were thus limited, likely contributing to the limited response rate.

Because of the cross-sectional nature of this study it is not possible to determine whether risk perceptions motivate behavioural expectancies over time (Halpern-Felsher & Rubinstein, 2005). A longitudinal study is needed to examine young women's behavioural and perceptual changes regarding tobacco exposure as a risk factor for breast cancer and to evaluate the effect of these changes in the volition phase.

Other limitations of concern are related to constraints in conducting a secondary analysis using an existing data set. A clear constraint of performing secondary analysis is not having control over what questions are asked or how they are posed. Since the online survey was not designed to answer the specific research questions proposed for this study, some variables were not available for analyses. Measures of the HAPA constructs of outcome expectancy and self-efficacy used in this study were not ideal. Lastly, some of the analyses in the present research did not produce large enough sample sizes (i.e., cell sizes greater than five) to produce robust results. As such, data was aggregated for many of the chi-square analyses. Type II errors, whereby an effect may exist but may be too modest to detect with small sample size, may therefore be possible. However, this was an exploratory study and the results contribute to understanding of young women as a target audience for health messaging about tobacco exposure as a risk factor for breast cancer.

5.9 Sex and gender-based analysis

Sex and gender both affect women's and men's exposure to tobacco. *Sex* refers to biological characteristics such as hormones, chromosomes, anatomy, and physiology (Dell & Poole, 2009; Greaves & Hemsig, 2009). Gender refers to the social constructions of, and influences on, what it means to be male or female including roles and relationships, personality

traits, attitudes, behaviours, and values (Dell & Poole, 2009; Greaves & Hemsig, 2009). These are fluid concepts influenced by cultural, social, and temporal factors.

There is a growing body of evidence that describes gender influences on tobacco behaviours. Psychosocial benefits and functions of smoking differ for males and females. Females often report that they use smoking to manage emotions, suppress appetite, control weight, gain autonomy from parents, and to foster peer acceptance (Alexander, Frohlich, Poland, Haines, & Maule, 2010; Curbow et al., 2007; Greaves, 2007; Seguire & Chalmers, 2000).Women's SHS exposure patterns are also gendered, with women often being exposed to SHS in the workplace and at home. It is important to understand that multiple determinants of health compound and intersect with sex and gender, and are therefore necessary to understand women's unique experiences of tobacco behaviour as well as to develop prevention programs and interventions that are gender-sensitive (Bekker, 2003; Nowatski & Grant, 2011). As such, this study uses a gender-based lens to frame implications and recommendations.

5.10 Implications

Considerable evidence exists to support gender- and age-sensitive approaches to prevention, treatment, research, and policy (Dell & Poole, 2009). All research, policy, and practice should entail sex- and gender-based analysis to ensure appropriate health care policies and programming, reduce health inequities, and reduce health care expenditures (Nowatski & Grant, 2011). The implications of the study findings for research, policy, and practice will be discussed in the following sections.

5.10.1 Research implications

There have been virtually no efforts to develop messaging strategies to raise the awareness of young women about current evidence regarding smoking and SHS exposure as risk

factors for premenopausal breast cancer, and about breast health practices (Haines et al., 2010). The findings of this study can be used to guide this work and evaluations of these efforts. The direct involvement of young women in developing health promotion messages and including their voices has shown promising results when developing tailored messages (Bottorff et al., 2010; Parent Action on Drugs, October, 2006; Team Shan, March 2011). There is a need to ensure that interventions promote self-efficacy and highlight how healthy choices can fit into young women's current lifestyles, including offering specific strategies for how to do so (K. M. Johnson et al., 2009). Evidence demonstrates that a multifaceted approach delivered through numerous information channels will be most effective in disseminating risk reduction messages (Johnson et al., 2009; Lopez et al., 2008; Terre, 2009). It is recommended that further research be undertaken to gain a richer understanding of this target audience for health messaging, including their self interests, motivators, and barriers (Johnson et al., 2009). Qualitative and quantitative research methods are needed to capture the complexity of women's experiences (Nowatski & Grant, 2011).

