BEYOND DEMOGRAPHICS: PERSONALITY, NORMS, AND MECHANISMS OF WOMEN'S CANCER SCREENING

by

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This thesis contains no material which has been accepted for any award or any other degree at any university or other institution. It is affirmed by the candidate that, to the best of her knowledge, the thesis contains no material previously published or written by another person, except where in text reference is made.

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THESIS ABSTRACT

This thesis looks at factors underlying women's health behaviors and aims to uncover what factors lead to women's cancer screening across various contexts. We consider screenings in different cultures, one where screening is normative and one where few engage in the behavior. Additionally, we consider factors important in having a first screening and sustaining screening behavior. We go beyond demographics to understand what psychosocial factors could be used to promote action in various contexts in an effort to increase screening performance and to detect cancer early.

Chapter 1 focuses on women's mammogram screening in a culture where screening is normative. In this chapter we investigate how personality and religiousness influence women's two year mammogram rates in the United States. A total of 474 women, of who over 80% had a mammogram in the last two years, were studied.

Chapter 2 shifts focus from women's mammogram screening in cultures where screening is normative to a culture where screening is non-normative. In this chapter, we investigate how screening-based individual differences influence women in Turkey's cancer screening behavior. A total of 483 women, whose current screening rates of breast and cervical cancer range from 24 to 30%, were studied. We find current screening rates vary drastically for women who have participated in the workforce versus those women who are homemakers. We then look at screening-based individual differences underlying these behaviors.

Chapter 3 continues to investigate women's cancer screening in cultures where screening is non-normative; however, Chapter 3 also adds the distinction of initiation and maintenance of a behavior. In this chapter we investigate how screening-based individual differences influence women in Turkey's mammogram intentions. A total of 748 women,

36% of whom ever had a mammogram, were studied. We investigate the influences of initiation and maintenance, as well as, self-direction versus doctor-direction on mammogram intentions.

ÖZET

Bu tezde kadınların sağlık davranışlarının altında yatan faktörler incelenerek kadınların çeşitli durumlarda kanser taraması yapmasına hangi faktörlerin neden olduğunu ortaya çıkarmayı amaçlamaktadır. Taramaların normatif olduğu ve olmadığı farklı kültürlerdeki taramaları incelemenin yanı sıra ilk taramaya ve düzenli taramalara neden olan faktörleri de inceledik. Demografinin ötesine geçerek çeşitli durumlarda hangi psikososyal faktörlerin tarama performansını arttırmada ve erken kanser teşhisini teşvik etmede kullanılabileceğini araştırdık.

Tezin birinci bölümünde taramaların normatif olduğu bir kültürde kadınların mamogram taramalarını inceledik. Bu bölümde kişilik ve dindarlığın Amerika Birleşik Devletleri'ndeki kadınların iki yıllık mamogram oranlarını nasıl etkilediğini araştırdık. Son iki yılda mamogram yaptıranların %80 oranında olduğu 474 kadından oluşan bir popülasyon kullandık.

Tezin ikinci bölümünde taramaların normatif olmadığı bir kültürde kadınların mamogram taramalarını inceledik. Bu bölümde tarama tabanlı bireysel farklılıkların Türkiye'deki kadınların kanser tarama davranışlarını nasıl etkilediğini araştırdık. Güncel meme ve rahim ağzı kanser tarama oranlarının %24 ile %30 arasında olduğu 483 kadından oluşan bir popülasyon kullandık. Güncel tarama oranlarının çalışan ve çalışmayan kadınlar arasında büyük miktarda değişiklik gösterdiğini bulduk. Daha sonra bu davranışların altında yatan tarama tabanlı bireysel farklılıkları araştırdık.

Tezin üçüncü bölümünde taramaların normatif olmadığı kültürde kadınların kanser taramalarını incelemeye devam ettik, ancak, üçüncü bölümde bir davranışın başlaması ve devam etmesi ayrımını da ekledik. Bu bölümde tarama tabanlı bireysel farklılıkların

Türkiye'deki kadınların mamogram niyetlerini nasıl etkilediğini araştırdık. En az bir kez mamogram yaptıranların %36 oranında olduğu 748 kadından oluşan bir popülasyon kullandık. Başlama ve devam etmenin yanı sıra öz yönlendirmeye karşı doktor yönlendirmesinin mamogram niyetleri üzerindeki etkisini inceledik.

DEDICATION

To the greatest loves of my life

Alper and Lara…

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and kept me sane when I swore that I could not take anymore. On each journey, you have been there encouraging and supporting my every step. I love you more every day. You are my rock, my sounding board, and my life. My PhD would not be possible without you.

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THESIS INTRODUCTION

Two women sit side by side in an oncology waiting room. Both are 65 years of age, both are anxious, both have full lives, both have grandchildren, and both have been diagnosed with breast cancer. The difference is that one woman's likelihood of surviving cancer is almost 100% making her as likely as any woman outside this waiting room to see her 70th birthday. The other woman's chance of surviving her cancer and blowing out 70 candles surrounded by family and friends is 20% or less. On the surface, these two women look similar, but it is what is below the surface, what a mammogram revealed earlier in one woman that made all the difference. The woman who has had regular mammograms had an early diagnosis of breast cancer and now a much higher chance of surviving five years. The woman who did not have her regular screenings has cancer that has spread and is now much more difficult to treat.

This thesis looks at what factors underlie these two representative women's behaviors and aims to uncover factors leading to women's cancer screening across various contexts. We consider screenings in different cultures, one where screening is normative and one where few engage in the behavior, as well as, consider factors important in having a first screening and sustaining screening behavior. We go beyond demographics to understand what factors could be used to promote action in various contexts in an effort to increase screening performance, to detect cancer early, and to increase the number of future birthdays a woman gets.

The tale of these two women is similar for women in waiting rooms across the world with both breast and cervical cancer diagnoses. Breast cancer is the most frequently diagnosed cancer among women worldwide, and in developing countries, breast cancer has

the highest mortality rate of all cancer among females (American Cancer Society, 2015; Ferlay, 2014; World Health Organization, 2014). While cervical cancer generally appears as the fourth in both cancer incidence and mortality among women, countries where screenings are lowest bear the largest burden of cancer deaths among women (American Cancer Society, 2015; Ferlay, 2014; World Health Organization, 2014). Although mammograms and other cancer screening tests such as clinical breast exam and Papanicolaou tests, or PAP smears, have been proven tools for diagnosing cancers early when they are more treatable (Berry, 2005), not all women pursue these life preserving tests. Where screening is the norm in nations like the United States with 70% of women having a mammogram every two years (National Center for Health Statistics, 2013), in nations like Turkey only 20% of women have ever had a mammogram (Turkish Statistical Institute, 2012). Consequently, in Turkey where incidence of breast cancer is rising and has more than doubled in areas leading a more Western lifestyle, less than 5% of women were diagnosed early before the breast cancer could be felt (Ozmen, 2008).

The state of mammogram research in both nations, United States and Turkey, typically focus of demographic variables to indicate who does and does not screen (American Cancer Society, 2013; Turkish Statistical Institute, 2012). These demographic factors associated with cancer screenings are generally comprised of age, education, ethnicity, metropolitan living status, and family history of cancer (e.g., Calvocoressi et al., 2004; Calvocoressi, Stolar, Kasl, Claus & Jones, 2005; Turkish Statistical Institute, 2012, Vernon, et al., 1992; Vernon, Laville & Jackson, 1990). While such factors are useful in identifying women who do and do not screen, these need to be supplemented with psychosocial factors (Rakowski and Breslau, 2004). This thesis advocates shifting the main focus from demographics to using psychosocial variables relevant in cultures with

high and low screening as the larger picture to understand the mechanisms of women's cancer screenings.

Behavior, Person and Situation

With two different cultures involved in this work, with dramatically different rates of women's cancer screening, we must consider the impact of both the person screening and the situation, or climate in which screening occurs. Classical psychological theories note that behavior is a function of both the person and the environment (Lewin, 1935). With behavior being influenced by both situation and personal attributes, we are left asking "When are situations most likely to exert powerful effects and, conversely, when are person variables likely to be most influential?" (Mischel, 1977, p. 346). Furthermore, strong situation hypothesis posits that situations vary in their strength which affects the likelihood that personality attributes can emerge (Cooper & Withey, 2009). Strong situations are ones in which all people share a similar view of the event, situations which induce identical responses, situations providing strong incentives for performance, and situations requiring skills that everyone possess to a similar extent. Whereas weak situations are not uniformly viewed, generate different non-uniform responses, and do not offer sufficient incentives (Mischel, 1977).

Women's cancer screening behavior could be classified as strong or weak depending on the norms of the culture. Although the United States would appear strong because screening is normative, we argue that personality can enter due to the prevalence and culture of screening, the programs to reduce barriers, the support of influential others in screening, the ease of screening, and the lack of penalties for not acting. Thus, when programs have been crafted to remove almost all situational barriers facilitating actions, then the variance situation could account for is reduced leaving only personality to

influence behavior. In nations like the United States where situational variance is significantly reduced, we expect that personality characteristics to influence screening behavior-a claim investigated in Chapter 1.

In Turkey, where most women do not screen, and screening is discussed in terms of ever performed rather than annual or biannual performance, situation should prevail. Due to lack of knowledge, low descriptive norms, and many barriers, situation remains fairly untouched. Although personality may be important here, the personality attributes we expect are those associated with intentions towards the specific screening test rather than traits of the woman. We need to look at facilitating factors affecting cues to action, barriers, efficacy, and descriptive norms-as seen in Chapter 2 and Chapter 3. Otherwise the culture of "not engaging" is too strong to overcome with personality alone.

Thus, the first chapter in this work investigates women's mammogram screenings in the United States (Sen & Kumkale, in press). This chapter looks at the complex interactions of personality attributes and determines the advantage of viewing screening considering such factors. The second and third chapters focus on women's cancer screening in Turkey. Both of these chapters focus on the low levels of screening throughout Turkey using subsets of nationally representative data. Chapter 2 first investigates how women with and without work experience vary in their cancer screenings and how screenings may be raised in each group through screening-based factors such as perceived susceptibility and self-efficacy. Furthermore, Chapter 2 identifies personal differences within women for all screening behaviors except mammograms. Chapter 3 further studies mammogram screening among women in Turkey, highlighting personal attributes associated with initial and subsequent mammogram screenings. The three chapters attempt to reveal a clearer picture of the person-situation interaction and provide

evidence for personality being crucial in cultures where screening is normative and situation-specific psychosocial variables being of more importance when screening is rare.

CHAPTER 1

WHERE SCREENING IS NORMATIVE, PERSONALITY MATTERS:

A STUDY OF MAMMOGRAM SCREENING IN THE UNITED STATES

ABSTRACT

Chapter 1 focuses on women's mammogram screening in a culture where screening is normative. In this chapter we investigate how personality and religiousness influence American women's two year mammogram rates. A total of 474 women, of who over 80% had a mammogram in the last two years, were studied.

CHAPTER 1—INTRODUCTION

Although it has become normative for women in industrialized nations to have a mammogram every one or two years (National Center for Health Statistics, 2013), the United States strives to increase these rates by another 10% by 2020 (U.S. Department of Health and Human Services, 2015). Thus, with so many women already screening, it is increasingly important to understand the attributes of women not having mammograms. In the past, targeting women not screening was typically done using demographics; however, to reach even higher levels of attendance, a better understanding of the contributions of personality and religiousness is crucial. Therefore, in the present research, we developed models with personality and religiousness attributes using decision trees. By using decision trees, we allow complex interactions among personality attributes to be seen for the first time in mammogram attendance. As expected, decision trees incorporating personality attributes and religiousness outperformed all other models developed in traditional ways.

Baseline comparison: Demographic attributes in mammogram attendance

In order to see the true advantages of using personality and religiousness in identifying women not having mammograms, a baseline comparison with demographics is necessary. Important demographic attributes linked with increased screening have historically included older age, higher education, positive family history of breast cancer, and usually non-Hispanic White race (e.g., Calvocoressi et al., 2005; Vernon, et al., 1992, 1990). In general, attributes linked to screenings appear in a simple list-wise manner focusing on main effects, although a few studies hint to the complex relationship among demographic attributes (Rakowski and Breslau, 2004; Vernon, et al., 1992). As noted by

researchers, further work is needed to explore interactions among these demographic attributes and other psychological factors (Rakowski &Breslau, 2004).

Personality and religiousness attributes in mammogram attendance

While a better understanding of differences across demographic groups has been instrumental in raising screening rates, to target those not attending, models based on demographic attributes alone will not be sufficient. Scant personality research has implicated the contributions of several factors in mammogram attendance. Attributes such as higher conscientiousness, low neuroticism, higher future time-orientation—how much a person thinks about the future, and low fatalism—believing that life events are not predetermined were individually all associated increased with mammogram attendance (e.g., Lukwago et al., 2003; Mayo et al., 2001; Schwartz et al., 1999). Although these few psychological variables were identified as facilitators of mammogram attendance, research is needed to determine what combination of these attributes underlies mammogram attendance. This study focuses on the combination of identified factors for screening rather than including all personality variables. For instance, while higher conscientiousness and lower neuroticism have been correlated with attendance, openness, extraversion, and agreeableness were not studied or were not associated with mammogram attendance and are thus not included (Schwartz et al., 1999; Siegler, Feaganes, & Rimer, 1995).

Trends also exist between religiousness attributes and mammogram attendance, although sometimes these trends are less clear. For instance, loci of control may vary in religious women with some women having high internal or personal control, some working in a collaborative relationship with God, and others having a passive locus where God is in control. Women with passive control, especially for health domains, are less likely to have a mammogram (Holt et al., 2007). Furthermore, weekly religious service attendance is

associated with higher levels of screening compared with attending services more or less frequently (Salmoirago-Blotcher et al., 2011). Trends are less clear for religiousness variables such as religiosity, where personality may interact sometimes. In studies exploring religiosity, the attribute facilitated attendance when time-orientation was included in the model; however, religiosity impeded attendance when fatalism was included (Azaiza, Cohen, Daoud, & Awad, 2011; Steele-Moses et al., 2009). Although few studies have touched upon the complexities of religiousness in mammogram screening, a more comprehensive study examining personality and religiousness together is sorely needed.

Decision trees

Identifying non-attending women and seeing the complex relationships between constructs necessitates analyses sensitive to complexities. Decision trees are especially suited to exploring the interplay of attributes and are able to detect interactions and nonlinear relationships (Breiman et al., 1984; Strobl et al., 2009). In this context, the goal of decision trees is to identify groups of women who vary in their likelihood of screening. Here trees begin by splitting the full sample into smaller groups, or nodes, using whichever attribute makes women within the resultant groups more similar in their attendance behavior. When a group of women cannot be split further, it becomes a terminal node.

Based on these splits, complex relationships are transformed into simple profiles with clear rules resulting from each split which are particularly useful in applied settings (e.g., Calvocoressi et al., 2005; Demir & Kumkale, 2013; Freitas et al., 2012). Furthermore, unlike commonly used methodologies such as logistic regression, where all interactions and categorizations must be specified a priori for analysis, trees allow for any attribute combination as long as the resultant groups are more similar. Trees also

determine an attribute's optimal cut point or grouping of categories. In addition to classifying individuals, tree analysis yields a misclassification error, or proportion of the individuals who are classified incorrectly based on the model.

Present study

The goal of this research was to develop a better understanding of the attributes of women not following mammogram guidelines. Specifically, we used survey data from women aged 41 and older (*N*=474) to develop logistic regression models and decision trees using various personality and religiousness-related attributes. We first looked at models using demographic characteristics to gauge what increase using personality and religiousness attributes might offer.

Although decision trees are a more exploratory method of analysis to allow for complex interactions, various trends were expected with the attributes. Specifically, increasing age, family history of breast cancer, college education, and Non-Hispanic White race were demographic variables expected to be associated with attendance. For personality variables, future time-orientation, higher conscientiousness, lower neuroticism, and lower fatalism were expected to be associated with attendance. Finally, for religiousness attributes, weekly attendance, low passive God locus of control, and high internal locus of control were expected to be associated with attendance. Combinations of factors and important cut points of attributes of each construct were explored with no a priori hypotheses.

CHAPTER 1—METHODS

Sample

The present study used *prospective* data from two modules of the National Survey of Midlife Development in the United States (MIDUS) (Ryff et al., 2013, 2012a, 2012b).

MIDUS is a longitudinal study of 7,108 participants that began in 1995. Participants completing MIDUS II (2004-2006), including a special African-American sample from Milwaukee, were eligible to participate in subsequent modules such as the health-focused Biomarker 4 (2004-2009).

Our sample included women from Biomarker 4 (n=713). Mammogram recommendations in 2001 began at age 40; thus, we excluded women under age 41 to allow for first screening (n=43). After the exclusion of women with a cancer history (n=102), multiple women from the same family (n=55), women with incomplete mammogram status (n=5), and women with incomplete personality data (n=34), the final sample contained 474 women aged 41 and over.

Measures

Demographics. Participants answered questions regarding age, education, family history, and race (See Table 1 for all variables). Insurance status was not measured concurrently with mammogram status; therefore, available status information from MIDUS II was not used in the present analyses.

Personality attributes. Participants in MIDUS II self-reported their conscientiousness, neuroticism, fatalism, and future time-orientation using multi-item scales whose references, factor loadings, and construction details are reported in the MIDUS Documentation Manuals.

Conscientiousness was measured with five items indicating how hardworking, organized, careful, responsible, and thorough participants were (*1 = Not at all*; *4 = A lot*); $\alpha = 0.66$). Neuroticism was measured by asking participants to rate how moody, nervous, worried and not calm they were (*1 = Not at all*; *4 = A lot*; $\alpha = 0.74$). Additionally, participants rated their level of fatalism with two items ($\alpha = 0.64$): "I have little control over the things that happen to me" and "What happens in my life is often beyond my

control" (*1 = Strongly disagree; 7 = Strongly agree*). Finally, participants rated three reverse coded future time-orientation items: "I believe there is no sense planning too far ahead because so many things can change", "I have too many things to think about today to think about tomorrow", and "I live one day at a time" (*1 = Not at all*; *4 = A lot*; α = 0.62).

Religiousness-related attributes. Religiousness attributes encompassed attendance, religiosity, and locus of control. Participants indicated their frequency of religious service attendance (*Never* to *More than weekly*) and how religious they were *(1 = Not at all; 4 = Very).* Finally, participants answered five questions to report their locus of control on three separate dimensions. They answered three items about passive locus of control: e.g. "In your daily life, how often do you ask yourself what your religious or spiritual beliefs suggest you should do" (*1 = Often; 4 = Never;* α = 0.78). Participants answered one item for the collaborative dimension: "I work together with God as partners" (*1 = None; 4 = A great deal).* Finally, the following item was used to measure internal health locus of control: "Keeping healthy depends on things that I can do" (*1 = Strongly agree; 7 = Strongly disagree).*

Mammogram attendance. While women provided all personality and religiousness information during MIDUS II, they answered questions about two-year mammogram attendance information in the follow-up Biomarker 4 module. The dependent variable was coded as having or not having a mammogram within the last 24 months (1 = attenders vs. 0 = non-attenders).