5.10.2 Policy and practice implications

The findings of this study also have implications for policy and practice. Despite considerable declines in smoking prevalence levels of the general population, smoking has increasingly become concentrated among socially and economically disadvantaged populations (Alexander et al., 2010; Greaves, 2007; Moore, McLellan, Tauras, & Fagan, 2009). This subset of the population includes those with lower education levels, lower income levels, those in working class occupations, and women (Alexander et al., 2010; Moore et al., 2009). Women's smoking rates are declining at a slower rate than that of men's, and in some countries the smoking rates among young women have surpassed that of young men (Alexander et al., 2010;

Greaves, 2007). Adolescence and young adulthood is a time of exposure to new social influences and life transitions (i.e., starting college/university, working increased hours, new living arrangements), as well as increased smoking uptake among women (Graham, 2009). This developmental period may provide the context for teachable moments, providing an opportune time for promoting health and wellness and to encourage individuals to adopt risk-reducing health behaviours (McBride et al., 2003). Developing policies and practice recommendations to address women's tobacco exposure behaviours requires an examination of macro-, meso-, and micro-level contexts. These three levels interact and overlap within the context of women's lives. Macro level refers to broad, social structural influences, including social values and norms; meso level refers to social organizations (i.e., workplace, educational settings) and the interpersonal context; and micro level refers to the individual level influences.

5.10.2.1 Macro and meso-level implications

At the macro level, the results of this study contribute to increasing efforts to minimize young women's exposure to smoking and SHS, and potentially reduce their risk for development of premenopausal breast cancer. Young women indicated that they perceive this risk information as important and interesting, and reported that they are interested in learning how to reduce their risk for developing breast cancer. This suggests that knowledge of this risk factor for breast cancer may enhance young women's receptivity to tobacco reduction and cessation support. Continued support is needed for broad-based tobacco control policies to provide smoke-free environments to enable young women to reduce their exposure to SHS, and public awareness campaigns about the link between tobacco smoke and breast cancer to encourage others to take action to protect young women from SHS.

At the meso level, women must be supported in their efforts to reduce exposure to SHS by supporting smoke-free spaces.. Policies should be developed that ensure integration of young women's views, while sharing expertise and resources with employee and student groups, unions, community members, and other stakeholder organizations (i.e., women's health centres) (Greaves, Vallone, & Velicer, 2006; Johnson et al., 2009). Smokers in young women's social networks also need to be encouraged to avoid exposing young women to SHS. Policies and practice must be aimed at supporting families to develop and enforce home smoking restrictions to reducing/eliminating smoking in the home. Evidence demonstrates that home-based smoke free policies may contribute to smoking reduction and higher rates of smoking cessation among women.

Domestic power differentials between men and women may limit women's agency and ability, particularly that of young women, to control their home environment and the smokers in it (Alexander et al., 2010; Greaves & Jategaonkar, 2006; Moore et al., 2009). Regardless of their smoking status, women are directly affected by male smoking in the home, through exposure to SHS, diversion of income to tobacco purchases, and premature loss of earning power of family members due to tobacco-related illness (Greaves, 2007). As such, men must also be messaged about the potential effect of their tobacco use on women's breast health. The health warnings on cigarette packages do not contain information about smoking and breast cancer. This may be one important way to raise awareness among all smokers of the importance of protecting young women from SHS.

5.10.2.2 Micro-level implications

At the individual level, practitioners can intervene with young women to explore attitudes and beliefs around smoking and its health effects. The influential attributes of peers and groups

can be addressed, debunking stereotypes and myths, and reframing attributes (i.e., the "cool smokers") to more health-conscious messages (i.e., framing non-smokers as being more mature and independent by choosing not to smoke). Ultimately, the aim of interventions at the individual level is to increase young women's self-efficacy in their ability to change their smoking and protect themselves and others from SHS.

Smoking cessation for young women can be achieved at multiple levels. Multiple contexts (i.e., community, school, family, intrapersonal and interpersonal relations) can be addressed by media campaigns, community activities, task forces, and parent education (Lopez et al., 2008). These components address several risk and protective factors for adolescent tobacco use (i.e., efficacy to resist, functional meaning of use, peer influence, norms re: tobacco, and community access), and is beneficial to teen and young adult smoking cessation (Lopez et al., 2008). Smoking cessation programs and services that engage young women directly are also crucial. Evidence demonstrates that young women are receptive to many smoking cessation modalities such as: counselling (i.e., individual, group, telephone); psychoeducational programming (i.e., workshops, print material, self-help booklets) that promote problem solving, stress management, relapse prevention, and problem solving skills; talking to a healthcare provider; and, nicotine replacement therapy (i.e., gum, patch) (Backinger, 2003). It is important to ensure that these methods of smoking cessation be age- and gender-sensitive to be as effective and engaging as possible for teens and young adults.