Statistical analyses

Attributes associated with having or not having a mammogram within the last 24 months were analyzed first with logistic regression (Table 1) and then with decision trees (i.e., CART-Classification and Regression Trees; Figure 1 and Table 2). In both types of

analyses, models using (a) demographic attributes, (b) personality and religiousness attributes, and (c) combination of all attributes were developed and compared. In order to compare the performance of individual regression models and trees, measures of non-attender and attender predictive ability were constructed (Table 3). Calculations were based on dividing the number of correctly predicted non-attending women identified in each model by the total number of non-attending women in the sample. Additionally, the same calculation was performed using correctly predicted attending women divided by the total number of attending women (please see Table 3). Finally, random-forest analyses were conducted to verify the findings of the decision trees (Breiman, 2001; Strobl et al., 2009; Figure 2).

CHAPTER 1—RESULTS

Descriptive information

Mammogram attendance within the past 24 months was 81% (see Table 1). Women were predominantly non-Hispanic White (73%) with an average age of 57.3 years (*SD* = 10.48). Forty-five percent of the sample women had a college degree. Furthermore, they were particularly conscientious *(Range* = 1 to 4, *M* = 3.45; *SD* = 0.47), religious (31% very religious and 47% somewhat religious), and high in internal locus of control *(Range* = 1 to 7, *M* = 6.45; *SD* = 0.94).

Table 1. Descriptive statistics and logistic regression models of mammogram attendance.

	Descriptive Statistics (Full and by Mammogram Attendance)		
	Full (N = 474)	**No (19.2%)**	**Yes (80.8%)**
	Mean (SD) or %	Mean (SD) or %	Mean (SD)or %
Demographic Variables			
Age	*57.30 (10.48)*	*54.53 (10.23)*	*57.96 (10.44)*
41-49	26.6%	36.3%	24.3%
50-59	33.3%	36.3%	32.6%
60-69	25.9%	19.8%	27.4%
70 and above	14.1%	7.7%	15.7%
Positive family history	34.6%	35.2%	34.5%
College graduate	45.1%	44.0%	45.4%
Race			
Non, Hispanic white	73.0%	69.2%	73.9%
African American/Black	21.7%	27.5%	20.4%
Other	5.3%	3.3%	5.7%
Personality Variables			
Conscientiousness (1-4)	*3.45 (0.47)*	*3.33 (0.50)*	*3.47 (0.41)*
Neuroticism (1- 4)	*2.08 (0.64)*	*2.09 (0.70)*	*2.08 (0.63)*
Fatalism (1-7)	*2.66 (1.51)*	*2.62 (1.52)*	*2.66 (1.51)*
Future-orientation (1-4)	*2.65 (0.74)*	*2.45 (0.80)*	*2.70 (0.72)*
Religiousness Variables			
Attendance			
Never	19.2%	24.2%	18.0%
Less than weekly	29.3%	26.4%	30.0%
Once a week	31.4%	27.5%	32.4%
More than weekly	20.0%	22.0%	19.6%
Religiosity			
Not very-not at all	21.9%	25.3%	21.1%
Somewhat	46.8%	38.5%	48.8%
Very	31.2%	36.3%	30.0%
Locus of Control			
Passive (1-4)	*1.99 (0.87)*	*1.93 (0.84)*	*2.00 (0.88)*
Collaborative (1-4)	*2.85 (1.09)*	*2.92 (1.02)*	*2.84 (1.10)*
Internal (1-7)	*6.45 (0.94)*	*6.49 (0.89)*	*6.44 (0.96)*

Note. CI, confidence interval; SD, standard deviation; * $p \leq 0.05$; ** $p \leq 0.01$.

Logistic Regression

To examine attributes associated with having or not having a mammogram within the last 24 months, univariate and the following multivariate logistic regression models were conducted: (a) baseline demographic model, (b) personality and religiousness model, and (c) an integrative model (see Table 2). In univariate models, only age, conscientiousness, and future time-orientation predicted mammogram attendance: Women who were older (60-69 years: odds ratio [OR] = 2.07, $p < 0.05$; above 70 years: OR = 3.04, $p < 0.05$), more conscientious (OR = 2.00, $p < 0.01$), or more future time-oriented (OR = 1.59, $p < 0.01$) were more likely to have a mammogram. These same attributes and relationships held in all multivariate models. Interestingly, religiousness attributes never made a difference in the models (See Table 2 for models, odds ratios, and significance values).

Overall, logistic regression models performed very poorly in predicting non-attenders: 0.0% with demographics, 3.3% with personality and religiousness, and 4.4% with the full model. Thus, these models were not fruitful in developing a better understanding of non-attending women. This finding justifies the use of decision trees.

Table 2. Descriptive statistics and logistic regression models of mammogram attendance.

	Univariate Models		Demographic Model		Personality & Religiousness Model		Integrative Model	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Demographic Variables								
Age								
41-49	1.00	Referent	1.00	Referent			1.00	Referent
50-59	1.34	0.77, 2.33	1.32	0.76, 2.30			1.43	0.79, 2.58
60-69	2.07*	1.09, 3.92	2.10*	1.10, 3.99			2.27*	1.15, 4.48
70 and above	3.04*	1.26, 7.32	3.05*	1.25, 7.40			3.66**	1.41, 9.48
Positive family history	0.97	0.60, 1.57	0.92	0.56, 1.50			0.92	0.55, 1.53
College graduate	1.06	0.67, 1.68	1.09	0.68, 1.76			0.93	0.55, 1.57
Race								
Non, Hispanic white	1.00	Referent	1.00	Referent			1.00	Referent
African American/Black	0.69	0.41, 1.18	0.75	0.44, 1.30			0.98	0.54, 1.80
Other	1.63	0.47, 5.62	1.76	0.50, 6.12			2.39	0.65, 8.79
Personality Variables								
Conscientiousness (1-4)	2.00**	1.21, 3.30			2.14**	1.24, 3.68	2.13**	1.23, 3.69
Neuroticism (1- 4)	0.97	0.68, 1.39			1.18	0.80, 1.73	1.33	0.89, 2.00
Fatalism (1-7)	1.02	0.88, 1.19			1.11	0.93, 1.31	1.08	0.90, 1.28
Future-orientation (1-4)	1.59**	1.16, 2.17			1.57**	1.11, 2.22	1.63*	1.12, 2.36
Religiousness Variables								
Attendance								
Never	1.00	Referent			1.00	Referent	1.00	Referent
Less than weekly	1.53	0.80, 2.93			1.58	0.76, 3.30	1.72	0.81, 3.64
Once a week	1.58	0.83, 3.01			2.06	0.86, 4.96	2.09	0.85, 5.11
More than weekly	1.20	0.60, 2.38			2.04	0.78, 5.37	2.07	0.76, 5.63
Religiosity								
Not very-not at all	1.00	Referent			1.00	Referent	1.00	Referent
Somewhat	1.52	0.84, 2.73			1.59	0.78, 3.22	1.57	0.75, 3.27
Very	0.99	0.54, 1.81			1.07	0.46, 2.51	1.05	0.44, 2.52
Locus of Control								
Passive (1-4)	1.11	0.85, 1.45			1.26	0.80, 1.97	1.23	0.78, 1.94
Collaborative (1-4)	0.93	0.75, 1.15			0.94	0.70, 1.25	0.88	0.65, 1.18
Internal (1-7)	0.94	0.73, 1.21			0.92	0.71, 1.20	0.92	0.71, 1.20

Note. CI, confidence interval; SD, standard deviation; * $p \leq 0.05$; ** $p \leq 0.01$.

Decision trees

We developed three different decision trees with attribute sets identical to the ones used in the logistic regression models. To avoid overfitting the data, we did not let the trees to grow more than five levels and pruned them as recommended (Breiman et al., 1984).

Demographics decision tree. While the demographics-based logistic regression model did not predict any non-attender correctly, the decision tree correctly classified 17.6% of the non-attenders (see Panel A in Figure 1). In this tree, the first split separated less adherent women aged 45 and younger from rest of the sample. The younger women (Node 1) were further split by education. Women 45 and under without a college degree were the most vulnerable group screening at the lowest rates (48%). For younger women, education seemed to have a protective role (48% vs. 82%).

Personality and religiousness decision tree. As in logistic regression, constructing a decision tree with personality and religiousness attributes revealed a significant association of only conscientiousness and future time-orientation (see Panel B in Figure 1). Where the personality and religiousness logistic regression model predicted only 3.3% of non-attenders correctly, 22.0% were correctly predicted with a simple tree. In this tree, present time-oriented women attended less than those with a more future time-oriented outlook (Node 1 vs. 2). Further division among these present time-oriented women did not take place. For the less present time-oriented women, conscientiousness made a significant difference (Node 3 and 4). When women were not especially present time-oriented (Node 2), those low in conscientiousness screened less (57% attendance in Node 3 vs. 83% attendance in Node 4).

Integrative decision tree. Entering all attributes at once as in the full logistic regression model led to an ultimate tree with nine clusters, shaded in grey, of women

varying in their rate of attendance from 0% to 100% (see Figure 1, Panel C and Table 3). In addition to three homogenous, or pure nodes (Nodes 3, 7, and 14), this tree contained two curvilinear relationships involving age and neuroticism. Besides neuroticism, the tree also identified passive locus of control as a predictor of screening, a relationship missed by logistic regression models. While the full logistic regression model predicted only 4.4% of the non-attenders, the integrative decision tree predicted 42.9% of the non-attenders and 89.6% of attenders correctly.

The first split took place with future time-orientation. For women very low in future time-orientation (Node 1), age was the most crucial factor for screening likelihood and exhibited a curvilinear relationship. Here, 0% of women 45 and younger (Node 3) screened compared to 100% of the women aged 45 plus to 55 (Node 7). Women over the age of 55 had a screening rate of 56% which was more than the youngest group but less than the mid-age range (Node 8).

For women who were not extremely present time-oriented (Node 2), age was also important. For those under 60, conscientiousness made a significant difference (Nodes 9 and 10). For the conscientious group (Node 10), screening rates did not vary further as a function of other attributes; but neuroticism and passive locus of control made a difference in less conscientious women. Neuroticism, in particular, had an interesting curvilinear relationship (see nodes 11, 15, and 16). Finally, adding passive God locus of control produced a pure node with 100% of women attending who were high on the attribute, under 60, not extremely present time-oriented, less conscientious, and lower in neuroticism (Node 14). This integrative decision tree was superior to the all other decision trees and logistic regression models presented.

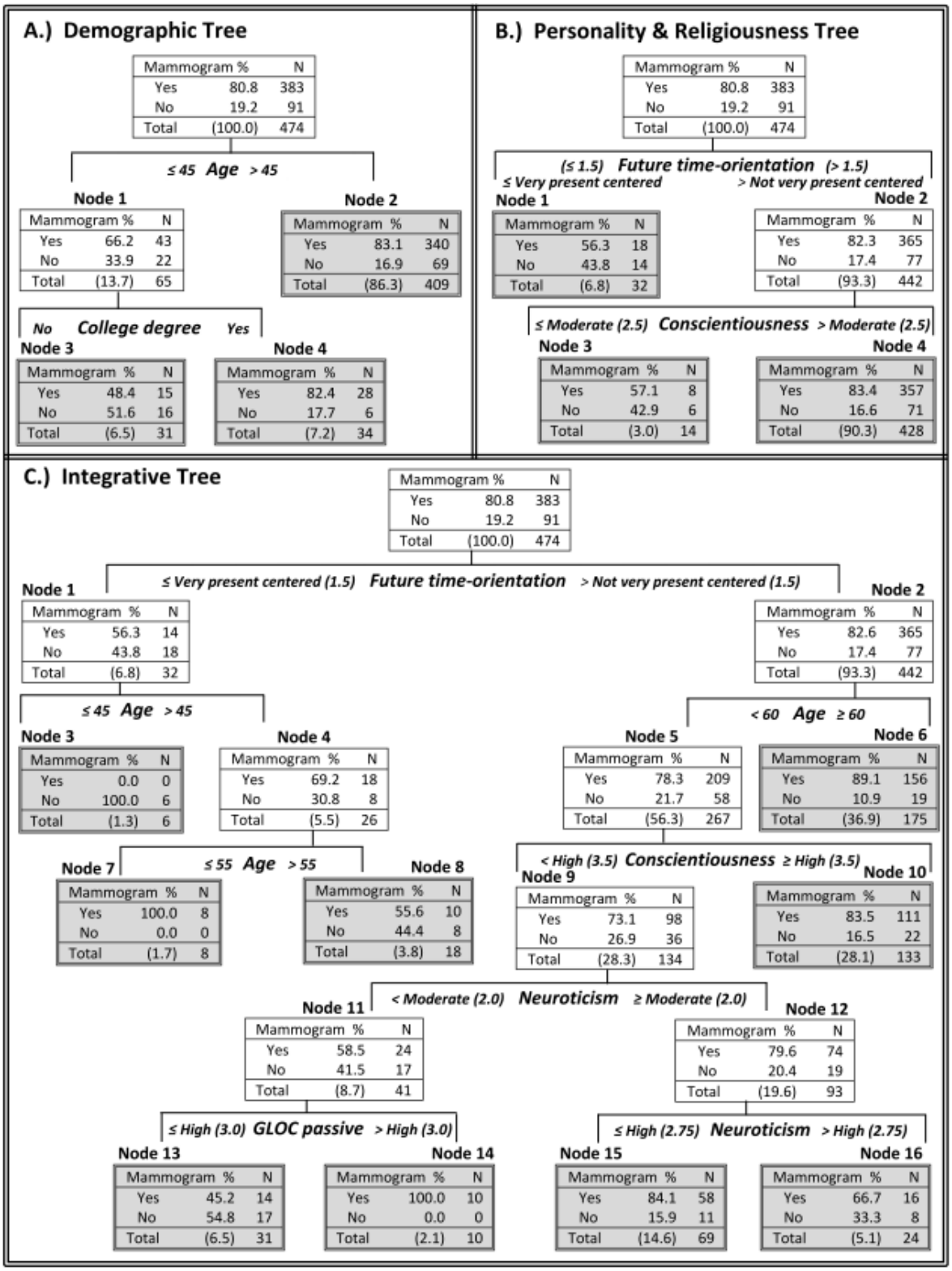

Figure 1. Mammogram attendance decision trees.

Note. Personality and religiousness attributes are 4 point scales (1 *Not at all*; 4 *A lot*).

Table 3. Integrative decision tree terminal nodes by variable values.

% Non-Attender	Age	Future Time-Orientation	Conscientiousness	Neuroticism	GLOC Passive	Terminal Node #
100.0%	**41 to 45**	**1.5 or lower** Very present centered	--	--	--	3
54.8%	**Under 60**	**Over 1.5** Not very present centered	**Less than 3.5** Not very conscientious	**Less than 2.0** Low neuroticism	**3.0 or less** Not believing strongly the God is in control	13
44.4%	**Over 55**	**1.5 or lower** Very present centered	--	--	--	8
33.3%	**Under 60**	**Over 1.5** Not very present centered	**Less than 3.5** Not very conscientious	**Over 2.75** Higher neuroticism	--	16
16.5%	**Under 60**	**Over 1.5** Not very present centered	**3.5 or higher** Very conscientious	--	--	10
15.9%	**Under 60**	**Over 1.5** Not very present centered	**Less than 3.5** Not very conscientious	**2.0 to 2.75** Moderate neuroticism	--	15
10.9%	**60 and over**	**Over 1.5** Not very present centered	--	--	--	6
0.0%	**Over 45 to 55**	**1.5 or lower** Very present centered	--	--	--	7
0.0%	**Under 60**	**Over 1.5** Not very present centered	**Less than 3.5** Not very conscientious	**Less than 2.0** Low neuroticism	**Higher than 3.0** Believing strongly the God is in control	14

All variables are on 4 point scales; Variables included in analysis but did not enter tree: Education, race, family history, fatalism, attendance, religiosity, collaborative locus of control, and internal locus of control.

Model comparisons

Next we compared the performance of decision trees with logistic regression models in terms of predictive ability (Table 4). As can be seen, all logistic regression models, even those with interactions similar to decision tree structures, performed poorly in correctly identifying women not attending mammogram screenings. Overall, models incorporating personality and religiousness outperformed those based solely on demographics. Taking personality attributes into account significantly improved prediction of non-attenders identifying 22.0% without age and 42.9% when age was mixed with personality.

Table 4. Comparison of analytic models predicting mammogram attendance.

Model	Non-attenders Classified Correctly (%)[a]	Attenders Classified Correctly (%)[b]
Logistic Regression Models		
Demographics	0.0	100.0
Personality and Religiousness	3.3	99.7
Integrative Model	4.4	99.0
Logistic Regression Models with Interactions		
Demographics (with age and education interaction)	0.0	100.0
Personality and Religiousness (with time-orientation and conscientiousness interaction)	1.1	99.7
Decision Trees		
Demographics	17.6	96.1
Personality and Religiousness	22.0	93.2
Integrative Model	42.9	89.6

Note.

[a] This percentage was calculated by (1) dividing the number of non-attenders correctly predicted by the model by the actual number of non-attenders (2) multiplying by 100.

[b] This percentage was calculated by (1) dividing the number of attenders correctly predicted by the model by the actual number of attenders (2) multiplying by 100.

Validation of the Decision Tree: Random forests

To assess the robustness of the final tree and to identify whether an important attribute or relationship might have been missed, we conducted supplementary random-forest analysis (Breiman, 2001; Strobl et al., 2009). A random-forest is simply a collection of trees. In a forest, not only are samples varied but also predictors are varied allowing attributes that may be formerly overshadowed by stronger predictors to contribute. Consequently, random forests allow for a measure of variable importance across a multitude of trees. If an attribute consistently finds its place in trees, even when hundreds of trees are grown from varied parameters, there can be little doubt of its importance as a predictor. Thus, compared to logistic regression, it is harder to miss important predictors in decision trees and random forests.

Specifically, we developed a random forest of 1000 trees and calculated variable importance. Each tree had a maximum of 5 predictors and up to 10 levels. Parent and child node sizes were set at a minimum of 10 and 5 respectively representing 2% and 1% of the sample. Variable importance was calculated using the percentage of times each attribute appeared as one of the five predictors within the resultant trees.

Within the 1000 tree forest (Figure 2), the first five most important attributes were identical to those in the full tree. Age was the most important attribute associated with mammogram attendance followed by conscientiousness, future time-orientation, neuroticism, and passive locus of control. Except for age, all other demographic attributes had weaker importance compared to personality attributes verifying the usefulness of predicting nonattendance from personality and religiousness attributes.