5.11 Conclusion

Smoking and SHS exposure among young women is a significant health concern because it raises risk for developing tobacco-related illness later in life, including breast cancer. While increased tobacco control measures in recent decades have reduced the overall prevalence of

smoking and SHS exposure in Canada, rates of SHS exposure among youth are still high. There is a narrowing gap in smoking rates between men and women, and a reversal of traditional smoking trends between girls and boys. Adolescence and young adulthood is a critical period when the majority of tobacco experimentation and uptake occurs. It is important, therefore, to understand young women's perceptions of smoking and SHS exposure during this critical time period. Because most other established risk factors for breast cancer are not amenable to modification, reducing tobacco exposure may offer one of the few opportunities to prevent and reduce breast cancer incidence. Increasing efforts in research, policy, and practice is crucial for raising awareness among young women about tobacco exposure as a modifiable risk factor for breast cancer. Expressed interest in and perceived importance of information about smoking and SHS as risk factors for breast cancer suggests that there is real potential for effectively delivering health messages and programs that are targeted to reducing exposure to SHS and active smoking in young women to reduce their chances of developing breast cancer.

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APPENDICES

Appendix A

Letter of Introduction

THE UNIVERSITY OF BRITISH COLUMBIA

OKANAGAN

Centre for Healthy Living and Chronic Disease Prevention
3333 University Way
Kelowna, B.C. V1V 1V7
Tel: 250-807-8627
Fax: 250-807-8090
E-mail: joan.bottorff@ubc.ca

November 3, 2008

Dear _____:

RE: Online survey for young women

I am writing to request your organization's participation in dissemination of an online survey for young women aged 15-24. The purpose of the survey is to understand young women's information needs regarding breast cancer, smoking, and secondhand smoke. Our research team has identified your organization as one with a stake in young women's health, and your participation will contribute to increased awareness among young women of tobacco exposure as a risk factor for premenopausal breast cancer.

Exposure to tobacco smoke early in life can carry important risks for breast cancer later on. According to recent studies, approximately 47% of new premenopausal breast cancer cases can be attributed to secondhand and active smoking. Currently there is inadequate information available on how best to effectively create and implement messaging for young women of differing age groups. Tobacco exposure is a modifiable risk factor, which makes this an extremely important and timely issue. The current survey is an opportunity to begin increasing awareness among young women about the development of premenopausal breast cancer related to tobacco exposure. Issues and needs identified by young women in this survey will be used to guide efforts to promote breast health and reduce young women's risk for breast cancer. The survey results will also help inform health officials and educators about the perspectives of young women.

As part of your participation, we would like you to circulate the attached call for participation to the members of your organization. This can be done by putting a link to our survey on your website, and any social networking page that your organization may have (i.e., Facebook,

MySpace), as well as distributing an e-mail to your listservs with a link to the survey URL. Please find attached a template for your use in doing this, which can be copied and pasted.

For your interest, please find attached an abstract detailing the study background, purpose of the survey, and what is expected of participation. Also attached is a literature review by one of the study investigators, Dr. Kenneth Johnson, on the topic. If you would like an example set of questions used in this survey prior to promoting it to your organization's members, please contact us.

If you have any questions or concerns, please contact me at the above address, or you can contact the research assistant, Erin Ptolemy, at eptolemy@interchange.ubc.ca or at (250) 807-8072.

Thank you for considering this request.

Yours truly,

Joan L. Bottorff, PhD, RN, FCAHS
Professor and Chair in Health Promotion and Cancer Prevention
Director, Centre for Healthy Living and Chronic Disease Prevention

Appendix B

The ‘Smoking and Breast Cancer Messages for Young Women’ survey

Note: Skip patterns do not appear in print version of survey.

Smoking and Breast Cancer Messages for Young Women

We want to learn what young women think about recent evidence linking tobacco and early breast cancer.

Take this **15-20 minute** online survey and tell us what you think about this topic!