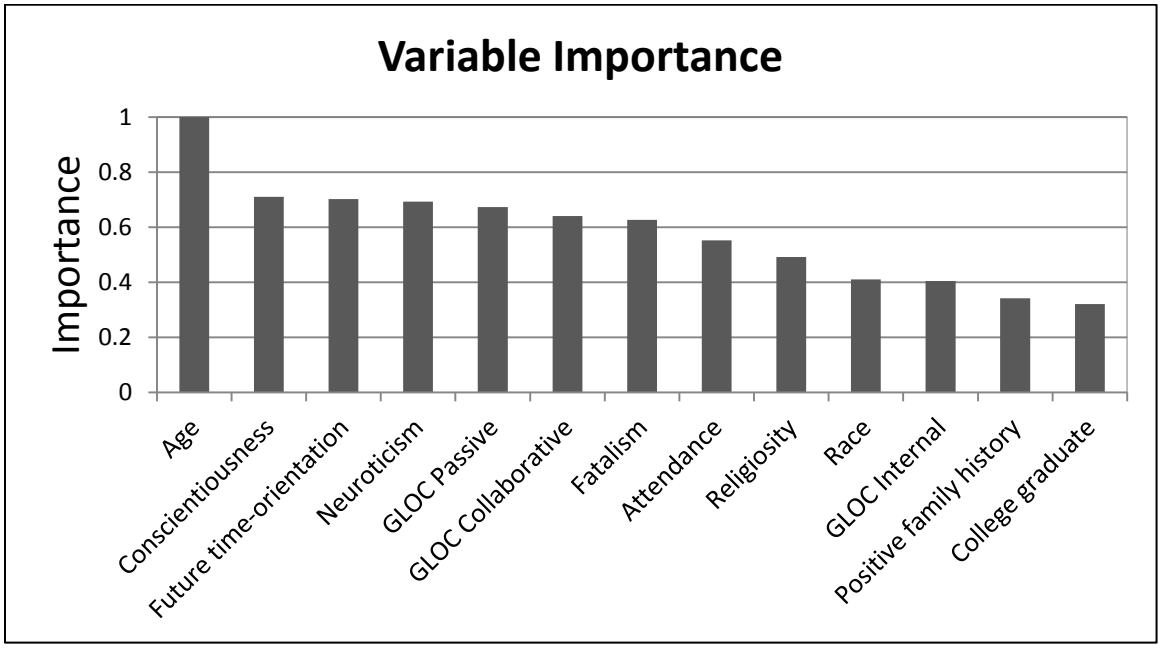

Figure 2. Variable importance for mammogram attendance.

Note. Importance values are scaled so that the highest ranking attribute is equal to 1.0.

CHAPTER 1—DISCUSSION

The present study addressed the question of mammogram non-attendance among women aged 41 and over. Since having mammograms is now the norm, understanding attributes of women who do not screen has become critical. Unlike past research, which typically revolved around demographic attributes, the present study examined the relevance of religiousness and personality attributes such as conscientiousness, time orientation, and neuroticism. Using demographics as a baseline, as expected, focusing on personality attributes significantly improved identification of non-attending women.

Small differences were seen in the classification ability of logistic regression when adding personality and religiousness attributes to demographics. However, decision trees allowed for complex relationships, and by nature of these relationships, trees greatly increased identification of non-attenders. Where logistic regression only implicated age, time-orientation, and conscientiousness as important factors, tree analyses revealed significant relationships involving several attributes not seen in logistic models (e.g., whether or not one has college degree, level of neuroticism, passive God locus of control). Furthermore, decision trees identified two curvilinear relationships involving age and neuroticism while producing a simple diagram with distinct cut-points useful for interventions. These findings suggest that decision trees can be used in place of traditional classification methods such as logistic regression in this context—not only as a supplement to them.

The integrative decision tree did well in identifying groups of women varying in their level of attendance from 0% to 100%. Women in two groups screened at 100%. The first group consisted of women 45 plus to 55 who were very present-centered. However,

younger women with similar scores on time-orientation had 0% attendance. The second group with 100% attendance included women below 60 who were not very present time-oriented, below average in both neuroticism and conscientiousness, and higher in passive God locus of control. Literature suggests that higher passive locus of control may act as an impediment to screening (Holt et al., 2007); however, decision trees revealed that women who were similar on all characteristics but lower in passive locus of control had the second lowest attendance rates of all groups. Perhaps passive locus is harmful only when other personality attributes are not considered.

One additional unexpected relationship emerged from the tree. Whereas neuroticism was expected to impede attendance, the integrative tree revealed a surprising curvilinear relationship where an optimal level of neuroticism was associated with higher attendance. This finding calls for further research as it seems to run counter to earlier findings on fear appeals (Witte, 2000).

Contributions, limitations, and applications

In exploring interactions among mammogram predictors with decision trees, the current study showcases the importance of personality and religiousness attributes. Such interactions allowed counterintuitive relationships to emerge not only showing passive locus of control to be a facilitator, but also, displaying an optimal amount of worry not previously seen.

With the current factors, the tree's overall performance was far superior to logistic regression. This tree afforded identification of new predictors along with non-linear relationships. Furthermore, it contained three groups of women who were identical in their screening behavior (pure nodes; see Nodes 3, 7, and 14). Random forest analysis supported the generalizability of the conclusions. Nonetheless, the sample size was relatively small (N= 474) with only 20% of women not attending (N =91). Thus, these

smaller pure nodes offer prime targets for future study. With increased sample size, future work analyzing the behavior and motivations in these specific women could no doubt add to mammogram attendance literature. Such research focusing on pure nodes of non-attending women would be even more fruitful in boosting mammogram attendance and reaching current national goals.

While MIDUS is a large dataset, variables such as mammogram knowledge, doctor recommendation, and screening history beyond last mammogram were not assessed. Whereas more global features like neuroticism and God locus of control were assessed in MIDUS, more specific measures like breast cancer fear and God locus of health control could aid in further understanding the mechanisms of mammogram attendance (Champion et al., 2004; Holt et al., 2007). Additionally, insurance status was assessed in MIDUS II with an average 27-month lag time between its measurement and mammogram status. Adding a concurrent measure of insurance status and other above mentioned factors could only increase predictive ability.

While more factors could have been added, one strength of the study lies in the ease of attribute assessment. Besides age, only 15 questions are needed to construct the integrated decision tree (Table 5). With the ability to assess psychological attributes with only a few items (Stephenson et al., 2003), the number of questions may be further reduced and thus could be easily incorporated into national surveys, online assessment tools, or patient intake forms.

A final contribution is the production of an easily applicable tree greatly improving the identification of non-attenders and providing avenues for future interventions that could be tailored around salient personality attributes positively associated with attendance or could temporarily elevate women low in beneficial attributes. Physicians could identify women in their own practices benefitting from mammography and, using such models,

predict the likelihood of screening focusing more effort on women in the least attendant groups. For instance, to temporarily boost women with low levels of future time-orientation, interventions focusing on long term gains may be helpful (Nodes 3 and 8). Past research has shown that time perspective can be increased through interventions, and increases in future time-orientation can lead to positive health behaviors (Hall & Fong 2003; Marko & Savickas, 1998). Additionally, positive affect may assist in people thinking less about short term costs and more about long term gains, thus inducing a positive mood in these women and discussing long term gains may make them more receptive to screening (Aspinwall, 2003). Due to time-orientation being implicated as an important factor in other cancer screenings such as cervical cancer, brief interventions making women less present time-orientated may have a spillover effect into other screening domains (Roncancio et al., 2014).

Furthermore, for low attending women who are younger than 60, not very present time-oriented, and lower in conscientiousness, interventions focusing on fear and worry may assist in screening (Nodes 13 and 16). Fear and worry can be induced; however, an optimal amount of fear has never been identified (Witte, 2000). It is possible optimal levels of fear, anxiety, and worry only exist in a subgroup of people and while others have too much worry or fear of cancer (Clarke & Everest, 2006). Thus interventions elevating concern for breast cancer in women with lower neuroticism coupled with reassurance focusing on efficacy of screening tests may increase attendance. For women with higher levels of neuroticism, the same reassurance without increased threat may increase their coping abilities and motivate screening (Ruiter et al., 2003). Although the model indicates that women who allocate more control of their lives to God attend more than women who rely less on God, bolstering this construct may not work in women who are not religious, and until studied further, could adversely affect other health domains (Allen et al., 2014).

Options such as these provide alternatives for interventions focusing on personality in efforts to increase not only mammogram screening but also other healthy behaviors.

Mammography has long been viewed as a proven tool for detecting breast cancer early when it is more treatable (Berry et al., 2005); however, recent reports have highlighted both the potential risk for over diagnosis of breast cancers not needing treatment and the possible lower estimated impact on breast cancer mortality reduction (Bleyer & Welch, 2012; Miller, Wall, Baines, Sun, To & Narod, 2014). Currently, even with these findings large agencies still advocate for high levels of national screening (Smith, Brooks, Cokkinides, Saslow & Brawley, 2013; U.S. Department of Health and Human Services, 2013). While blanket recommendations still prevail, trends are moving toward more individualized recommendations for mammogram attendance involving discussion of both benefits and risks of screening with healthcare professionals (Pace & Keating, 2014). With such a need for personalized recommendations, decision trees may be the right tool to aid customizing this information for individual women. Furthermore, collecting information on personality attributes in a medical setting as part of patient intake could be considered as routine as assessing other demographic factors related to health.

To meet future mammogram screening goals, new strategies which uncover attributes of women not having mammograms are necessary. These strategies include integration of both personality and religiousness attributes, as well as, the identification of complex relationships. In spite of this large task, the outcome must be easily interpretable and easily applicable in order to be useful. Profiles such as the one created here allow for the synergies between attributes of mammogram attendance while retaining utility and providing new intervention opportunities.

Table 5. Intake items necessary to utilize mammogram decision tree.

Instructions: Please indicate how well each of the following describes you.

Measure	Not at all	A little	Some	A lot
Conscientiousness				
1) Hardworking	1	2	3	4
2) Organized	1	2	3	4
3) Careful	1	2	3	4
4) Responsible	1	2	3	4
5) Thorough	1	2	3	4
Neuroticism				
6) Moody	1	2	3	4
7) Nervous	1	2	3	4
8) Worried	1	2	3	4
9) Calm (R)	1	2	3	4
Future Time-Orientation				
10) I believe there is no sense planning too far ahead because so many things can change. (R)	1	2	3	4
11) I have too many things to think about today to think about tomorrow.(R)	1	2	3	4
12) I live one day at a time. (R)	1	2	3	4
Passive God Locus of Control				
13) I try to make sense of the situation and decide what to do without relying on God. (R)	1	2	3	4
14) I look to God for strength, support, and guidance.	1	2	3	4
15) When you have decisions to make in your daily life, how often do you ask yourself what your religious or spiritual beliefs suggest you should do?	Never 1	Rarely 2	Sometimes 3	Often 4

Note. (R) Items are reverse coded. The survey is composed of items used in the current study, and items grouped by construct should be averaged. Further reduction may be possible.

CHAPTER 2

WHERE SCREENING IS NON-NORMATIVE, SCREENING-BASED INDIVIDUAL DIFFERENCES MATTER:

A STUDY OF WOMEN'S CANCER SCREENING AMONG WORKFORCE PARTCIPANTS AND HOMEMAKERS IN

TURKEY

ABSTRACT

Chapter 2 shifts focus from women's mammogram screening in cultures where screening is normative to a culture where screening is non-normative. In this chapter, we investigate how screening-based individual differences influence women in Turkey's cancer screening behavior. A total of 483 women, whose current screening rates of breast and cervical cancer range from 24 to 30%, were studied. We find current screening rates vary drastically for women who have participated in the workforce versus those women who are homemakers. We then look at the screening-based individual differences underlying these behaviors.

CHAPTER 2—INTRODUCTION

In Islamic cultures, two dominant viewpoints exist on women's workforce participation. The conservative standpoint confines women's role to the home, while the more liberal view embraces women's workforce participation (Moghadam, 1988; Sidani, 2005). Research suggests that, even in Islamic cultures that predominantly subscribe to the conservative point of view, for practical reasons, many Muslim women cannot afford to stay at home and must enter the workforce (Sechzer, 2004). Thus, in the absence of Islamic laws directly prohibiting women's workforce participation, women in such cultures must balance their time between their jobs and fulfilling their role as a homemaker (Jawad, 1998).

While workforce participation may overload some women trying to juggle both family demands and job responsibilities, it may also provide benefits to women beyond the economic value of a paycheck. These benefits include increases in decision making abilities, self-esteem, and self-efficacy (Ross &Wright, 1998; Sorensen & Verbrugge, 1987). Such benefits gained during workforce participation may persist even after retirement (Silver, 2010). Thus, these benefits may have implications for health protective behaviors. In the current study, we investigate the influence of women's workforce participation on health protective behaviors—drawing the distinction between homemakers and women with workforce participation. Specifically, we examine how women's workforce participation in Turkey influences cancer screening behaviors using the Health Belief Model.

Women's Role in Turkey

In Turkey, a secular nation with a 98% Muslim population, one-third of women ages 15 to 64 participate in the workforce compared to over two-thirds of men (Gündüz-Hoşgör & Smits, 2008; World Bank, 2015). In Turkey, women's workforce participation is slightly higher than Arab countries but lower that countries classified as low and lower middle income (World Bank, 2015). According to the Gender Gap Index, a global ranking of gender-based disparities, Turkey has some of the world's worst gender disparities ranking125th of 142 countries (World Economic Forum, 2014). When economic participation and education are considered, Turkey ranks 128th for labor participation and 105th for educational attainment.

If women are not participating in the workforce, what is their predominate role in Turkey? Even if the country is no longer ruled by Islamic law since the establishment of the republic, patriarchal roots and Islamic influences still exist (Erman, 2001; Toktas & O'Neil, 2015). Despite Turkey's secular roots, western influence, and bid for European Union membership, a woman's traditional role is still widely considered to be in the home with emphasis placed on bearing children. Furthermore, according to the World Values Survey, 77% of respondents in Turkey believe that a woman has to have children to be fulfilled (World Values Survey, 2014a). Whereas, 61% of respondents believe that workforce participation was the best way for a woman to be independent; 66% of the population also believe that when women work, children suffer (World Values Survey, 2014a, b).

Women and Workforce Participation

With women in the workforce having to manage work responsibilities and household obligations, often times role-overload and work-family conflict occur (Greenhaus & Beutell, 1985; Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964). In Turkey,

compared to men, women report feeling greater levels of work interference in the family domain; and although these women have greater overall life satisfaction, they feel less parental satisfaction and greater employment related guilt (Aycan & Eskin, 2005). Furthermore, in global meta-analytic findings such conflicts have been associated with general psychological strain, higher levels of depression, and physical health problems (Allen, Herst, Bruck &Sutton, 2000).

Workforce participation may cause additional physical and emotional burden for women. However, it can also provide women with many benefits beyond an economic incentive. For instance, workforce participation has been shown to increase self-esteem, decision making efficacy, and personal control (Ross & Wright, 1998; Sorensen & Verbrugge, 1987). Evidence suggests that workforce participation can bring about larger and more diverse social networks for working and retired women (Stoloff, Glanville & Bienenstock, 1999). Greater social networks may increase the chances of women encountering individuals diagnosed with cancer, which may increase their awareness of cancer risk.

In line with these social and psychological benefits, women participating in the workforce are often found to be generally healthier than non-working women (Annandale & Hunt, 2000). This increase in self-assessed health of working women extends beyond the baseline effect of people with poor health not being able to participate in the workforce (Arber, 1997). Not only do women in the workforce have better health, they also may have more control over their health. Besides decision-making efficacy and greater sense of personal control, women in the workforce have been found to have a greater influence in household decisions and decisions about their own health (Senarath &Gunawardena, 2009). Furthermore, women who are active workforce participants had higher cancer screening rates than unemployed women (Damiani et al., 2012). Unfortunately, the

unemployed distinction combined housewives, students, unemployed, and retired women, thus the impact of workforce participation experience on cancer screening could not be assessed. If work does provide greater control and decision making ability, this effect should hold even when women are retired.

In sum, if workforce participation does have an impact on cancer screening, it may come from multiple avenues. Perhaps, the larger more diverse social network increases the chance women will encounter a cancer survivor, outside of their own family, thus increasing their own feelings of susceptibility. Higher rates of screening may occur through increased self-efficacy. With increased decision-making ability may also come the skills necessary to accurately assess cancer's health risk or severity, as well as skills needed to evaluate the benefits and barriers of each screening test. If work truly does empower women, increase their self-efficacy, decision-making ability, and provide a wider social network with more opportunities to see cancer exemplars, then women who are in the workforce, as well as those who have been in the workforce namely the retired and currently unemployed, may also have higher rates of screening through perceptions of susceptibility, benefits, barriers, and efficacy. If women with workforce participation are able to more accurately assess the severity of cancer, their perceived severity may increase of decrease depending on reference point. These factors may be similar for all working women; however, additional considerations for cancer screening in Muslim women must be considered.

Cancer Screening in Islamic Countries

To understand how workforce participation may influence breast and cervical cancer screenings in Turkey, it is crucial to understand how such tests may be viewed in predominantly Islamic cultures. It is estimated that over 2 million women worldwide were diagnosed with either breast or cervical cancer in 2012, with approximately 800,000

women losing their lives to the diseases that same year (Ferlay et al., 2013). One of the best strategies to reduce mortality from breast and cervical cancer is through screenings such as clinical breast exams, mammograms, and PAP smears. However, not all groups take advantage of available screenings. Muslim women across a variety of national identities have low screening rates for clinical breast exams, mammograms, and Papanicolaou tests (PAP smear test) (Baron-Epel, Granot, Badarna & Avrami, 2004; Bener, Alwash, Miller, Denic, & Dunn, 2001; Guvenc, Seven, Kilic, Akyuz & Akcan, 2012; Matin & LeBaron, 2004; Yilmaz, Guler, Bekar & Guler, 2011).

While teachings of Islam advocate disease prevention and individual responsibility in health matters, certain tenants dealing with modesty and same gender physicians may result in culture specific barriers for breast and cancer screenings (Rajaram & Rashidi, 1999). Multiple studies involved modesty and embarrassment associated with breast and cervical cancer screenings, with as many as 25% of Muslim women specifically citing embarrassment in some studies (Cohen & Azaiza, 2008; Matin & LeBaron, 2004; Salman, 2012). Thus, lower screening rates and cultural specific barriers must be considered when assessing clinical breast exam, mammogram, and PAP behaviors and intentions in Muslim populations.

Health Belief Model

To understand the mechanisms of Muslim women's cancer screening behaviors with respect to workforce participation, what is needed is a model accounting for enhanced perceived susceptibility, severity, benefits and self-efficacy as well as, allowing for specific barriers such as concerns about modesty. A psychological model that has frequently been used in public health and health psychology literature to predict health protective behavior and allows for these contributions is the Health Belief Model (HBM) (Champion 1984; Rosenstock 1974). According to HBM, a woman will engage in cancer

screening to the extent that she believes 1) she is susceptible to cancer (perceived susceptibility), 2) cancer may have severe negative consequences (perceived severity), 3) screening will reduce the cancer's negative consequences (perceived benefits); and 4) obstacles against screening are minimal (perceived barriers). HBM additionally ascribes a key role to confidence in a woman's ability to engage in screening. Applications of HBM also indicate that factors influencing the wellbeing of a person, including access to healthcare, health history and socioeconomic factors, may have an impact on not only risk perceptions but also control perceptions and relatedly the extent to which an individual will feel efficacious enough to engage in a protective behavior (Baum, Garofalo & Yali 1999; Chen & Land 1990; Gerstorf, Rocke & Lachman 2011; Shiloh & Ilan 2005). The current study tests all five HBM constructs to determine what differences may exist between homemakers and workforce participants, as well as, which HBM factors underlie intentions to have screening tests in both groups.

Current Study and Hypotheses

While research exists on women's cancer screening behaviors in Turkey, some using the health belief model, no study examines the distinction of workforce participation and the mechanisms that differ between homemakers and women in the workforce (Guvenc, Akyuz & Acikel, 2011; Guvenc, Seven, Kilic, Akyuz & Akcan, 2012; Secginli & Nahcivan, 2004; Yilmaz, Guler, Bekar & Guler, 2011). The current study uses a subset of data from a national survey of Turkey's urban population and controls for differences in socioeconomic variables, access to health care, and experience with cancer. We study not only the past screening behaviors of women but also attempt to understand the mechanisms driving these two potentially different groups of Muslim women.

We propose four main hypotheses for women's cancer screenings: clinical breast exam, mammogram, PAP, and a composite measure of screening tests. First, women in

the workforce will have higher rates of (a) ever having each exam and (b) being current on each screening. Second, the trend that women with workforce participation have a higher number of up-to-date screening tests will hold across groups varying in age, education, and religiosity. Third, women in the workforce will have higher intentions to have a clinical breast exam in the next three years, a mammogram in the next two years, and a PAP in the next three years, as well as, composite measure for all screening tests. Finally, we expect women with workforce participation to have higher susceptibility and greater self-efficacy than homemakers. Besides these predictions, we also explored the possibility that barriers perceived by these two groups of women could be different-- an important question that becomes critical for intervention purposes.

CHAPTER 2—METHODS

Participants

We analyzed data from 483 women, aged between 40 and 70, who completed breast and cervical cancer screening measures as part of a broader study we conducted on health protective behaviors in Turkey. The broader study (N = 3021) used multistage cluster sampling in 33 urban cities and involved face-to-face interviews lasting 45 and 60 minutes. The original dataset included both women and men aged 20 to 70. For the purpose of our current study, women under the age of 40 and men were removed from the data set. Additionally, women with a previous cancer diagnosis or chronic gynecologic condition were also excluded—resulting in the final sample of 483 women.

The mean age of women in this sample was 50.86 (SD = 8.30). Of respondents, 71.6% had a primary school education or less. The majority of respondents (83.5%) had a combined household income of 2,000TL (less than $1,000) or below. The majority of the

respondents were married (80.1%), with 51.6% having 3 or more children. More than half of the respondents lived in a metropolitan area of Turkey (61.9%). Respondents reported moderately high level of religiosity, on a scale ranging from 0 to 10 (M = 7.00; SD = 1.86). When religiosity was dichotomized into lower (scores 0 to 5) and higher levels (scores 6 to 10), 80.2% of women were classified as higher in religiosity.

In terms of access to health care services, the majority of the respondents reported having health insurance (including the Social Security Institution's Universal Health Insurance) (94.6%). Likewise, most of the respondents sought medical care in the last twelve months (89.3%); however, only a small proportion of the respondents reported visiting gynecologists regularly (19.5%). Women generally considered themselves to be healthy *(*M = 6.51, SD = 1.78; on a scale ranging from 0 to 10).

The main demographic variable of interest in the current study was whether or not the respondent categorized herself as a "housewife" (in Turkey, the concept of housewife is still being commonly used to refer to homemakers; in this article we will henceforth use homemakers). The majority of women categorized themselves as homemakers (75.2%), while the remainder categorized themselves as working full-time (13.5%), working part-time (1.4%), currently seeking employment (0.4%), or retired (9.5%). Unpaid family workers and women with no work status were not included (N = 19).

Measures

The survey items were evaluated for reliability and validity through a series of four pilot tests.

Past Cancer Screening Behaviors and Future Screening Intentions. Respondents answered questions about their screening behaviors and their future screening intentions for three cancer screening tests: clinical breast examination, mammogram, and Papanicolaou test (PAP smear test). For each screening behavior, women reported two

measures of performance: whether they have ever engaged in the screening behavior and whether they were current in this screening (i.e., whether they had completed the screening test in a time frame recommended by health organizations) (Table 7). For example, it is recommended that women aged 40 and above have a mammogram every two years. Hence, each respondent reported whether she has ever had a mammogram and whether she had a mammogram within the last two years.

We computed two composite past cancer screening measures. The first measure was based on the screening tests that women had ever completed. For this measure women received one point for each screening test ever performed. If a woman had performed all three screening exams her score was 3, while women completing no screening tests had a score of 0. The same computation was performed with current screening behaviors. A woman who was current on all of her exams received a score of 3, and a woman with no current tests had a score of 0 regardless of number of exams ever completed.

Women also reported their behavioral intentions to get the following cancer screenings on a 5-point scale (1 = not at all likely; 5 = very likely): clinical breast exam in the next 3 years, mammogram in the next 2 years, and PAP in the next 3 years. Besides using these three intention measures individually, we also calculated an average intention score combining all three types of cancer screening tests.

Health Belief Model (HBM) Variables. Women responded to all HBM items using 5-point scales for clinical breast exam, mammogram, PAP, and a composite measure for all screening tests. For susceptibility, respondents reported how likely they thought they would develop breast cancer or cervical cancer in the future, as well as, their perceived risk for both cancers compared to the average women their age ($M_{\text{Susceptibility breast cancer}} = 2.85$, $SD = 0.88$, $r = 0.71$; $M_{\text{Susceptibility cervical cancer}} = 2.80$, $SD = 0.93$, $r = 0.78$; $M_{\text{Susceptibility composite}} = 2.82$, $SD = 0.81$, Number of items = 4, $\alpha = 0.84$). Severity was

composed of three measures each for breast and cervical cancer. For breast and cervical cancers, women rated their agreement with the statements that by developing the cancers in question "problems would last a long time," "feelings about self would change," and "whole life would change" ($M_{\text{Severity breast cancer}} = 3.89$, $SD = 0.80$, $\alpha = 0.84$; $M_{\text{Severity cervical cancer}} = 3.89$, $SD = 0.72$, $\alpha = 0.82$; $M_{\text{Severity composite}} = 3.89$, $SD = 0.68$, Number of items = 6, $\alpha = 0.87$).

For each screening behavior women rated perceived benefits of and barriers to performance. For example benefit items measured agreement that having the screening would help women to "worry less," "find cancer early," and "decrease chances of dying" ($M_{\text{Benefits clinical breast exam}} = 4.11$, $SD = 0.57$, Number of items = 4, $\alpha = 0.71$; $M_{\text{Benefits mammogram}} = 4.13$, $SD = 0.59$, Number of items = 3, $\alpha = 0.68$; $M_{\text{Benefits PAP}} = 4.05$, $SD = 0.58$, Number of items = 4, $\alpha = 0.72$; $M_{\text{Benefits composite}} = 4.09$, $SD = 0.46$, Number of items = 11, $\alpha = 0.81$). Examples for barriers included embarrassment, not having a female doctor, being afraid of finding something wrong, lack of time, and financial cost of screening ($M_{\text{Barriers clinical breast exam}} = 2.59$, $SD = 0.92$, Number of items = 9, $\alpha = 0.91$; $M_{\text{Barriers mammogram}} = 2.77$, $SD = 0.91$, Number of items = 8, $\alpha = 0.89$; $M_{\text{Barriers PAP}} = 2.65$, $SD = 0.94$, Number of items = 4, $\alpha = 0.84$; $M_{\text{Barriers composite}} = 2.67$, $SD = 0.85$, Number of items = 21, $\alpha = 0.96$). Finally, efficacy was measured with the following two items specific to each screening behavior: "If I wanted to I could easily obtain" and "I can easily obtain" ($M_{\text{Efficacy clinical breast exam}} = 3.81$, $SD = 0.83$, $r = 0.63$; $M_{\text{Efficacy mammogram}} = 3.65$, $SD = 0.92$, $r = 0.72$; $M_{\text{Efficacy PAP}} = 3.69$, $SD = 0.85$, $r = 0.62$; $M_{\text{Efficacy composite}} = 3.73$, $SD = 0.72$, Number of items = 6, $\alpha = 0.84$).

CHAPTER 2—RESULTS

Comparison of Demographic Indicators by Workforce Participation

Table 6 compares women who classified themselves as homemakers and women who classified themselves as working or retired in terms of key demographic indicators. There was no statistically significant age difference between homemakers (M = 51.13, SD = 8.59) and women who reported being working or retired (M = 50.03, SD = 7.31, F (1, 481) =1.59; p = 0.21). Compared to homemakers, working or retired women were more likely to have a higher level of education, to be not married, to have fewer children, to have a higher household income, and to be less religious (Table 6).

No differences were observed between women classifying themselves as homemakers and women who reported being working/retired in terms of being insured, having sought medical care within the last twelve months, or having a regular gynecologist. Likewise, there were no statistically significant differences in terms of self-rated overall health status. Finally, there were no differences between homemakers and working/retired women in terms of whether they had a family history of breast or cervical cancer, and in terms of whether they have had a family member or a close other with a cancer diagnosis.

Table 6. Descriptive statistics for full sample and by workforce participation.

Measure	Full Sample (N = 483)	Homemaker (N = 363)	Working/Retired (N = 120)
Demographics			
Age	50.86 (8.30)	51.13 (8.59)	50.03 (7.31)
Education			
1. Primary school or less	71.6%	82.6% $_b$	38.3% $_a$
2. Some high school	28.4%	17.4% $_b$	61.7% $_a$
Married	80.1%	84.3% $_b$	67.5% $_a$
Number of Children			
1. No children	3.5%	2.8%	5.8%
2. 1 child	10.4%	7.2% $_b$	20.0% $_a$
3. 2 children	34.6%	31.7% $_b$	43.3% $_a$
4. 3 or more children	51.6%	58.4% $_b$	30.8% $_a$
Household income (monthly)			
1. 1000 TL or less (very low)	39.8%	44.8% $_b$	25.4% $_a$
2. 1001-2000 TL (low)	43.7%	43.3%	44.7%
3. 2001 TL or more (> moderate)	16.5%	11.9% $_b$	29.8% $_a$
Lives in a metropolitan area	61.9%	59.5%	69.2%
Religiosity (0-10)	7.00 (1.86)	7.13 (1.88) $_b$	6.59 (1.75) $_a$
Access to Care/General Health			
Has insurance	94.6%	93.6%	97.5%
Had medical care in the last 12 months	89.3%	89.6%	88.2%
Has a regular gynecologist	19.5%	19.6%	19.3%
Current general health status (0-10)	6.51 (1.78)	6.42 (1.83)	6.77 (1.61)
Personal Experience with Cancer			
Family member diagnosed with cancer	37.7%	39.4%	32.5%
Close other diagnosed with cancer	29.8%	31.4%	25.0%
Breast or cervical cancer family history	7.5%	8.3%	5.0%

Note. Means with different subscripts within a row are significantly different, $p < 0.05$.

Past Cancer Screening Behaviors and Workforce Participation

Table 7 summarizes the past breast and cervical cancer screening behaviors of women in the study. Women's screening rates for both breast and cervical cancer were low: only 41.2% of women ever had a clinical breast exam, 34.9% ever had a mammogram, and 39.8% ever had a Pap smear. As expected, however, there were differences between homemakers and working/retired women in each of these behaviors.

Working/retired women were 1.76 times more likely than homemakers to have ever had a clinical breast examination ($p < .01$) and 1.83 times more likely than homemakers to have had a clinical breast examination in the past year ($p < .01$). There was no significant difference between groups with respect to whether they have ever had a mammogram(*OR* = 1.37, $p = 0.15$); however, working/retired women were also 1.83 times more likely than homemakers to have had a mammogram in the past two years ($p < .01$) (Table 6). For cervical screening, working/retired women were 1.87 times more likely than homemakers to have ever had a PAP ($p < .01$) and 1.62 times more likely than homemakers to have had a PAP in the last 3 years ($p < .05$).

When the composite measure of screenings were examined, working/retired women ($M = 1.43$) had a higher mean number of screening tests ever completed than homemakers ($M = 1.06$; F (1, 481) =8.69; $p < 0.01$), as well as, a higher number of current screening tests completed ($M = 1.06$ for working/retired and $M = 0.71$ for homemakers, F (1, 481) =10.82; $p < 0.001$).

Table 7. Breast and cervical cancer screening behaviors by workforce participation (N = 483).

Behaviors	Descriptive Statistics			Logistic Regression	
	Full Sample	Homemaker	Working/Retired	Homemaker	Working/Retired
Individual Past Behaviors					
Clinical Breast Exam (Ever)	41.2%	37.7% $_b$	51.7% $_a$	1.0 (Referent)	1.76**
Clinical Breast Exam (1 Year)	24.4%	21.5% $_b$	33.3% $_a$	1.0 (Referent)	1.83**
Mammogram (Ever)	34.9%	33.1%	40.3%	1.0 (Referent)	1.37
Mammogram (2 Years)	24.6%	21.7% $_b$	33.6% $_a$	1.0 (Referent)	1.83**
PAP (Ever)	39.8%	36.0% $_b$	51.3% $_a$	1.0 (Referent)	1.87**
PAP (3 Years)	31.4%	28.7% $_b$	39.5% $_a$	1.0 (Referent)	1.62*
Composite Behaviors					
Number of Screening Tests Completed (Ever)	1.15 (1.05-1.26)	1.06 (0.95-1.19) $_b$	1.43 (1.20-1.65) $_a$		
Number of Screening Tests Completed (Current)	0.80 (0.71-0.89)	0.71 (0.62-0.81) $_b$	1.06 (0.85-1.27) $_a$		

Note. * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$; Different subscripts indicate significant differences $p \leq 0.05$.

Current Screenings and Demographic Factors

Although having a test at some point in life may be useful, what is critical for detection and survival is to be current or up-to-date with screening. The longer the lag time between the screening and the present time, the less useful the test. For instance, a 60 year old woman who had one mammogram 20 years ago, can no longer benefit from that screening. Thus, we concentrate on differences in current clinical breast exams, current mammograms, current PAP smears, and the mean number of current tests completed.

For current screening prediction, there are several demographic factors that may interact with workforce participation. First we look at the main effects of age, education, income, metropolitan living status, and religiosity on current cancer screenings. Then, we examine these demographic factors and their respective interactions with workforce participation (Figure 1)

Age. When women were split into three groups based on age, the younger two groups of women completed more current screening tests ($M_{40 \text{ to } 49} = 0.90$, $SD = 1.03$; $M_{50 \text{ to } 59} = 0.81$, SD = 1.03; $M_{60 \text{ and older}} = 0.49$, $SD = 0.82$; $F(2, 480) = 5.61$, $p < 0.01$). Figure 1(a) shows the interaction between age and workforce participation. Although there was a trend across all ages where working/retired women completing more current screening exams than homemakers, the relationship was only significant for women between 50 and 59 years of age ($M_{\text{Working /retired}} = 1.23$, $SD = 1.20$; $M_{\text{Homemaker}} = 0.64$, $SD = 0.90$, $F(1, 147) = 10.84$, $p < 0.001$). With older women screening less, we investigated whether differences existed between women who were working and those who were retired. After controlling for age, no differences in the number of current screening tests completed existed between women who were currently working and those who were retired ($M_{\text{Working}} = 1.08$, $SD = 1.12$; $M_{\text{Retired}} = 1.02$, $SD = 1.22$; $F(1,119) = 0.26$; $p = 0.61$).

Education. Women with higher levels of education had higher numbers of current cancer screening tests completed ($M_{\text{Some high school}} = 1.02$, $SD = 1.12$; $M_{\text{Primary school or less}} = 0.71$, $SD = 0.94$; $F(1, 481) = 9.55$, $p < 0.01$). Figure 1(b) shows the interaction between education and workforce participation. Namely, among women with primary school education or less, there was a significant difference between working/retired women and homemakers ($M_{\text{Working /retired}} = 1.02$, $SD = 1.16$; $M_{\text{Homemaker}} = 0.66$, $SD = 0.90$, $F(1, 344) = 5.84$, $p < 0.05$), among women with some high school education, this difference, although in the same direction, was not significant ($M_{\text{Working /retired}} = 1.08$, $SD = 1.16$; $M_{\text{Homemaker}} = 0.95$, $SD = 1.08$, $F(1, 135) = 0.45$, $p = 0.51$).

Income. Women with the highest levels of income also had the highest number current screening tests completed compared to lower income levels ($M_{\text{2001 TL and over}} = 1.23$, $SD = 1.10$; $M_{\text{1001-2000 TL}} = 0.81$, SD = 1.02; $M_{\text{1000TL and under}} = 0.64$, $SD = 0.94$; $F(2, 439) = 9.17$, $p < 0.001$). When the interaction between income and workforce participation was considered(Figure 1 (c)), the trend of working/retired women screening more held for lower and moderate levels of income but disappeared among women who report higher than 2000TL household income (1000 TL and under: $M_{\text{Working /retired}} = 0.93$, $SD = 1.13$, $M_{\text{Homemaker}} = 0.58$, SD =0.89, $F(1, 174) = 3.46$, p = 0.07; 10001-2000TL: $M_{\text{Working /retired}} = 1.10$, $SD = 1.24$, $M_{\text{Homemaker}} = 0.70$, SD =0.91, $F(1, 191) = 5.79$, $p < 0.05$; 2001TL and more: $M_{\text{Working /retired}} = 1.18$, $SD = 1.11$, $M_{\text{Homemaker}} = 1.28$, SD =1.10, $F(1, 71) = 0.17$, p = 0.69).

Metropolitan Living Status. Women living in metropolitan areas had a higher number of current screening tests completed ($M_{\text{Metropolitan}} = 0.89$, $SD = 1.04$; $M_{\text{Non-metropolitan}} = 0.65$, $SD = 0.94$; $F(1, 481) = 6.42$ $p < 0.05$). When workforce participation was considered (Figure 1(d)) the trend existed such that working/retired women had more total current screening tests than homemakers; however, the difference was only significant

for women living in non- metropolitan areas (Metropolitan: $M_{\text{Working /retired}} = 0.99$, $SD = 1.14$, $M_{\text{Homemaker}} = 0.85$, SD =0.99, F (1, 297) = 1.04, p = 0.31; Non-metropolitan: $M_{\text{Working /retired}} = 1.22$, $SD = 1.18$, $M_{\text{Homemaker}} = 0.51$, SD =0.81, F (1, 182) = 18.24, $p < 0.001$).