You are eligible to take this survey if you are:
- A young woman between the ages of 15-24
- A smoker or a non-smoker

Tips:
- Hitting the 'Next' button takes you to the next page
- If you decide you want to change your answer, hit the 'Prev' button to take you to the previous page

-You must hit the 'DONE' button at the end of the survey to let us know your thoughts!

Consent Form

Since this survey is part of a research project, we ask you to read the following information and indicate whether or not you agree to proceed with the survey

Purpose: You are invited to take part in an online survey of young women aged 15 to 24. This survey is being conducted by the University of British Columbia Okanagan and is concerned with understanding young women's information needs related to the link between smoking, second-hand smoke, and breast cancer.

Study Procedures: The survey will take approximately 15-20 minutes for you to complete online. You will be asked to answer questions about second-hand smoke, smoking, breast cancer, and how you think awareness should be promoted among young women about the link between tobacco exposure and risk of early breast cancer. Your results will be confidential; nobody will know who you are, so please be as honest as possible. We are very interested in what you think, so please read all the instructions carefully and answer each question to the best of your ability.

Confidentiality: This online survey is hosted by a web survey company located in the USA and as such is subject to U.S. laws. In particular, the US Patriot Act allows authorities access to the records of internet service providers. This survey does not ask for personal identifiers or any information that may be used to identify you. The web survey company servers record incoming IP addresses of the computer that you use to access the survey but no connection is made between your data and your computer's IP address. If you choose to participate in the survey, you understand that your responses to the survey questions will be stored and accessed in the USA. The security and privacy policy for the web survey company can be found at the SurveyMonkey home page. To visit this, click here

All data collected from this survey will be stored in password protected computer files at the University of British Columbia Okanagan. The information we get from this study might be used again for more research on young women's understanding of their health risks, but only if approved by the appropriate university committees. The information collected in this study may be used for teaching purposes without revealing any information that would identify you.

Risk and Potential Benefits: You will not receive any direct benefit from your participation in this study. However, we do think the results of this study will assist with designing messages to increase awareness about tobacco exposure and breast cancer. Some participants may find answering questions about breast cancer increase their worry about getting the disease.

Consent: Your participation in this survey is voluntary and you are free to withdraw from the survey at any time by simply closing your browser window. If you do decide that you would like to come back to the survey at a later time you will have to start your survey again.

If you have any questions or desire further information with respect to this study, you may contact Dr. Joan Bottorff at 250-807-8627. If you have any concerns about your treatment or rights as a Research subject, you may contact the Research Subject Information Line at the UBC Office of Research Services at 604-822-8598.

*** 1. If you proceed with the study by clicking on the computer screen button "I accept", this will indicate you understand the above conditions of participation in this study and agree to proceed with the survey.**

- ◯ I accept
- ◯ I decline

*** 2. Gender**

- ◯ Male
- ◯ Female

*** 3. How old are you today?**

- ◯ younger than 15
- ◯ 15
- ◯ 16
- ◯ 17
- ◯ 18
- ◯ 19
- ◯ 20
- ◯ 21
- ◯ 22
- ◯ 23
- ◯ 24
- ◯ older than 24

*** 4. What is the highest level of education you have completed? (Choose one)**

- ◯ Grade 8
- ◯ Grade 9
- ◯ Grade 10
- ◯ Grade 11
- ◯ Grade 12
- ◯ Some college/tech school/university
- ◯ Completed college/tech school/university
- ◯ Other (please specify)

*** 5. What are the first three digits of your postal code or zip code? (i.e. V6T or 902)**

* 6. How would you describe yourself? Please check all that apply

- ☐ Aboriginal (First Nations/North American Indian, Métis, Inuit)
- ☐ White/Caucasian
- ☐ Chinese
- ☐ Japanese
- ☐ Korean
- ☐ Filipino
- ☐ South Asian (i.e. East Indian, Pakistani, Punjabi, Sri Lankan)
- ☐ South East Asian (i.e. Cambodian, Indonesian, Vietnamese, Laotian)
- ☐ West Asian (e.g. Afghan, Iranian)
- ☐ Arab
- ☐ Black (e.g. African, Haitian, Jamaican, Somali)
- ☐ Latin American
- ☐ Other (please specify)

* 7. Are you a member of a First Nation?

- ○ No
- ○ Yes (please specify)

* 8. Are you a member of an Indian Band?