Religiosity. Finally, women with lower levels of religiosity had higher numbers of current tests completed ($M_{\text{Low religiosity}} = 1.00$, $SD = 1.14$; $M_{\text{High religiosity}} = 0.73$, $SD = 0.96$; F (1, 474) = 5.35, $p < 0.05$). Figure 1(e) once again shows the trend that working/retired women had a higher mean number of current screening tests completed although the relationship was only significant in women with high religiosity levels (Low religiosity: $M_{\text{Working /retired}} = 1.17$ $SD = 1.12$, $M_{\text{Homemaker}} = 0.92$, SD =1.15, F (1, 92) = 0.95, p = 0.33; High religiosity: $M_{\text{Working /retired}} = 0.98$, $SD = 1.15$, $M_{\text{Homemaker}} = 0.66$, SD =0.88, F (1, 379) = 7.46, $p < 0.01$).

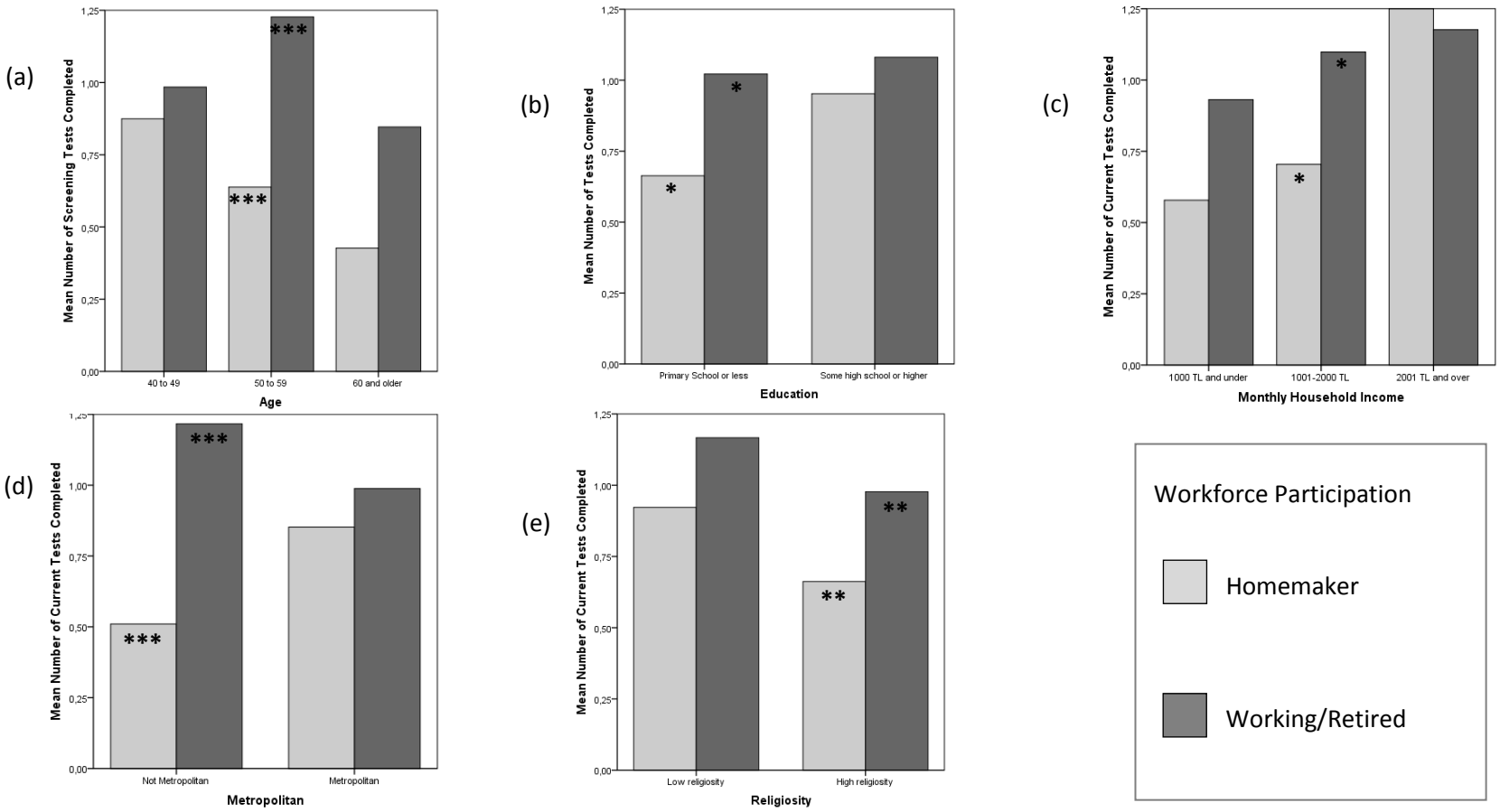

Figure 3. Mean Number of Current Cancer Screening Tests Completed by Workforce Participation and Demographics (N = 483).

Note: * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$; For mean number of current tests completed the range is 0 to 3 screening tests including: clinical breast exam, mammogram, and PAP smear.

Future Screening Intentions

As stated, being up-to-date on all cancer screening tests is important for early detection of cancer. We have shown that working/retired women were consistently higher on all cancer screenings even when additional demographic interactions were considered. Here, we focus on women's intentions to stay current with their cancer screenings. We will particularly focus on intentions to have a clinical breast exam in the next three years, a mammogram in the next two years, and a PAP in the next three years, as well as intentions to be current on all screenings.

As summarized in Table 8, there were significant differences between working/retired women and homemakers in terms of intentions to get clinical breast examination ($M_{\text{Homemaker}} = 2.98$, $SD = 1.06$; $M_{\text{Working /retired}} = 3.26$, $SD = 1.03$), F (1, 468) =7.91; $p < 0.01$) PAP test ($M_{\text{Homemaker}} = 2.83$, $SD = 1.10$; $M_{\text{Working/retired}} = 3.11$, $SD = 1.00$), F (1, 452) =5.84; $p < 0.16$, and composite intentions to be current in all three of the cancer screening tests ($M_{\text{Homemaker}} = 2.95$, $SD = 0.91$; $M_{\text{Working /retired}} = 3.13$, $SD = 0.82$), F (1, 481) =3.75; $p < 0.05$ However, there was no significant difference between working/retired women and homemakers in terms of intentions to get a mammogram ($M_{\text{Homemaker}} = 2.93$, $SD = 1.01$; $M_{\text{Working /retired}} = 3.07$, $SD = 0.96$), F (1, 461) =1.67; $p = 0.20$).

Table 8. HBM for screening behavior intentions by workforce participation.

		Homemaker N= 363			Working/Retired N=120		
Measure		M	SD	Intention Correlation	M	SD	Intention Correlation
Clinical Breast Exam	Intention	2.98_b	1.06		3.26_a	1.03	
	[+]Susceptibility	2.83	0.87	0.34***	2.98	0.85	0.30***
	[+]Severity	3.89	0.77	0.14**	3.87	0.83	0.11
	Benefits	4.12	0.59	0.23***	4.14	0.50	0.24**
	Barriers	2.65_b	0.90	-0.02	2.42_a	0.95	0.03
	Efficacy	3.77_b	0.87	0.33***	3.94_a	0.69	0.13
Mammogram	Intention	2.93	1.01		3.07	0.96	
	[+]Susceptibility	2.83	0.87	0.33***	2.98	0.85	0.10
	[+]Severity	3.89	0.77	0.08	3.87	0.83	0.01
	Benefits	4.10_b	0.60	0.16**	4.22_a	0.58	0.12
	Barriers	2.78	0.90	-0.01	2.63	0.94	0.08
	Efficacy	3.64	0.92	0.21***	3.62	0.93	0.04
PAP	Intention	2.83_b	1.10		3.11_a	1.00	
	[+]Susceptibility	2.75_b	0.94	0.34***	2.95_a	0.89	0.46***
	[+]Severity	3.86	0.74	0.06	3.93	0.65	0.16*
	Benefits	4.01_b	0.61	0.14**	4.15_a	0.48	0.18*
	Barriers	2.70_b	0.93	0.00	2.49_a	0.96	0.07
	Efficacy	3.64_b	0.87	0.36***	3.84_a	0.78	0.42***
Composite Screening Intentions	Intention	2.95_b	0.91		3.13_a	0.82	
	Susceptibility	2.77_b	0.81	0.42***	2.98_a	0.78	0.35***
	Severity	3.89	0.68	0.13**	3.91	0.66	0.08
	Benefits	4.07_b	0.48	0.25***	4.17_a	0.40	0.23**
	Barriers	2.72_b	0.83	0.03	2.53_a	0.88	0.08
	Efficacy	3.69	0.74	0.41***	3.82	0.66	0.21**

Note. [+]Susceptibility and severity are based on breast or cervical cancer items and are not test specific; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$. Different subscripts indicate significant differences $p \leq 0.05$; Although full correlation matrix is not shown, no collinearity problems exist.

Predicting Screening Intentions with HBM

Table 8 also summarizes the differences between homemakers and working/retired women in terms of the variables in the HBM (i.e., susceptibility, severity, perceived benefits of cancer screening, perceived barriers for cancer screening, and efficacy). Homemakers and working/retired women were similar to each other for many of the HBM constructs across the three screening behaviors and composite intentions. No differences were observed between homemakers and working/retired women with respect to perceived breast cancer susceptibility; however, working/retired women had higher perceived cervical cancer susceptibility ($M_{\text{Working/retired}} = 2.95$, $SD = 0.89$; $M_{\text{Homemaker}} = 2.75$, $SD = 0.94$), $F(1, 465) = 4.40$, $p < 0.05$).

No differences in perceived severity of breast or cervical cancer existed. Homemakers perceived fewer benefits for mammogram, PAP, and composite screening tests (mammogram: $M_{\text{Working/retired}} = 4.22$, $SD = 0.58$; $M_{\text{Homemaker}} = 4.10$, $SD = 0.60$; $F(1, 473) = 4.26$; $p < 0.05$; PAP: $M_{\text{Working/retired}} = 4.15$, $SD = 0.48$; $M_{\text{Homemaker}} = 4.01$, $SD = 0.61$; $F(1, 465) = 5.41$; $p < 0.05$; composite screening tests: $M_{\text{Working/retired}} = 4.17$, $SD = 0.40$; $M_{\text{Homemaker}} = 4.07$, $SD = 0.48$; $F(1, 481) = 4.64$; $p < 0.05$). Conversely, homemakers also perceived greater barriers than working/retired women for clinical breast exam, PAP, and composite screening tests (CBE: $M_{\text{Working/retired}} = 2.42$, $SD = 0.95$; $M_{\text{Homemaker}} = 2.65$, $SD = 0.90$), $F(1, 479) = 5.52$; $p < 0.05$; PAP: $M_{\text{Working/retired}} = 2.49$, $SD = 0.96$; $M_{\text{Homemaker}} = 2.70$, $SD = 0.93$; $F(1, 469) = 4.31$; $p < 0.05$; composite screening tests: $M_{\text{Working/retired}} = 2.53$, $SD = 0.88$; $M_{\text{Homemaker}} = 2.72$, $SD = 0.83$; $F(1, 481) = 4.76$; $p < 0.05$). When analyzed individually, the barriers contributing to the differences were as follows: embarrassment for all types of screening, no nearby facility for CBE, and too much time for PAP. There was no difference in perception of cost as a barrier between the two groups. Finally, levels of efficacy differed such that working women had higher

efficacy for clinical breast exam and PAP smears than homemakers (Clinical breast exam: $M_{\text{Working/retired}} = 3.94$, $SD = 0.69$; $M_{\text{Homemaker}} = 3.77$, $SD = 0.87$; $F(1, 477) = 3.77$; $p < 0.05$; PAP: $M_{\text{Working/retired}} = 3.84$, $SD = 0.78$; $M_{\text{Homemaker}} = 3.64$, $SD = 0.87$; $F(1, 459) = 4.63$; $p < 0.05$).

As shown on Table 8, on a bivariate level, susceptibility was associated with intention for all behaviors except for working women's mammogram intentions. Among homemakers, cancer severity perceptions had a significant correlation with clinical breast exam intentions and composite intentions. Among working/retired women, cancer severity perceptions were significantly correlated only with PAP intentions. Women's perceptions regarding screening benefits were associated with all intentions except for working women's mammogram intentions. Women's perceived barriers were not associated with any screening intentions. Finally, women's efficacy levels were associated with all behavioral intentions except for working women's clinical breast exam and mammogram intentions.

Overall, multivariate linear regression models using the HBM showed similar results for homemakers and working women (See Table 9). For homemakers, HBM explained 21% of the variance in clinical breast exam intentions, 16% in mammogram intentions, 21% in PAP intentions, and 30% for all screening intentions. For working/retired women, HBM explained 12% of the variance in clinical breast exam intentions, 3% in mammogram intentions, 32% in PAP intentions, and 16% for all screening intentions.

As can be seen from Table 9, for both homemakers and working/retired women, perceived susceptibility was an important predictor of intentions. The only exception to this was working/retired women's intentions to get a mammogram. One key difference between homemakers and working/retired women concerns the impact of perceived

efficacy on behavioral intentions. Whereas among homemakers, efficacy consistently had a positive impact on screening intentions, among working/retired women, efficacy was not related to intentions to get a clinical breast examination, a mammogram or the composite intention score. Besides susceptibility and efficacy, the only other construct that emerged as a significant predictor of intentions was perceived benefits, which, only among homemakers, had a positive impact on composite cancer screening intention score. Women's perception of severity and barriers was not a significant predictor of intentions in any of the models.

Table 9. Regression for Health Belief Model by cancer screening behavior intention and workforce participation (N= 483).

	Beta Weights					
Health Belief Model	Susceptibility	Severity	Benefits	Barriers	Efficacy	R^2
CBE Homemaker	0.29***	0.05	0.09	−0.07	0.26***	0.21
CBE Working	0.25*	0.03	0.17	−0.01	0.02	0.12
Mammogram Homemaker	0.33***	−0.02	0.11	−0.06	0.16**	0.16
Mammogram Working	0.09	−0.05	0.13	0.10	0.01	0.03
PAP Homemaker	0.30***	−0.03	0.03	−0.08	0.30***	0.21
PAP Working	0.39***	−0.03	0.05	−0.03	0.32***	0.32
Composite Future Homemaker	0.36***	0.01	0.12*	−0.07	0.31***	0.30
Composite Future Working	0.31***	−0.07	0.15	0.06	0.10	0.16

Note. * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.

CHAPTER 2—DISCUSSION

Recent research underlines the increasing importance of understanding social determinants of health behavior in designing interventions to enhance health protective behavior (e.g., Bambra et al. 2010; De Jesus & Xiao 2014; Ruger, Emmons, Kearney, & Weinstein 2009). Various socioeconomic indicators, such as income, education, ethnicity and access to health insurance have been linked to not only disparities in health status (Espelt et al. 2008; Tucker-Seeley, Harley, Stoddard & Sorensen 2012) but also differences pertaining to engagement in health protective behavior (Oluyemi, Welch, Yoo, Lehman, McGarrity, & Chuang 2014; Sabik, Tarazi, & Bradley, 2015; Selvin & Brett 2003; Wee 2012; Whitman, Shah, Silva, & Ansel 2007).

Among various socioeconomic indicators, the relationship between workforce participation and health may be of crucial importance in designing interventions for cancer screening among women. First, research indicates that the relationship between health and workforce participation may be a mutually reinforcing one in the sense that poorer health may both be the cause and the effect of less participation in the workforce (Bambra et al. 2010; Bartley, Ferrie & Montgomery 2005). Second, current research indicates that the impact of factors like workforce participation on health disparities may differ across different socio-political systems (Moss 2002) and be more pronounced in countries like Turkey which are characterized by unevenly distributed social resources and acute gender inequalities (Espelt et al. 2008). Third, as a demographic indicator, workforce participation is particularly unique in that it may both facilitate and hinder health protective behavior. On the one hand, workforce participation has been shown to improve self-esteem and confidence, which may increase proactivity in health protective behavior

(Sorensen & Verburgge 1987). On the other hand, particularly when women are expected to remain responsible for homemaking even when employed, the double burden and role conflicts may strain women's resources (such as time) for engaging in health protective behavior (Artazcoz, Borrell, Benach, Cortes, & Rohlfs 2004; Payne & Doyal 2010), including, potentially, cancer screening and screening.

Given these considerations, the aim of this article was to investigate workforce participation as a predictor of breast (clinical breast examination and mammogram) and cervical (PAP smear) cancer screening behavior. Also the article used the Health Belief Model as a framework to compare women who have workforce participation experience with homemakers in terms their intentions to engage in breast and cervical cancer screening.

First, as has been reported by other studies conducted in Turkey (Gulten, Seven, Kilic, Akyuz, & Gulcin 2012), it should be noted that the uptake of screening for both breast and cervical cancer are low. Namely, less than one-third of the participants reported being current in their screening tests. Second, we observe significant differences between homemakers and working/retired women in terms of whether they have ever had breast or cervical cancer screening and in terms of the extent to which they are current on their screenings. Of these two measures of cancer screening, being current in one's screenings have more direct implications for protection of one's health (a woman who may have had one PAP smear 10 years ago is not necessarily safer than a woman who never had a PAP smear). In this respect, it is important to note that working/retired women are almost twice as likely as homemakers to be up to date in their screening behavior.

The results also indicate that workforce participation significantly interacts with other indicators of socioeconomic status such as age, income, metropolitan area and education level, as well as religiosity among women. Namely, among women who were

between 50 and 59 years old, whose income and education are lower, who live in less metropolitan areas and who are more religious, being the workforce has a considerable influence in increasing the likelihood that women will engage in screening. This is indicative of the potential of workforce participation to compensate for disparities that are caused by lower socioeconomic status. Furthermore, our analyses point to two potential mediators of this effect: higher efficacy and perceived susceptibility. First, as also suggested above, workforce participation may increase self-esteem, which in turn may make it more likely that women will be proactive in screening. Indeed, we observe that at least for clinical breast examination and for PAP smear, working/retired women have higher self-efficacy than homemakers. Second, wider social networks of women who have been or currently are in the workforce may mean that they will be more likely to witness cancer incidents. Consequently, as was observed in this current study, this may increase their perceived susceptibility to cancer. Further research is needed to more directly test these potential mediators (perceptions of control and self-esteem and cancer related incidents in the social network of women) of the relationship between workplace participation and cancer screening. While this study focused on women aged 40 and above, further research is also needed to assess the possibility that younger women, child bearing responsibilities may also factor as a potential strain on women's resources to engage in protective behavior.

In terms of the application of the health belief model, results indicate that for both groups of women (working/retired vs. homemakers) perceived susceptibility is the most consistent predictor of intentions. On the other hand, it should also be noted that efficacy had a more consistent relationship with intentions to engage in cancer screening among homemakers. This may potentially be due to the plateau effect of the overall higher efficacy scores among working/retired women.