- ○ No
- ○ Yes (please specify)

* 9. Do you have a close relative who has been diagnosed with breast cancer?

- ○ No
- ○ Yes, if so who (e.g. mother, aunt, grandmother)

Sorry- you're ineligible!

Thank you for your interest in our survey, however we are interested in responses from **women** aged **15-24** who give consent to participate.

If you have any questions about the survey, please contact Dr. Joan Bottorff at 250-807-8627 or joan.bottorff@ubc.ca. For more information about this topic, click here.

For more information about breast cancer, please visit the Canadian Breast Cancer Network website, www.cbcn.ca, or the Young Survival Coalition website at www.youngsurvival.org

Exposure to **Second-hand Smoke**

Second-hand smoke, also known as *environmental* tobacco *smoke* or *passive smoke*, is what smokers exhale and what rises from a burning cigarette.

*** 10. In the <u>past</u> <u>month</u> (excluding your own smoking), how often were you exposed to second-hand smoke...**

	never	once	a few times	more than a few times	a lot	Not applicable
inside a car or other vehicle?	◯	◯	◯	◯	◯	◯
inside someone else's home?	◯	◯	◯	◯	◯	◯
on an outdoor patio of a restaurant or bar?	◯	◯	◯	◯	◯	◯
inside a restaurant?	◯	◯	◯	◯	◯	◯
inside a bar or tavern?	◯	◯	◯	◯	◯	◯
at a bus stop or shelter?	◯	◯	◯	◯	◯	◯
at an entrance to a building?	◯	◯	◯	◯	◯	◯
at your workplace?	◯	◯	◯	◯	◯	◯
at/near your school?	◯	◯	◯	◯	◯	◯
at any other public place such as a shopping mall, arena, concert, or sporting event?	◯	◯	◯	◯	◯	◯
outdoors such as on a sidewalk or in a park?	◯	◯	◯	◯	◯	◯

anywhere else? (please specify)

*** 11. Overall (excluding your own smoking) in the <u>past</u> <u>month</u> were you exposed to second-hand smoke?**

- ◯ Every day
- ◯ Almost every day
- ◯ At least once in a week
- ◯ At least once in the past month

*** 12. Including both household members and regular visitors, does anyone smoke inside your home every day or almost every day?**

- ◯ Yes
- ◯ No

*** 13. Are there any restrictions against smoking cigarettes in your home?**

- ◯ Yes
- ◯ No

Exposure to Second-hand Smoke

* 14. How is smoking restricted in your home? (Check all that apply)

- ☐ Smokers are asked to refrain from smoking in the house
- ☐ Smoking is allowed in certain rooms only
- ☐ Smoking is restricted in the presence of young children
- ☐ Other restriction (please explain)

Smoking Behaviour

*** 15. Have you ever tried cigarette smoking, even one or two puffs?**

- ◯ Yes
- ◯ No

Smoking Behaviour

*** 16. How old were you when you took your first puff of a cigarette?**

*** 17. About how many cigarettes have you smoked in your entire life?**

- ◯ I have only had a puff or a few puffs.
- ◯ 1-5 cigarettes
- ◯ 6-15 cigarettes
- ◯ 16-25 cigarettes
- ◯ 26-99 cigarettes (less than 5 packs)
- ◯ more than 100 (more than 5 packs)

*** 18. Have you smoked cigarettes, even a puff in the past 30 days?**

- ◯ Yes
- ◯ No

Smoking Behaviour

*** 19. Approximately how many cigarettes do you smoke each day?**

- ◯ less than 1
- ◯ 1 to 5
- ◯ 6 to 10
- ◯ 11 to 20
- ◯ 21 to 30
- ◯ 31 to 40
- ◯ 41 or more

*** 20. In the past month, approximately how many days did you smoke cigarettes?**

- ◯ 1 to 2 days
- ◯ 3 to 5 days
- ◯ 6 to 10 days
- ◯ 11 to 20 days
- ◯ 21 to 29 days
- ◯ everyday

Smoking Behaviour

*** 21. Please select the one category that best describes your smoking behaviour <u>right</u> <u>now</u>:**

- ◯ "I am a non-smoker"
- ◯ "I am a current smoker"

For "non-smokers"

*** 22. How would you define yourself in terms of your <u>overall</u> smoking behaviour?**

- ◯ "I am a non-smoker"
- ◯ "I am an ex-smoker/former smoker"
- ◯ "I am an experimental smoker"

*** 23. Do you think you will try a cigarette (or other tobacco product) soon?**

- ◯ Definitely not
- ◯ Probably not
- ◯ Probably yes
- ◯ Definitely yes

*** 24. If one of your best friends were to offer you a cigarette (or other tobacco product), would you smoke it?**

- ◯ Definitely not
- ◯ Probably not
- ◯ Probably yes
- ◯ Definitely yes

*** 25. Do you think you will be smoking (or using other tobacco products) one year from now?**

- ◯ Definitely not
- ◯ Probably not
- ◯ Probably yes
- ◯ Definitely yes

For "current smokers"

*** 26. How would you define yourself in terms of your <u>overall</u> smoking behaviour?**

- ◯ "I am an experimental smoker"
- ◯ "I am an irregular/occasional smoker"
- ◯ "I am a regular smoker"

*** 27. Have you ever tried or used any tobacco products other than cigarettes?**

- ◯ Yes
- ◯ No

* 28. Please select all the other tobacco products you have ever tried or used

- [ ] Cigarillos
- [ ] Cigars
- [ ] Smokeless tobacco (e.g. chew/spit tobacco, snus/snuff)
- [ ] Other (please specify)

For "current smokers"

*** 29. Are you seriously considering quitting smoking within the next 6 months?**

- ◯ Yes
- ◯ No

*** 30. Are you seriously considering quitting smoking within the next 30 days?**

- ◯ Yes
- ◯ No

*** 31. In the past 12 months, did you stop smoking for at least 24 hours because you were trying to quit?**

- ◯ Yes
- ◯ No

*** 32. How many times in the past 12 months, did you stop smoking for at least 24 hours because you were trying to quit?**

Definition/Links

Here are some definitions of terms that we will be using:

- **Cancer-** Cancer occurs when, for unknown reasons, cells divide without control or order. The uncontrolled growth may produce a tumor than can be benign (not cancer) or malignant (cancer).
- **Early** breast **cancer-** Also known as "premenopausal breast cancer", this breast cancer occurs in women before the age of 50
- **Cancer** risk **factor-** A cancer "risk factor" may mean you have an increased chance of developing cancer. It does not mean that you will develop cancer.
- **Lifestyle** protective **factors-** Things that people can do to reduce their risk of cancer such as quitting smoking or eating a diet rich is vegetables, fruits, and fibre.
- **Lifestyle** risk **factors–** These are things that people do that make it more likely that cancer will occur. For example, smoking is strongly linked to lung cancer, but not everyone who smokes will get lung cancer.

o Lifestyle factors are called **"modifiable"** (able to be changed) because we can change our lifestyle to reduce our risk factors and increase our protective factors.
o Some risk factors for cancer are **"non-modifiable"** and for breast cancer, these include:
- having a close female relative who has had breast cancer before menopause or in both breasts
- getting older
- being female

Just as it is not certain that you will develop cancer if you have risk factors, so it is not certain that if you increase your protective factors you will avoid cancer. We are interested in finding out whether or not knowing about risk factors and the potential link with cancer would change your view about your -own modifiable risk factors.

If you have questions or concerns about this information, you can contact Dr. Joan Bottorff at the University of British Columbia Okanagan, 250-807-8627 or joan.bottorff@ubc.ca. For more information about this topic, go to the Canadian Breast Cancer Network website, www.cbcn.ca

Please continue with this **survey!**

The Connection Between Early Breast Cancer and Second-hand Smoke

*** 33. Scientific studies have shown that second-hand smoke exposure may be related to an increased risk for <u>early</u> breast cancer. Have you heard about this before?**

- ◯ Yes
- ◯ No

*** 34. How important is this information to you at this stage of your life?**

- ◯ 1 (not at all important)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (very important)

*** 35. There are a variety of reasons why this information about second-hand smoke exposure and breast cancer is important to young women. Which of the following reasons apply to you? (Check all that apply)**

- ☐ I have a relative who has or had breast cancer
- ☐ I am frequently around other people who smoke
- ☐ I try to be as healthy as I can
- ☐ This information supports my choice to avoid exposure to second-hand smoke
- ☐ This information supports my choice to reduce my exposure to second-hand smoke