Implications

The results described in this article have several key applied implications. First, the finding that workforce participation is a significant predictor of uptake of cancer screening can be of crucial importance on not only identification of risk groups but also reaching them. Consider for example, the use of mobile cancer screening vehicles for reaching neighborhoods and women to be screened (for a discussion of such an outreach program, see Ozmen et al. 2011). By targeting relatively less well-off residential neighborhoods in nonmetropolitan areas during daytime (working hours), such an outreach program can be effective in terms of reaching women who, are least likely to proactively seek an opportunity to get screened. Second, from a message design standpoint, the results regarding the relationship between perceived susceptibility, efficacy and intentions suggest that messages that emphasize susceptibility, without scaring individuals, may potentially be effective across different socioeconomic groups. In addition, use of targeted communications to increase the behavioral efficacy of women with lower socioeconomic status may also be considered as an effective strategy.

CHAPTER 3

WHERE SCREENING IS NON-NORMATIVE, BOTH FOR INITATION AND MAINTAINANCE, SCREENING-BASED INDIVIDUAL DIFFERENCES MATTER:

A STUDY OF WOMEN'S PAST BEHAVIOR AND SELF-DIRECTION IN TURKEY

ABSTRACT

Chapter 3 continues to investigate women's cancer screening in cultures where screening is non-normative; however, Chapter 3 also adds the distinction of initiation and maintenance of a behavior. In this chapter we investigate how screening-based individual differences influence women in Turkey's mammogram intentions. A total of 748 women, 36% of whom ever had a mammogram, were studied. We investigate the influences of initiation and maintenance, as well as, self-direction versus doctor-direction on mammogram intentions. Furthermore, we then look at the screening-based individual differences underlying these behaviors and direction of behavior.

CHAPTER 3—INTRODUCTION

As with any early detection tool, for mammograms, it is crucial to ensure that women not only initiate screening but also maintain it over time (Berry et al., 2005). While a strong relationship exists between past behavior and future behavior (e.g., Ouellette & Wood, 1998), the probability of repetition is not the same across all past behaviors (Rise, Sheeran & Hukkelberg, 2010). For example, many studies point to physician recommendation as the most important factor in initial and maintenance of mammogram screenings (Fox & Stein, 1991; Halabi et al., 2000; Lerman, Rimer, Trock, Balshem & Engstrom, 1990; Rimer, Trock, Engstrom, Lerman & King, 1991; Taylor, Taplin, Urban, White & Peacock, 1995), yet self-determination theory suggests that performing a behavior by somebody else's inducement may impede motivation to repeat the behavior (Ryan & Deci, 2000). Alternatively, self-directed behavior may enhance the sense of autonomy and efficacy, thereby increasing the motivation to repeat the behavior. In this paper, we will test the possibility that women who believed the act of having a mammogram was their own free choice will be more likely to maintain the behavior in the future than those who believed the act was the choice of their doctor—a possibility never before tested. While physicians are involved in any act of mammogram screening, we focus on the perception of female patients as to who was the driving force for their mammogram, the woman herself or her doctor.

Self-Direction and Health Behavior

If, as we predict, women who attribute mammogram screening to their own choice are more likely to repeat the behavior, what causes underlie this association between perceived self-direction and higher likelihood of mammogram repetition? Several

behavioral models support the prediction that self-directed behavior may be more conducive to behavioral maintenance. For example, according to the Behavior Maintenance Model, past experience and accomplishment satisfaction are important predictors of behavioral maintenance than initiation. Also, self-efficacy and internal motivation, defined as self-directed motivations to act, exert influence in maintenance of a behavior (Rothman, 2000; Rothman, Baldwin, Hertel, & Fuglestad, 2011).

Self-Determination Theory (Ryan & Deci, 2000) similarly posits the crucial nature of and need for autonomy. The meta-analytic review of self-determination theory application in health contexts shows that when individuals are in medical situations with autonomy supportive environments—where physicians empower patients to make health decisions, such environments foster behavioral both engagement and maintenance (see Ng et al., 2012). More specifically with respect to mammograms, interventions emphasizing self-responsibility, or self-seeking mammogram behavior, have been shown to increase the likelihood of having a mammogram (Rothman, Salovey, Turvey & Fishkin, 1993). Thus, with the importance of autonomy, autonomy supportive health care environments, and self-responsibility in mammogram screening, mammograms which women attribute to their own perceived self-direction may be more likely to be repeated.

Integrated Behavioral Model

While mammogram literature showcases doctor recommendation and both the Behavioral Maintenance Model and Self-Determination Theory highlight self-direction, no study could be found comparing intentions for behavioral maintenance among women who perceived their mammograms to be self-directed versus those who perceived their mammograms to be doctor-directed. As such, this study will investigate whether the distinction between self-directed and doctor-directed mammogram screening influences intentions to maintain the behavior within the planned behavior framework (Fishbein &

Ajzen, 2010)—more specifically, the latest form of this framework, the integrated behavioral model (IBM; Fishbein, 2000).

To analyze the differences in choice and recommendation, we look to theory to help analyze differences in intentions and attributes motivating these groups. In addition to knowledge gained from Self-Determination Theory and Behavior Maintenance Models, models such as the Theory of Planned Behavior and Integrated Behavior Model have been useful in understanding both intentions and health behaviors (TPB: Ajzen, 1991; 1985; Fishbein & Ajzen, 1975; IBM: Fishbein, 2000; Fishbein et al., 2002; Fishbein, & Yzer, 2003). In TPB, intention to perform a behavior is determined by a combination of factors: attitudes towards performing the behavior, subjective norms concerning whether certain people approve or disapprove of the behavior, and lastly perceived control over the behavioral performance accounting for self-efficacy and volitional control. In meta-analyses, the TPB has done well in explaining health behaviors in a variety of health domains including screening behaviors and more specifically mammograms (Armitage and Conner, 2001; Conner & Sparks, 1996; Cooke & French, 2008). Adding to the TPB's predictors of intention, IBM also incorporates descriptive norms, or the perception of what people around you are doing, as determinates of intention to perform a behavior.

In the IBM, screening intentions are determined by attitudes towards that behavior, subjective norms concerning whether certain people approve the behavior, perceived behavioral control, and descriptive norms—perceptions regarding what others are doing. While past behavior is not a focal model construct, theorists believe that variables in the model (i.e., control perceptions), can mediate the relationship between past behavior and future intentions (Ajzen, 1991; Armitage, 2005; Conner & Armitage, 1998).

This study predicts that women with the perception of self-directed mammograms should have the most favorable intentions to rescreen, followed by women with perceived

doctor-directed mammograms and women with no screening history. Also, it is predicts that women with past experience of mammogram screening will have higher levels of control and efficacy compared to women with no previous screenings. Finally, women with perceived self-directed mammograms are expected to have the highest perceptions of both control and efficacy. Providing women with perceived self-directed mammograms do have higher rates of intentions to rescreen, we discuss the implications these findings could have on doctor-patient interactions for mammogram counseling, as well as, for other health behaviors.

CHAPTER 3—METHODS

Sample

We analyzed data from 748 women, aged between 41 and 70, completing the mammogram screening measure as part of a broader study we conducted on health protective behaviors in Turkey. The broader study used multistage cluster sampling in 33 urban cities and involved face-to-face interviews lasting 45 and 60 minutes with women and men between 20 and 70 (N =3021). For purposes of the current study, we excluded both men and women under the age of 41. The recommended age for initiation of mammograms is 40; thus in this study, women aged 41 or more were selected for analysis, allowing one year to complete the first mammogram. Women with a past diagnosis of cancer or chronic gynecologic condition were excluded due to increased surveillance as part of routine care. The resulting sample consisted of 748 women with a mean age of 51.47 (SD = 7.40), with no history of cancer or chronic gynecologic condition.

Study Measures

Four pilot tests, including one pilot test of the full questionnaire, were conducted for reliability and validity prior to the survey.

Mammogram Status. Women reported if they ever had a mammogram. Women having had a mammogram answered the following, "Some women themselves make the decision to have a mammogram, while others follow a recommendation by their doctors, families, and/or friends. In your opinion, which of the following best represents how you made your own decision to have a mammogram." Of women, 136 perceived the mammogram to be "completely based on their own initiative" and 137 perceived the mammogram to be "completely based on a doctor's recommendation." Two women reporting that their decision to have a mammogram was based on family/friends' recommendation were excluded from the analysis.

Integrated Behavioral Model. Attitudes were measured with three items gauging how unnecessary/ necessary, bad/good, and harmful/beneficial obtaining mammograms were ($\alpha = 0.85$). For descriptive norms, women reported the perceived prevalence of those around them obtaining mammograms (*1 = Almost none; 5 = Almost all*). Subjective norms were measured using two items: "My inner circle thinks I should have a mammogram" and "My doctor thinks I should have a mammogram" ($r = 0.68$). Efficacy was measured using two items: "If I wanted, I could obtain" and "I believe I can easily obtain" ($r = 0.69$). Perceived control was measured with one question: "Obtaining a mammogram is up to me." With the exception of descriptive norms, all IBM variables were measured using 5-point scales (*1 = Strongly disagree; 5 = Strongly agree;* see Table 10; items adapted from Montano & Kasprzyk, 2008).

Mammogram Intentions. For intentions, women responded how likely they were to have a mammogram in the next two years (*1 = Very unlikely; 5 = Very likely*).

CHAPTER 3—RESULTS

For analyses, women were divided into three groups: (a) women with perceived self-directed mammograms, (b) women with perceived doctor-directed mammograms, and (c) women with no previous mammograms. There were no differences in terms of age, ability to manage household needs, insurance status, current health, knowing someone with cancer, family history of breast cancer, breast cancer severity, breast cancer susceptibility, or breast cancer worry (see Table 10). In demographic aspects, women with perceived self-directed mammograms had a higher percentage of respondents with at least a middle school education compared with women who had never screened (39.0% compared with 26.3%, *d probit* = 0.35). Women with perceived self-directed mammograms also had a higher percentage of women with workforce participation than either women with perceived doctor-directed mammograms (36.0% compared with 22.7%, *d probit* = 0.39) or women with no previous mammograms (36.0% compared with 21.1%, *d probit* = 0.44). Additionally, women with perceived self-directed mammograms had a higher percentage of women living in metropolitan areas than those women who had never had a mammogram (69.1% compared with 56.4%, *d probit* = 0.34).

As for personal health related aspects, a higher percentage of women with perceived self-directed mammograms had medical care in the last twelve months compared with women never having a mammogram (95.6% compared with 86.0%, *d probit* = 0.63). Furthermore, women with perceived self-directed mammograms were more likely to have regular gynecologists compared with women with perceived doctor-directed mammograms (32.4% compared with 20.4%, *d probit* = 0.37) and women who never screened (32.4% compared with 15.0%, *d probit* =0.58). Finally, women with no mammograms had higher perceived screening barriers compared with women with both perceived self-directed

mammograms ($M_{Never\ performed}$ = 2.89, SD = 0.87, $M_{Self\text{-}directed}$ = 2.44, SD = 0.92, $p < 0.001$) and perceived doctor-directed mammograms ($M_{Never\ performed}$ = 2.89, SD = 0.87, $M_{Doctor\text{-}directed}$ = 2.68, SD = 0.89, $p < 0.05$, $F(2, 745) = 14.88$, $p < 0.001$). No differences in overall barriers existed between women with perceived self-directed and doctor-directed mammograms ($M_{Self\text{-}directed}$ = 2.44, SD = 0.92, $M_{Doctor\text{-}directed}$ = 2.68, SD = 0.89, $p = 0.09$). When individual barriers were considered, perceived self- and doctor-directed women had significant differences only in perceptions of embarrassment and pain. Women with perceived self-directed mammograms and those never having had a mammogram differed on all barriers except worry. Women with perceived doctor-directed mammograms and those never having had a mammogram differed only on worry, cost, and time.

Table 10. Descriptive statistics by mammogram status.

	Performed		Never Performed
	Self-Directed (a)	**Doctor-Directed (b)**	**(c)**
	N = 136	N = 137	N = 475
	% or Mean (SD)	% or Mean (SD)	% or Mean (SD)
Demographics			
Age	51.19 (6.57)	51.17 (7.08)	51.64 (7.72)
Middle school education	39.0 % $_{c*}$	32.8%	26.3 % $_{a*}$
Married	75.6 %	85.3 %	78.6 %
Number of children	2.67 (1.37)	2.74(1.74)	2.95 (1.74)
Currently works/retired	36.0 % $_{b*, c***}$	22.7 % $_{a*}$	21.1% $_{a***}$
Manage household needs (0-10)	5.48 (2.39)	5.20 (2.22)	5.20 (2.24)
Metropolitan	69.1 % $_{c*}$	65.0 %	56.4 % $_{a*}$
Personal Health Related			
Has Insurance	93.3 %	96.3 %	94.5 %
Current health (0-10)	6.78 (1.70)	6.59 (1.73)	6.54 (1.78)
Medical care in last 12 months	95.6 % $_{c**}$	89.8 %	86.0 % $_{a**}$
Regular gynecologist	32.4 % $_{b*, c***}$	20.4 % $_{a*}$	15.0 % $_{a***}$
Knowing Someone with Cancer			
Family or close other	57.4 %	58.4 %	49.9 %
Family breast cancer	9.7 %	10.2 %	5.5 %
Breast Cancer Beliefs			
Breast Cancer Severity (1-5)	3.95 (0.79)	3.94 (0.65)	3.93 (0.78)
Breast Cancer Susceptibility (1-5)	2.89 (0.94)	2.91 (0.77)	2.84 (0.86)
Breast Cancer Worry (1-5)	3.50 (1.25)	3.45 (1.28)	3.21 (1.23)
Mammogram Barriers (1-5)	2.44 (0.92) $_{c***}$	2.68 (0.89) $_{c*}$	2.89 (0.87) $_{a***, b*}$

Note. * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$; Different subscripts ($_{a,b,c}$) indicate groups significantly different from others.

As expected, all groups of women had significantly different intentions to have a mammogram in the next two years ($M_{Self\text{-}directed}$ = 3.52, SD = 0.91; $_{Doctor\text{-}directed}$ = 3.15, SD = 1.01; $M_{Never\ performed}$ = 2.79, SD = 0.99; $F(2,745) = 32.20$, $p < 0.001$; Table 11). Intentions to have a mammogram in the next two years were most favorable among women perceiving their mammograms as self-directed. Women never having a mammogram had the least favorable intentions, followed by women with perceived doctor-directed mammograms.

Women with no screening had significantly less favorable attitudes towards screening than those with a past mammogram. ($M_{Never\ performed}$ = 4.16, SD = 0.67, $M_{Self\text{-}directed}$ = 4.39, SD = 0.62, $p < 0.001$; $M_{Never\ performed}$ = 4.16, SD = 0.67, $M_{Doctor\text{-}directed}$ = 4.33, SD = 0.66, $p < 0.05$; $M_{Self\text{-}directed}$ = 4.39, SD = 0.62, $p < 0.001$, $M_{Doctor\text{-}directed}$ = 4.33, SD = 0.66, $p = 1.00$; F (2,745) = 8.69, $p < 0.001$). Compared with women who had never screened, women with perceived self-directed mammograms perceived more of those around them to be having mammograms ($M_{Never\ performed}$ = 2.39, SD = 1.06, $M_{Self\text{-}directed}$ = 2.85, SD = 1.11, $p < 0.001$). Women with self-directed mammograms were significantly more likely than women in other groups to believe that doctors and close other supported their screening ($M_{Self\text{-}directed}$ = 3.67, SD = 0.93, $M_{Never\ performed}$ = 3.32, SD = 1.08, $p < 0.01$; $M_{Self\text{-}directed}$ = 3.67, SD = 0.93, $M_{Doctor\text{-}directed}$ = 3.36, SD = 0.99, $p < 0.05$, $M_{Never\ performed}$ = 3.32, SD = 1.08, $M_{Doctor\text{-}directed}$ = 3.36, SD = 0.99, $p < 0.05$; $p = 1.00$; F (2,745) = 6.16, $p < 0.01$), to have higher self-efficacy, ($M_{Self\text{-}directed}$ = 3.92, SD = 0.73, $M_{Never\ performed}$ = 3.64, SD = 0.93, $p < 0.01$; $M_{Self\text{-}directed}$ = 3.92, SD = 0.73, $M_{Doctor\text{-}directed}$ = 3.61, SD = 0.92, $p < 0.05$, $M_{Never\ performed}$ = 3.64, SD = 0.93, $M_{Doctor\text{-}directed}$ = 3.61, SD = 0.92, $p = 1.00$; F (2,745) = 5.68, $p < 0.01$), and to have higher control perceptions ($M_{Self\text{-}directed}$ = 4.04, SD = 0.77, $M_{Never\ performed}$ = 3.67, SD = 1.00, $p < 0.001$; $M_{Self\text{-}directed}$ = 4.04, SD = 0.77, $M_{Doctor\text{-}directed}$ = 3.70, SD = 0.95, $p < 0.01$, $M_{Never\ performed}$ = 3.67, SD = 1.00, $M_{Doctor\text{-}directed}$ = 3.70,

SD = 0.95, $p = 1.00$; $F(2,745) = 8.35$, $p < 0.001$). No efficacy or control differences existed between women with perceived doctor-directed mammograms and those with no mammogram history.

Overall, the IBM model performed well in explaining variance in intentions among women who never had a mammogram ($R^2 = 0.32$, $B_{\text{attitude}} = 0.11$, $p < 0.01$, $B_{\text{descriptive norm}} = 0.49$, $p < 0.001$) and women who had a doctor-directed mammogram ($R^2 = 0.35$, $B_{\text{attitude}} = 0.28$, $p < 0.001$, $B_{\text{descriptive norm}} = 0.35$, $p < 0.001$), specifically with respect to attitudes and descriptive norms (see Table 12). Among women with perceived self-directed screenings, only descriptive norms significantly predicted ($B = 0.17$, $p < 0.05$), and IBM accounted for only 7% of the variance.

Table 11. IBM descriptive statistics and correlations for women's two year mammogram intentions by mammogram status.