36. Any other reasons?

The Connection Between Early Breast Cancer and Second-hand Smoke

*** 37. Among the young women you know, how many do you believe are regularly exposed to second-hand smoke?**

- ◯ None or almost none
- ◯ Minority
- ◯ About half
- ◯ Majority
- ◯ Nearly all or all
- ◯ Don't know

*** 38. How much do you think you will be exposed to second-hand smoke in 5 years time?**

- ◯ I'm likely to be exposed more than I am now
- ◯ I'm likely to be exposed to the same amount
- ◯ I'm likely to be exposed less than I am now
- ◯ I'm not sure

*** 39. Recent studies have shown that about 20% of new <u>early</u> breast cancer (before age 50) cases every year in Canada are related to second-hand smoke, and that exposure to second-hand smoke early in life may put you at higher risk for developing early breast cancer. Would having this information make you consider reducing your exposure to second-hand smoke?**

- ◯ Yes
- ◯ No
- ◯ I'm not sure

*** 40. How interested would you be in learning more about the relationship between <u>second-hand smoke</u> exposure and early breast cancer?**

- ◯ 1 (not at all interested)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (very interested)

Reasons why...

*** 41. There are a variety of reasons why young women <u>are</u> interested in information about second-hand smoke and breast cancer. Which of these apply to you? (Check all that apply)**

- ☐ Knowing more about the statistics shows the reality of the risk
- ☐ Information like this provides extra motivation to stay away from second-hand smoke
- ☐ Knowing about breast cancer and second-hand smoke is important for all young women
- ☐ Information like this makes being exposed to second-hand smoke seem not cool
- ☐ Knowing ways to stay healthy is important
- ☐ Other (please specify)

Reasons why...

*** 42. There are a variety of reasons why young women <u>are</u> <u>not</u> interested in information about second-hand smoke and breast cancer. What reasons apply to you? (Check all that apply)**

- ☐ Everything causes cancer anyway
- ☐ Second-hand smoke isn't that serious
- ☐ The research isn't strong enough
- ☐ It's more fun to be around others that smoke than worry about it
- ☐ Information about breast cancer and second-hand smoke just makes me worried
- ☐ Knowing about breast cancer and second-hand smoke is important for older women
- ☐ Other (please specify)

The Connection Between Early Breast Cancer and Smoking

*** 43. Scientific studies have shown that <u>smoking</u> may be related to an increased risk for <u>early</u> breast cancer. Have you heard about this before?**

- ◯ Yes
- ◯ No

*** 44. How important is this information to you at this stage of your life?**

- ◯ 1 (not at all important)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (very important)

*** 45. There are a variety of reasons why this information about smoking and breast cancer is important to young women. Which of the following reasons apply to you? (Check all that apply)**

- ☐ I have a relative who has or had breast cancer
- ☐ I smoke cigarettes
- ☐ I try to be as healthy as I can
- ☐ This information supports my choice not to smoke
- ☐ This information supports my choice to reduce my smoking

46. Any other reasons?

The Connection Between Early Breast Cancer and Smoking

*** 47. Among the young women you know, how many do you believe smoke?**

- ◯ None or almost none
- ◯ Minority
- ◯ About half
- ◯ Majority
- ◯ Nearly all or all
- ◯ Don't know

*** 48. In 5 years time, do you think you are likely to...**

- ◯ remain a non-smoker
- ◯ smoke more
- ◯ smoke the same amount that you do now
- ◯ smoke less
- ◯ quit smoking
- ◯ start smoking
- ◯ I'm not sure

*** 49. Recent studies have shown that 25% of new <u>early</u> breast cancer (before age 50) cases every year in Canada can be attributed to smoking, and that smoking early in life may put you at higher risk for developing early breast cancer. Would having this information make you consider changing your smoking behaviours?**

- ◯ Yes
- ◯ No
- ◯ I'm not sure
- ◯ I don't smoke

*** 50. How interested would you be in learning more about the relationship between smoking and early breast cancer?**

- ◯ 1 (not at all interested)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (very interested)

Reasons why...

*** 51. There are a variety of reasons that may influence why young women <u>are</u> interested in this information about smoking and breast cancer. What reasons apply to you? (Check all that apply)**

- ☐ Knowing more about the statistics shows the reality of the risk
- ☐ Information like this provides extra motivation to stop smoking
- ☐ Information about breast cancer and smoking is important for all young women
- ☐ Information like this makes smoking seem not cool
- ☐ Knowing ways to stay healthy is important
- ☐ Other (please specify)

Reasons why...

*** 52. There are a variety of reasons that influence why young women <u>are</u> <u>not</u> interested in this information about smoking and breast cancer. What reasons apply to you? (Check all that apply)**

- ☐ Everything causes cancer anyway
- ☐ Smoking is not that serious
- ☐ The research isn't strong enough
- ☐ It's more fun to smoke than worry about it
- ☐ Information about breast cancer and smoking just makes me worried
- ☐ Information about breast cancer and smoking is important for older women
- ☐ Other (please specify)

How do we raise awareness of this link?

*** 53. What do you see as barriers to raising awareness among young women about the relationship between smoking, second-hand smoke, and early breast cancer? (Check all that apply)**

- ☐ There's too much negativity and exaggeration in these kinds of campaigns
- ☐ Young women in my age group don't think about the "long term"
- ☐ There are more important things to be concerned about like school, my social life, and my future
- ☐ Breast cancer campaigns are not interesting to young women of my age
- ☐ Young women in my age group aren't motivated to find out this information on their own
- ☐ There are so many messages already about smoking and second-hand smoke
- ☐ Other (please specify)

*** 54. A number of approaches have been suggested for raising awareness among young women about the link between smoking, second-hand smoke, and the risk for breast cancer. We are interested in your opinion about these approaches. Please rate the effectiveness of each of the following.**

	Not at all effective	A little effective	Somewhat effective	Quite effective	Very effective
Hearing about it from teachers	○	○	○	○	○
Hearing about it from peers	○	○	○	○	○
Hearing about it from a breast cancer survivor	○	○	○	○	○
Hearing about it from mothers	○	○	○	○	○
Including it in a health and education curriculum	○	○	○	○	○
Using TV ads	○	○	○	○	○
Using print ads (e.g. brochures, posters)	○	○	○	○	○
Putting information on internet websites	○	○	○	○	○
Using messaging campaigns (e.g. t-shirts, ribbons, wristbands)	○	○	○	○	○
Health warnings on cigarette packages	○	○	○	○	○
Using celebrity endorsements	○	○	○	○	○
Spreading the word through social networking sites (e.g. Facebook, MySpace, blogs)	○	○	○	○	○

55. Any other ways?

*** 56. How do you think the general public should be informed about this risk?**

*** 57. How important to you is it to have specific information (e.g. scientific research) about these risk factors (smoking and second-hand smoke) for breast cancer?**

- ◯ 1 (not at all important)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (very important)

*** 58. How important do you think it is for young women your age to know about how to reduce their chances of getting breast cancer?**

- ◯ 1 (not at all important)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (very important)

-

*** 59. If we were able to show you easy and effective ways to eliminate or reduce your exposure to second-hand smoke, and which would reduce your risk for early breast cancer, would you be interested in having this information?**

- ◯ Yes
- ◯ No
- ◯ I am not ever exposed to second-hand smoke

*** 60. If we were able to show you easy and effective ways to quit or reduce your smoking, and which would reduce your risk for early breast cancer, would you be interested in having this information?**

- ◯ Yes
- ◯ No
- ◯ I don't smoke

Last page!

Now a few final questions about the survey...

*** 61. Did answering these questions about the potential link between smoking and second-hand smoke with breast cancer make you anxious (nervous)?**

- ◯ 1 (not at all)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (extremely anxious or nervous)

62. Is there anything we could do or ways to ask these questions which would lessen feelings of anxiety or nervousness that you or other young women may have?

*** 63. What do you think about the length of this survey. Was it...**

- ◯ Too long?
- ◯ Too short?
- ◯ Just right?

64. Please add any additional comments you may have

You're done!

Thank you for participating! **Please click the 'DONE' button to submit your survey.**

If you are interested in participating in a follow-up telephone interview on developing strategies to raise awareness about smoking, second-hand smoke, and early breast cancer, e-mail Dr. Joan Bottorff

If you have any questions, concerns, or comments about the survey, or would like a summary copy of the survey results, e-mail Dr. Joan Bottorff or call 1-250-807-8627