		Descriptive Statistics		Correlations				
Mammogram Status		Mean	Standard Deviation	Intention	Attitude	Descriptive Norms	Subjective Norms	Efficacy
Self-Directed	Intention (a)	3.52 b, c	0.91					
N=136	Attitude (a)	4.39 c	0.62	0.18*				
	Descriptive Norms (a)	2.85 c	1.11	0.18*	0.02			
	Subjective Norms (a)	3.67 b, c	0.93	0.11	0.26**	0.12		
	Efficacy (a)	3.92 b, c	0.73	0.02	0.27**	0.05	0.34***	
	Control (a)	4.04 b, c	0.77	0.09	0.28***	0.01	0.30***	0.63***
Doctor-	Intention (b)	3.15 a, c	1.01					
Directed	Attitude (b)	4.33 c	0.66	0.41***				
N=137	Descriptive Norms (b)	2.62	1.08	0.45***	0.16			
	Subjective Norms (b)	3.36 a	0.99	0.35***	0.29***	0.29***		
	Efficacy (b)	3.61 a	0.92	0.21**	0.15	0.09	0.15	
	Control (b)	3.70 a	0.95	0.26**	0.28***	0.12	0.21**	0.65***
Never	Intention (c)	2.79 a, b	0.99					
Performed	Attitude (c)	4.16 a, b	0.67	0.13**				
N=475	Descriptive Norms (c)	2.39 a	1.06	0.53***	−0.02			
	Subjective Norms (c)	3.32 a	1.08	0.28***	0.13**	0.31***		
	Efficacy (c)	3.64 a	0.93	0.23***	0.19***	0.18***	0.46***	
	Control (c)	3.67 a	1.00	0.21***	0.25***	0.15**	0.43***	0.70***

Note. * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$; Different subscripts (a,b,c) indicate groups significantly different from others.

Table 12. IBM linear regression for women's two year mammogram intentions by mammogram status.

		Linear Regression	
Mammogram Status		Beta	R^2
Self-Directed	Intention		
N=136	Attitude	0.16	0.07
	Descriptive Norms	0.17*	
	Subjective Norms	0.06	
	Efficacy	–0.11	
	Control	0.10	
Doctor-Directed	Intention		
N=137	Attitude	0.28***	0.35
	Descriptive Norms	0.35***	
	Subjective Norms	0.14	
	Efficacy	0.07	
	Control	0.07	
Never Performed	Intention		
N=475	Attitude	0.11**	0.32
	Descriptive Norms	0.49***	
	Subjective Norms	0.06	
	Efficacy	0.07	
	Control	0.03	

Note. * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$.

CHAPTER 3—DISCUSSION

This study found that women with past mammogram screenings had more favorable intentions to maintain screening compared to women who never screened. More importantly, in line with this study's prediction that not all past behaviors are equal in terms of leading to behavioral maintenance, women with perceived self-directed mammograms had the most favorable intentions for a repeat mammogram in two years. This finding is in line with the SDT's need for autonomy, as well as the behavioral maintenance model's premise on motivation (Ryan & Deci, 2000; Rothman, 2000). However, this runs counter to research showing doctor recommendation, rather than autonomy supportive environments, as the top factor for rescreening (Halabi et al., 2000, Mandellblatt & Yabroff, 1999; Rimer et al., 1991).

Also as expected, both self-efficacy and control were higher among women with perceived self-directed mammograms (Rothman et al., 2011). Furthermore, if past behavior is important, it should influence intentions through behavioral control and efficacy (Ajzen, 1991). Initially, it was expected that all women with past mammogram experience should have higher levels of perceived control and efficacy than women who had not yet had a mammogram. Surprisingly, women with perceived doctor-directed mammograms and women with no previous mammograms did not differ from each other in terms of self-efficacy or control. In other words, higher levels of perceived control and efficacy defined women with self-directed mammograms more than it did the other two groups. It should be noted that there was no difference between women with perceived self vs. doctor-directed mammograms in terms of overall perceived screening barriers,

implying that attributing the mammogram to a recommendation may not raise control and efficacy as much as choosing to screen.

Besides self-efficacy and control, women with perceived self-directed and perceived doctor-directed mammograms might be different from each other in terms of family history of breast cancer and perceived susceptibility to breast cancer (Halabi et al., 2000; Taylor et al., 1995). In the current study, no differences in either family history of breast cancer or in perceived susceptibility existed between these two groups of women.

Furthermore, the findings indicated that the IBM model did not perform as well in terms of predicting screening intentions among women with perceived self-directed mammograms as it did among women with perceived doctor-directed mammograms or women with no mammogram history. This finding underlines the need to consider further refinements in the IBM model in predicting behavioral maintenance—especially in circumstances where perceived efficacy is high.

The data used for this study was cross-sectional. Thus, we cannot be sure whether efficacy and control increased in women as a result of having a perceived self-directed mammogram or if these women were already higher on their behavioral control. Past mammogram behavior was self-reported, although literature points to this as being of little concern (Degnan et al., 1992). Additionally, screening rates and education level were low in this sample. Thus, results may not generalize to more educated women or to samples with higher rates of screening uptake. Further studies are needed to test the generalizability, as well as, possible extension to other health behaviors occurring annually or biannually. Most importantly, prospective studies are necessary to test a causal relationship between the empowerment of perceived self-direction and future intentions.

In spite of limitations, these findings have broad application possibilities. While studies have shown doctor recommendation the top factor in women having mammograms,

a simple change in recommendation language emphasizing the number of women choosing to screen followed by offers to provide assistance with referral if the woman chooses to have a mammogram could not only increase the likelihood that women will have a mammogram for the first time, but also the likelihood that women continue regularly having a mammogram.

In spite of the labels self-directed and doctor-directed, doctors continue and should continue to play a crucial role in self-directed behavior. As mammogram recommendations become more personalized to balance risks and benefits of screening, this role becomes even more critical. Through this research we aim to show that empowerment may be more conducive to future behavior than inducement. The best combination for ensuring continued mammogram compliance is most likely a model where doctors and women work together to make the decision to have a mammogram and where women feel empowered to make the final choice. We believe this can be achieved through short interventions slightly altering recommendation wording. Instead of stating that a woman needs to have a mammogram and the office will schedule the procedure, physicians could say that they strongly recommend screening and if the woman chooses to have the procedure the office is happy to facilitate the appointment. A fine balance between stressing the need for screening and empowerment is necessary with pilot tests needed to find that balance.

Women having mammograms based on doctor recommendations are already in contact with medical staff. Likewise, data from this current study suggest that almost 90% of women who have never screened have had medical care in the last 12 months. Therefore, opportunity exists not only for physician interaction but also empowerment. With doctor recommendations being so heavily emphasized, simple interventions changing

a doctor recommendation into an empowering suggestion that a women choose screening may motivate regular mammograms, detect breast cancer early, and save lives.

THESIS DISCUSSION

Now armed with the knowledge we have about women's cancer screening, let us travel back to a time beyond the day where our two women sat side by side in the waiting room. Let us travel to the point where these two women's paths diverged-where one woman chose regular screening and the other did not. At this point, both women look similar; however, we can use what we now know about screening to predict who will and will not engage in screening and to motivate our non-screening woman to act.

This thesis provides us with a roadmap highlighting potential ways to raise screening rates in a wider variety of contexts. Let us start by asking about the prevalence of screening in both women's cultures. If screening is normative and most situational barriers are removed from screenings in that culture, we take the personality path. With the personality path, we have a map of characteristics to identify women not screening focusing on elevating levels of future time-orientation, conscientiousness, or worry depending on which combination of personality to woman holds. If screening is non-normative, we take the screening–based individual difference route. Here elevations in risk perception, attitudes towards screening, perceptions of more women screening, and self-efficacy-especially among homemakers are all key to mammogram initiation. To encourage women to continue screening on a regular basis, both perception of more women screening and empowerment to screen are potentially crucial attributes in cultures where screening is not normative.

Although this thesis only focused on screening-based individual differences for women in cultures where screening is not normative, the researchers did investigate the contribution of personality in this context. In analysis conducted outside of this thesis on

women in Turkey, personality variables (time-orientation, conscientiousness, neuroticism, and God locus of control) that were important in United States' women were not influential among women in Turkey. Perhaps, personality can enter into the Turkish screening models only when repeat behavior is considered and after women have overcome the barrier of initial action. Perhaps even with initial screening completed, the culture of inaction is too strong to currently accommodate personality differences.

Similarly in this thesis, as personality was not studied in the culture with non-normative cancer screenings, screening-based individual differences were not studied in the United States women. A large body of literature, including meta-analytic reviews, shows how these variables are associated with cancer screenings in United States women (e.g. Champion & Skinner, 2008; Cooke & French, 2008; Menon, Champion, Monahan, Daggy, Hui & Skinner, 2007; Montano & Kasprzyk, 2008; Steele & Porche, 2005; Tanner-Smith & Brown, 2010). This thesis did not cover these variables in women in the United States due to the premise that the numerous interventions have incorporated these constructs into the already high screening in this culture (Champion & Skinner, 2008). We instead chose to look at personality which has been largely ignored in cancer screening research and which showed large potential as a future avenue to boost screening rates even higher.

Final Contributions, Limitations, and Future Directions

This thesis goes beyond a mere compilation of studies on a certain behavior to show how context and culture can affect variables important in similar behaviors. Rather than delving into one screening behavior within a specific group of individuals, this thesis aimed to create a guide that could be useful in research across international borders and for women in various stages of behavior adoption. Especially for cultures where cancer screenings programs are underutilized, this thesis gives recommendations on how to

increase screening uptake for women in the early stages of screening implementation and how to continue to raise rates once higher levels of screening are accomplished.

Furthermore, Chapter 1 of this thesis shows how personality and norms can be useful in not only identifying women not screening but by providing tools to target these constructs within non-attending women. While personality is an important topic in social psychology, its study in the health domain has been very limited as discussed in the first chapter. Segmenting by personality and using these traits to boost screening is a new avenue for interventionists to pursue. This thesis not only highlights how personality can be used to increase screening but could extend into other health domains opening a new vein of research. Personality has previously not be well utilized in the past with former studies using standard methodology and linear representations of personality constructs potentially missing critical thresholds where personality becomes important in a behavior.

This thesis is a pioneer in the use of decision trees for personality attributes– especially for health behaviors. It contributes to a new stream of research and points to methodology that might uncover a similar set of personality attributes common to multiple cancer screening behaviors and possibly more varied early detection measures. This thesis begins to shed light on the ways that incorporating personality could change the face of personalized medical care and health interventions. It aims to introduce personality to the health domain in hopes that one day its status within the medical community is similar to its status held within the psychological community.

Additionally, Chapter 2 introduces the new distinction of homemakers versus workforce participants further helping to identify women not engaging in cancer screenings. This grouping makes identifying lower screening women easier than using socioeconomic status. It also shows how workforce participation can help elevate screening in some of the most vulnerable populations— lower education and lower income

women. Rather than just focusing on this distinction, the chapter delves into the mechanisms behind screenings in these two groups showing how both groups might be motivated to increase screening rates.

Finally, Chapter 3 sheds light on the importance of empowerment in women. Women who perceived their mammograms to be self-directed were more likely to pursue subsequent screenings compared with those who pursued their mammogram based on a perceived doctor's inducement. If this is true, a simple change in recommendation wording shifting from inducement to empowerment may have a great impact on repeat screening. This thesis challenged the notion that mere doctor recommendation is best and provided further reason to engage in autonomy supportive health environments.

Although this thesis provides a preliminary roadmap for intervention avenues to identify factors in women who are not pursuing cancer screening, it does have limitations. Currently, the three models for screening identification are based on cross-sectional data. Based on this constraint, it cannot be inferred that these elevated factors caused higher screening rates. Thus, the next step is to use the road map provided by this thesis to design interventions based on these findings. Potential interventions based on the findings of this thesis are easy to implement and if performed in a medical setting, do not substantially increase that amount of time required for patient care.

With globalization dominating the future and health agencies straddling both geographic and cultural borders, understanding health behaviors across a variety of contexts is crucial. It is our hope that this body of work advances not only the field of social psychology with its contributions to the areas of personality and norms research, but also begins to transform the medical community. We hope that by studying cancer screening behaviors across contexts and better understanding the product of person and

situation, that we can help reduce the burden of late stage cancer diagnosis giving all women a chance for early detection, healthier lives, and more birthdays.

REFERENCES

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50,* 179–211.

Allen, J. D., Pérez, J. E., Pischke, C. R., Tom, L. S., Juarez, A., Ospino. H., & Gonzalez-Suarez, E. (2014). Dimensions of religiousness and cancer screening behaviors among church-going Latinas. *Journal of Religion and Health, 53*(1), 190-203.

Allen, T. D., Herst, D. E., Bruck, C. S., & Sutton, M. (2000). Consequences associated with work-to-family conflict: A review and agenda for future research. *Journal of Occupational Health Psychology, 5,* 278–309.

American Cancer Society (2015). *Global Cancer Facts & Figures 3rd Edition*. Atlanta: American Cancer Society.

Annandale, E., & Hunt, K. (2000). Gender inequalities in health: Research at the crossroads. In E. Annandale, & K. Hunt (Eds.), *Gender inequalities in health* (pp. 1–35). Buckingham: Open University Press.

Arber, S. (1997). Comparing inequalities in women's and men's health in Britain in the 1990s. *Social Science & Medicine, 44*(6), 773–788.

Armitage, C. J. (2005). Can the theory of planned behavior predict the maintenance of physical activity?. *Health Psychology, 24*(3), 235-245

Artazcoz, L., Borrell, C., Benach, J., Cortès, I., & Rohlfs, I. (2004). Women, family demands and health: The importance of employment status and socio-economic position. *Social Science and Medicine, 59,* 263–274. doi:10.1016/j.socscimed.2003.10.029

Aspinwall, L. G. (2005). The psychology of future-oriented thinking: From achievement to proactive coping, adaptation, and aging. *Motivation and Emotion, 29*(4), 203-235.

Aycan, Z., & Eskin, M. (2005). Relative contributions of childcare, spousal support, and organizational support in reducing work–family conflict for men and women: The case of Turkey. *Sex Roles, 53*(7-8), 453-471.

Azaiza, F., Cohen, M., Daoud, F. & Awad, M. (2011). Traditional-Westernizing continuum of change in screening behaviors: comparison between Arab women in Israel and the West Bank. *Breast Cancer Research and Treatment*, *128*(1), 219-227.

Bambra, C., Gibson, M., Sowden, A., Wright, K., Whitehead, M., & Petticrew, M. (2010). Tackling the wider social determinants of health and health inequalities: evidence from systematic reviews. *Journal of Epidemiology and Community Health, 64*(4), 284–91. doi:10.1136/jech.2008.082743

Baron-Epel, O., Granot, M., Badarna, S., & Avrami, S. (2004). Perceptions of breast cancer among Arab Israeli women. *Women & Health, 40*(2), 101-116.

Bartley, M., Ferrie, J., & Montgomery, S. (2005). Health and labour market disadvantage: unemployment, non-employment and job insecurity. In M. Marmot & R. Wilkinson (Eds.), *The Social Determinants of Health* (pp. 76–96). Oxford: Oxford University Press.

Baum, A., Garofalo, J. P., & Yali, A. M. (1999). Socioeconomic status and chronic stress. Does stress account for SES effects on health*? Annals of the New York Academy of Sciences, 896,* 131–144. doi:10.1111/j.1749-6632.1999.tb08111.x

Bener, A., Alwash, R., Miller, C. J., Denic, S., & Dunn, E. V. (2001). Knowledge, attitudes, and practices related to breast cancer screening: a survey of Arabic women. *Journal of Cancer Education, 16*(4), 215-220.

Berry, D.A., Cronin, K.A., Plevritis, S.K., Fryback, D.G., Clarke, L., Zelen, M.,…Feuer, E. J., (2005). Effect of screening and adjuvant therapy on mortality from breast cancer. *New England Journal of Medicine, 353*(17), 1784-1792.

Bleyer, A. & Welch, H. G. (2012). Effect of three decades of screening mammography on breast-cancer incidence. *New England Journal of Medicine, 367*(21), 1998-2005.

Breiman, L. (2001). Random forests. *Machine Learning, 45*(1), 5-32.

Breiman, L., Friedman, J. H., Olshen, R. A. & Stone, C. J. (1984) *Classification and regression trees*. Monterey, CA: Wadsworth.

Calvocoressi, L., Kasl, S.V., Lee, C.H., Stolar, M., Claus, E.B., & Jones, B.A. (2004). A prospective study of perceived susceptibility to breast cancer and nonadherence to mammography screening guidelines in African American and White women ages 40 to 79 years. *Cancer Epidemiology Biomarkers & Prevention, 13*(12), 2096-2105.

Calvocoressi, L., Stolar, M., Kasl, S.V., Claus, E. B., & Jones, B. A. (2005). Applying recursive partitioning to a prospective study of factors associated with adherence to mammography screening guidelines. *American Journal of Epidemiology,* 162(12): 1215-1224.

Champion, V. L. (1984). Instrument development for health belief model constructs. *Advances in Nursing Science, 6*, 73–85.

Champion, V. L., & Skinner, C. S. (2008). The health belief model. In K. Glanz, B. K. Rimer & K. Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice*. San Francisco: Jossey-Bass.

Champion, V. L., Skinner, C. S., Menon, U., Rawl, S., Giesler, R. B., Monahan, .P & Daggy, J. (2004). A breast cancer fear scale: psychometric development. *Journal of Health Psychology, 9*(6), 753-762.

Chen, M., & Land, K. C. (1990). Socioeconomic Status (SES) and the Health Belief Model: LISREL Analysis of Unidimensional versus Multidimensional Formulations. *Journal of Social Behavior and Personality, 5*, 263–284.

Clarke, J. N. & Everest, M. M. (2006). Cancer in the mass print media: Fear, uncertainty and the medical model. *Social Science & Medicine, 62*(10), 2591-2600.

Cohen, M., & Azaiza, F. (2008). Developing and testing an instrument for identifying culture specific barriers to breast cancer screening in Arab women. *Acta Oncologica, 47*, 1570-1577.

Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behavior: A review and avenues for further research. *Journal of Applied Social Psychology, 28*, 1429–1464.

Cooke, R., & French, D. P. (2008). How well do the theory of reasoned action and theory of planned behaviour predict intentions and attendance at screening programmes? A meta-analysis. *Psychology and Health, 23*(7), 745-765.

Cooper, W. H., & Withey, M. J. (2009). The strong situation hypothesis. *Personality and Social Psychology Review, 13*(1), 62-72.

Damiani, G., Federico, B., Basso, D., Ronconi, A., Bianchi, C. B., Anzellotti, G. M., ... & Ricciardi, W. (2012). Socioeconomic disparities in the uptake of breast and cervical cancer screening in Italy: a cross sectional study. *BMC Public Health, 12*(1), 99.

De Jesus, M., & Xiao, C. (2014). Predicting Health Care Utilization Among Latinos: Health Locus of Control Beliefs or Access Factors? *Health Education & Behavior : The Official Publication of the Society for Public Health Education, 41*, 423–430. doi:10.1177/1090198114529130

Degnan, D., Harris, R., Ranney, J., Quade, D., Earp, J.A., & Gonzalez, J. (1992). Measuring the use of mammography: Two methods compared. *American Journal of Public Health, 82*(10), 1386-1388.

Demir, B., & Kumkale, G. T. (2013). Individual differences in willingness to become an organ donor: A decision tree approach to reasoned action. *Personality and Individual Differences, 55*, 63-69.

Espelt, A., Borrell, C., Rodríguez-Sanz, M., Muntaner, C., Pasarín, M. I., Benach, J., … Navarro, V. (2008). Inequalities in health by social class dimensions in European countries of different political traditions. *International Journal of Epidemiology, 37*, 1095–1105. doi:10.1093/ije/dyn051

Ferlay J, Soerjomataram I, Ervik M, Dikshit R, Eser S, Mathers C, Rebelo M, Parkin DM, Forman D, Bray, F. GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11 [Internet]. Lyon, France: International Agency for Research on Cancer; 2013. Available from: http://globocan.iarc.fr, accessed on 20/April/2015.

Ferlay, J., Soerjomataram, I., Ervik, M., Dikshit, R., Eser, S., Mathers, C., … & Bray, F. *GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11* [Internet]. Lyon, France: International Agency for Research on Cancer; 2013. Available from: http://globocan.iarc.fr, accessed on 20/January/2015.

Fishbein, M. (2000). The role of theory in HIV prevention. *AIDS Care, 12*(3), 273-278.

Fishbein, M., & Ajzen, I. (2010). *Predicting and changing behavior: The reasoned action approach*. New York: Psychology Press.

Fox, S. A., & Stein, J. A. (1991). The effect of physician-patient communication on mammography utilization by different ethnic groups. Medical care, 29(11), 1065-1682.

Freitas, C., Tura, L. F. R., Costa, N. & Duarte, J. (2012). A population-based breast cancer screening programme: Conducting a comprehensive survey to explore adherence determinants. *European Journal of Cancer Care, 21*(3), 349-359.

Gerstorf, D., Rocke, C., & Lachman, M. E. (2011). Antecedent–consequent relations of perceived control to health and social support: Longitudinal evidence for between-domain associations across adulthood. *The Journals of Gerontology, 66*(1), 61–71. doi:10.1093/geronb/gbq077.

Greenhaus, J. H., & Beutell, N. J. (1985). Sources of conflict between work and family roles. *Academy of Management Review, 10*, 76–88.

Gulten, G., Memnun, S., Ayse, K., Aygul, A., & Gulcin, A. (2012). Breast, Cervical, and Colorectal Cancer Screening Status of a Group of Turkish Women. *Asian Pacific Journal of Cancer Prevention*, *13*(9), 4273–4279. doi:10.7314/APJCP.2012.13.9.4273

Gunduz-Hosgor, A., & Smits, J. (2008). Variation in labor market participation of married women in Turkey. *In Women's Studies International Forum, 31*(2), 104-117).

Guvenc, G., Akyuz, A., & Acikel, C. H. (2011). Health belief model scale for cervical cancer and Pap smear test: psychometric testing. *Journal of Advanced Nursing, 67*(2), 428-437.

Guvenc, G., Seven, M., Kilic, A., Akyuz, A. & Akcan, G. (2012). Breast, cervical, and colorectal cancer screening status of a group of Turkish women. *Asian Pacific Journal of Cancer Prevention, 13*, 4273-9.

Halabi, S., Skinner, C. S., Samsa, G. P., Strigo, T. S., Crawford, Y. S., & Rimer, B. K. (2000). Factors associated with repeat mammography screening. *Journal of Family Practice, 49*(12), 1104-1112.

Hall, P. A. & Fong, G. T. (2003). The effects of a brief time perspective intervention for increasing physical activity among young adults. *Psychology and Health, 18*(6), 685-706.

Holt, C. L., Clark, E. & Klem, P. R. (2007). Expansion and validation of the spiritual health locus of control scale factorial analysis and predictive validity. *Journal of Health Psychology, 12*(4), 597-612.

Jawad, H. A. (1998). *The rights of women in Islam: An authentic approach*. New York: St. Martin's Press.

Kahn, R. L., Wolfe, D. M., Quinn, R. P., Snoek, J. D., & Rosenthal, R. A. (1964). *Organizational stress: Studies in role conflict and ambiguity*. New York: Wiley.

Lerman, C., Rimer, B., Trock, B., Balshem, A., & Engstrom, P. F. (1990). Factors associated with repeat adherence to breast cancer screening. Preventive medicine, 19(3), 279-290.

Lewin, K. (1935). *A dynamic theory of personality*. New York: McGraw Hill.

Lukwago, S. N., Kreuter, M. W., Holt, C. L., Steger-May, K., Bucholtz, D. C. & Skinner, C. S. (2003). Sociocultural correlates of breast cancer knowledge and screening in urban African American women. *American Journal of Public Health, 93*(8), 1271-1274.

Mandelblatt, J. S., & Yabroff, K. R. (1999). Effectiveness of interventions designed to increase mammography use: a meta-analysis of provider-targeted strategies. *Cancer Epidemiology Biomarkers & Prevention, 8*(9), 759-767.

Marko, K. W. & Savickas, M. L. (1998). Effectiveness of a career time perspective intervention. *Journal of Vocational Behavior, 52*(1), 106-119.

Matin, M., & LeBaron, S. (2004). Attitudes toward cervical cancer screening among Muslim women: a pilot study. *Women & Health, 39*(3), 63-77.

Mayo, R. M., Ureda, J. R, & Parker, V. G. (2001). Importance of fatalism in understanding mammography screening in rural elderly women. *Journal of Women & Aging*, 13, 57-72.

Menon, U., Champion, V., Monahan, P. O., Daggy, J., Hui, S., & Skinner, C. S. (2007). Health belief model variables as predictors of progression in stage of mammography adoption. *American Journal of Health Promotion, 21*(4), 255-261.

Miller, A. B., Wall, C., Baines, C. J., Sun, P., To, T. & Narod, S. A. (2014). Twenty five year follow-up for breast cancer incidence and mortality of the Canadian national breast screening study: randomised screening trial. *BMJ*, 348, g366.

Mischel, W. (1977). The interaction of person and situation. In D. Magnusson & N. S. Endler (Eds.), *Personality at the cross-roads: Current issues in interactional psychology* (pp. 333-352). Hillsdale, NJ: Lawrence Erlbaum.

Moghadam, V. (1988). Women, work, and ideology in the Islamic Republic. *International Journal of Middle East Studies, 20*(02), 221-243.

Montano, D. E. & Kasprzyk, D. (2008). Theory of reasoned action, theory of planned behavior, and the integrated behavioral model. In K. Glanz, B. K. Rimer & K. Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice*. San Francisco: Jossey-Bass.

Moss, N. E. (2002). Gender equity and socioeconomic inequality: A framework for the patterning of women's health. *Social Science and Medicine*. doi:10.1016/S0277-9536(01)00115-0

National Center for Health Statistics (2013) *Health, United States, 2012: With special feature on emergency care.* Hyattsville, MD: National Center for Health Statistics.

National Center for Health Statistics. *Health, United States, 2012: With Special Feature on Emergency Care.* Hyattsville, MD. 2013.

Ng, J. Y., Ntoumanis, N., Thøgersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Duda, J. L., & Williams, G. C. (2012). Self-determination theory applied to health contexts a meta-analysis. *Perspectives on Psychological Science, 7*(4), 325-340.

Oluyemi, A. O., Welch, A. R., Yoo, L. J., Lehman, E. B., & Mcgarrity, T. J. (2014). Colorectal Cancer Screening in High-Risk Groups Is Increasing , Although Current Smokers Fall Behind. *Cancer, July 15*, 2106–2113. doi:10.1002/cncr.28707

Ouellette, J. A., & Wood, W. (1998). Habit and intention in everyday life: the multiple processes by which past behavior predicts future behavior. *Psychological Bulletin, 124*(1), 54-74.

Ozmen, V. (2008). Breast cancer in the world and Turkey. *Journal of Breast Health, 4*(2) 7-12.

Ozmen, V., Ozaydin, N., Cabioglu, N., Gulluoglu, B. M., Unalan, P. C., Gorpe, S., … Anderson, B. O. (2011). Survey on a mammographic screening program in Istanbul, Turkey. *The Breast Journal, 17*(3), 260–267. doi:10.1111/j.1524-4741.2011.01065.x

Pace, L. E. & Keating, N. L. (2014). A systematic assessment of benefits and risks to guide breast cancer screening decisions. *JAMA, 311*(13), 1327-1335.

Payne, S., & Doyal, L. (2010). Older women, work and health. *Occupational Medicine (Oxford, England), 60*, 172–177. doi:10.1093/occmed/kqq030

Rajaram, S. S., & Rashidi, A. (1999). Asian-Islamic women and breast cancer screening: a socio-cultural analysis. *Women & Health, 28*(3), 45-58.

Rakowski, W. & Breslau, E. S. (2004). Perspectives on behavioral and social science research on cancer screening. *Cancer, 101*(S5), 1118-1130.

Rimer, B. K., Trock, B., Engstrom, P. F., Lerman, C., & King, E. (1991). Why do some women get regular mammograms?. *American Journal of Preventive Medicine. 7*(2), 69-74.

Rise, J., Sheeran, P., & Hukkelberg, S. (2010). The role of self-identity in the theory of Planned behavior: A meta-analysis. *Journal of Applied Social Psychology, 40*(5), 1085-1105.

Roncancio, A. M., Ward, K. K., & Fernandez, M. E. (2014). The influence of time perspective on cervical cancer screening among Latinas in the United States. *Journal of Health Psychology, 19*(12), 1547-1553.

Rosenstock, I. (1974). Historical origins of the health belief model. *Health Education Monographs, 2*(4), 328–335.

Ross, C. E., & Wright, M. P. (1998). Women's work, men's work, and the sense of control. *Work and Occupations, 25*(3), 333-355.

Rothman, A. J. (2000). Toward a theory-based analysis of behavioral maintenance. *Health Psychology, 19*(1S), 64-69.

Rothman, A. J., Baldwin, A. S., Hertel, A. W. & Fuglestad, P.T. (2011). Self-regulation and behavior change: Disentangling behavioral initiation and behavioral maintenance. In R.F. Baumeister & K. D. Vohs (Eds.),. *Handbook of self-regulation: Research, theory, and applications.* , (pp. 106-122). New York, NY: Guilford Press.

Rothman, A. J., Salovey, P., Turvey, C., & Fishkin, S. A. (1993). Attributions of responsibility and persuasion: Increasing mammography utilization among women over 40 with an internally oriented message. *Health Psychology, 12*(1), 39-47.

Ruger, J. P., Emmons, K. M., Kearney, M. H., & Weinstein, M. C. (2009). Measuring the costs of outreach motivational interviewing for smoking cessation and relapse prevention among low-income pregnant women. *BMC Pregnancy and Childbirth, 9*, 46.

Ruiter, R. A., Verplanken, B., Kok, G. & Werrij, M. Q. (2003). The role of coping appraisal in reactions to fear appeals: Do we need threat information?. *Journal of Health Psychology, 8*(4), 465-474.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68-78.

Ryff, C. D., Seeman, T., & Weinstein, M. (2013). *National survey of midlife development in the United States (MIDUS II): Biomarker project, 2004-2009.* Ann Arbor, MI: ICPSR.

Ryff, C., Almeida, D. M., Ayanian, J. S., Carr, D. S., Cleary, P. D., Coe, C., Davidson, R., Kruger, R. F., Lachman, M. E., Marks, N. F., Mroczek, D. K., Seeman, T., Seltzer, M. M., Singer, B. H., Sloan, R. P., Tun, P. A., Weinstein, M. & Williams, D. (2012a). *Midlife development in the United States (MIDUS II): Milwaukee African American sample, 2005-2006*. Ann Arbor, MI: ICPSR.

Ryff, C., Almeida, D. M., Ayanian, J. S., Carr, D. S., Cleary, P. D., Coe, C., Davidson, R., Kruger, R. F., Lachman, M. E., Marks, N. F., Mroczek, D. K., Seeman, T., Seltzer, M. M., Singer, B. H., Sloan, R. P., Tun, P. A., Weinstein, M. & Williams, D. (2012b). *National survey of midlife development in the United States (MIDUS II): 2004-2006*. Ann Arbor, MI: ICPSR.

Sabik, L. M., Tarazi, W. W., & Bradley, C. J. (2015). State Medicaid Expansion Decisions and Disparities in Women's Cancer Screening. *American Journal of Preventive Medicine, 48*(1), 98–103. doi:10.1016/j.amepre.2014.08.015

Salman, K. F. (2012). Health beliefs and practices related to cancer screening among Arab Muslim women in an urban community. *Health care for women international, 33*(1), 45-74.

Salmoirago-Blotcher, E., Fitchett, G., Ockene, J. K., Schnall, E., Crawford, S., Granek, I., Manson, J., Ockene, I., O'Sullivan, M. J., Powel, L., & Rapp, S. (2011). Religion and healthy lifestyle behaviors among postmenopausal women: the women's health initiative. *Journal of Behavioral Medicine, 34*(5), 360-371.

Schwartz, M. D., Taylor, K. L., Willard, K. S., Siegel, J. E., Lamdan, R. M., & Moran, K. (1999). Distress, personality, and mammography utilization among women with a family history of breast cancer. *Health Psychology, 18*(4). 327-332.

Secginli, S., & Nahcivan, N. O. (2004). Reliability and validity of the breast cancer screening belief scale among Turkish women. *Cancer Nursing, 27*(4), 287-294.

Selvin, E., & Brett, K. M. (2003). Breast and cervical cancer screening: Sociodemographic predictors among White, Black, and Hispanic women. *American Journal of Public Health, 93,* 618–623. doi:10.2105/AJPH.93.4.618

Sen, C. K. N. & Kumkale, G. T. (in press). Who does not get screened? A simple model of the complex relationships in mammogram non-attendance. *Journal of Health Psychology*.

Senarath, U., & Gunawardena, N. S. (2009). Women's autonomy in decision making for health care in South Asia. *Asia-Pacific Journal of Public Health, 21*(2), 137-43.

Shiloh, S., & Ilan, S. (2005). To test or not to test? Moderators of the relationship between risk perceptions and interest in predictive genetic testing. *Journal of Behavioral Medicine, 28*(5), 467–79. doi:10.1007/s10865-005-9017-4

Sidani, Y. (2005). Women, work, and Islam in Arab societies. *Women in Management Review, 20*(7), 498-512.

Siegler, I. C., Feaganes, J. R., & Rimer, B. K. (1995). Predictors of adoption of mammography in women under age 50. *Health Psychology, 14*(3), 274-277.

Silver, M. P. (2010). Women's retirement and self-assessed well-being: an analysis of three measures of well-being among recent and long-term retirees relative to homemakers. *Women & Health, 50*(1), 1–19.

Smith, R. A., Brooks, D., Cokkinides, V., Saslow, D. & Brawley, O. W. (2013). Cancer screening in the United States, 2013. *CA: A Cancer Journal for Clinicians*, 63(2): 87-105.

Sorensen, G., & Verbrugge, L. M. (1987). Women, work, and health. *Annual Review of Public Health, 8*, 235–251. doi:10.1146/annurev.pu.08.050187.001315

Steele, S. K., & Porche, D. J. (2005). Testing the theory of planned behavior to predict mammography intention. *Nursing Research, 54*(5), 332-338.

Steele-Moses, S. K., Russell, K. M., Kreuter, M., Monahan, P., Bourff, S., & Champion, V. L. (2009). Cultural constructs, stage of change, and adherence to mammography among low-income African American women. *Journal of Health Care for the Poor and Underserved, 20*(1), 257-273.

Stephenson, M. T., Hoyle, R. H., Palmgreen, P., & Slater, M. D. (2003). Brief measures of sensation seeking for screening and large-scale surveys. *Drug and Alcohol Dependence, 72*(3), 279-286.

Stoloff, J. A., Glanville, J. L., & Bienenstock, E. J. (1999). Women's participation in the labor force: the role of social networks. *Social Networks, 21*(1), 91-108.

Strobl, C., Malley, J., & Tutz, G. (2009). An introduction to recursive partitioning: Rationale, application, and characteristics of classification and regression trees, bagging, and random forests. *Psychological Methods, 14*(4), 323-348.

Tanner-Smith, E. E., & Brown, T. N. (2010). Evaluating the Health Belief Model: A critical review of studies predicting mammographic and pap screening. *Social Theory & Health, 8*(1), 95-125.

Taylor, V. M., Taplin, S. H., Urban, N., White, E., & Peacock, S. (1995). Repeat mammography use among women ages 50-75. *Cancer Epidemiology Biomarkers & Prevention, 4*(4), 409-413.

Toktas, S., & O'Neil, M. L. (2015). Competing frameworks of Islamic law and secular civil law in Turkey: A case study on women's property and inheritance practices. *Women's Studies International Forum, 48*, 29-38.

Tucker-Seeley, R. D., Harley, a. E., Stoddard, a. M., & Sorensen, G. G. (2012). Financial Hardship and Self-Rated Health Among Low-Income Housing Residents. *Health Education & Behavior*. doi:10.1177/1090198112463021

Turkish Statistical Institute. *Health Survey 2010*., Ankara, Turkey: Turkish Statistical Institute, Printing Division. 2012.

U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion (2015). *Healthy People 2020*. Retrieved from http://www.healthypeople.gov/2020/topics-objectives/topic/cancer/objectives.

Vernon, S. W., Laville, E. A., & Jackson, G. L. (1990). Participation in breast screening programs: A review. *Social Science & Medicine, 30*(10), 1107-1118.

Vernon, S. W., Vogel, V. G., Halabi, S., Jackson, G. L., Lundy, R. O. & Peters, G. N. (1992). Breast cancer screening behaviors and attitudes in three racial/ethnic groups. *Cancer*, *69*(1), 165-174.

Wee, L. E., Koh, G. C. H., Chin, R. T., Yeo, W. X., Seow, B., & Chua, D. (2012). Socioeconomic factors affecting colorectal, breast and cervical cancer screening in an Asian urban low-income setting at baseline and post-intervention. *Preventive Medicine, 55*, 61–67. doi:10.1016/j.ypmed.2012.04.011

Whitman, S., Shah, A. M., Silva, A., & Ansell, D. (2007). Mammography screening in six diverse communities in Chicago-A population study. *Cancer Detection and Prevention, 31*, 166–172. doi:10.1016/j.cdp.2006.12.008

Witte, K. & Allen, M. (2000). A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health Education & Behavior, 27*(5), 591-615.

World Bank (2015, April 10). *Labor participation rate*. Retrieved from http://databank.worldbank.org/data/views/reports/tableview.aspx

World Economic Forum (2104). *The global gender gap report 2014*. Geneva: World Economic Forum.

World Health Organization (2014). *World Health Organization—Cancer Country Profiles, 2014*. Retrieved from http://www.who.int/cancer/country-profiles/en/.

World Values Survey Association (2014a). *World Values Survey Wave 6 2010-2014 Official Aggregate v.20141107*. Madrid: Asep/JDS.

World Values Survey Association (2014b). *World Values Survey Wave 4 1999-2004 Official Aggregate v.20140429*. Madrid: Asep/JDS.

Yilmaz, M., Guler, G., Bekar, M., & Guler, N. (2011). Risk of breast cancer, health beliefs and screening behaviour among Turkish academic women and housewives. *Asian Pacific Journal of Cancer Prevention, 12*(3), 817-822.