Examining the Determinants of Colorectal Cancer Screening Practices among Asian Americans

A Dissertation Submitted to the Graduate Division of the University of Hawai‘i at Manoā
in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

In

Social Welfare

May 2017

By

Sophia B. Kim

Dissertation Committee:

Seunghye Hong, Chairperson
Paula T. Araullo Tanemura Morelli
Lana Sue I. Ka‘opua
Meripa Godinet
Seongah Im

ABSTRACT

Asian Americans (AA) are documented to have low colorectal cancer (CRC) screening rates. Recent studies have further revealed screening disparities among AA subgroups. Focused research on CRC screening among AA subgroups are needed to more effectively address the CRC burden experienced by this growing racial/ethnic population. The purpose of this dissertation was to examine the determinants of CRC screening among AA. Study 1 was a systematic review of the determinants to CRC screening among AA subgroups using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Study 2 used the 2012 Hawai‘i Behavioral Risk Factor Surveillance System dataset and examined the associations between CRC screening and ethnicity, controlling for socio-demographic and healthcare variables using multiple logistic regression. Study 3 used the 2009 California Health Interview Survey dataset and examined the associations between physician's recommendation and ethnicity, controlling for socio-demographic, cultural, and healthcare related variables using multiple logistic regression. All reported odds ratios were considered statistically significant at the $p \leq 0.05$ level. Study 1 found different determinants to CRC screening between the AA subgroups. Study 2 revealed ethnic and gender variances in CRC screening among the AA subgroups. Chi-square analyses showed gender variances in CRC screening among the total women sample and Japanese compared to their respective counterparts. Multiple logistic regression results further revealed ethnic and gender variances in CRC screening even after controlling for other covariates. Study 3 revealed that having high limited English proficiency decreased the odds for physician's recommendation for Chinese; being employed decreased the odds for Filipino; and having insurance decreased the odds for Korean.

Wide array of determinants influence AA subgroups' colorectal cancer screening practice (CCSP). Implications for policy, social work practice, and future research are evident from this dissertation. Researchers should remain cognizant of unique factors that play an influential role in subgroup's decision to complete CRC screening; and further investigate potentially important but understudied and misunderstood determinants of CCSP presented in this dissertation. In turn, intervention efforts should be tailored to highlight the cultural strengths of each distinct subgroup and to address their unique needs and barriers to CRC screening.

Table of Contents

List of Tables

List of Figures

Chapter 1. Introduction

Cancer Burden

Across ethnic/racial groups in the U.S., cancer is the second leading cause of death behind heart disease. However, unique from other racial/ethnic groups, Asian Americans (AA) are the first race/ethnic group to experience cancer as the leading cause of death (Asian American Network for Cancer Awareness, Research, & Training [AANCART], 2012; Hastings et al., 2015; Jun & Oh, 2013; Lee, Lundquist, Ju, Luo, & Townsend, 2011; McCracken et al., 2007). More than 100 malignancies are categorized under cancer, however, the common feature that all kinds of cancers share are in its formation which includes the uncontrollable growth and spread of abnormal (cancerous) cells in the body (World Health Organization [WHO], 2015a; American Cancer Society [ACS], 2015a). Staggering numbers indicate significant foreseeable cancer burden in the U.S.: in 2020, we can expect about 1,913,602 cancer incidences (new cases) and 753,003 cancer deaths in the U.S. (WHO, 2015b).

Colorectal Cancer

In the U.S., colorectal cancer (CRC) is the fourth most commonly diagnosed cancer, irrespective of one's gender, with the lifetime risk of developing CRC being one in 20 (National Cancer Institute [NCI], n.d.). In turn, CRC is among the top three leading cause of cancer mortality among men and women separately, and second leading cause when men and women are combined (ACS, 2015b). Among AA in particular, CRC is one of the top four cancers experienced (Miller, Chu, Hankey, & Ries, 2008). Consequently, CRC has been a significant contributor of cancer mortality for AA men and women, accounting for the second leading cause of cancer mortality for men and the third among women (Jun & Oh, 2013; McCracken et al., 2007).

Colorectal Cancer Anatomy

The colon and rectum make up the large intestine and are the last parts of the digestive system (gastrointestinal system) (ACS, 2015b). The colon, a muscular five feet long tube, makes up most of the large intestine and has the primary task of fluid and salt absorption from the food matter to form and store solid waste (stool/fecal matter); while the rectum, the final six inches of the digestive system, stores the stool or feces (after going through the colon) until it passes from the body through the anus (ACS, 2015b; NCI, 2015a). Due to their common features, cancer that starts in the colon or rectum is called CRC or may be referred separately as colon cancer or rectal cancer (ACS, 2015b). The development of CRC is a slow and extensive process (ACS, 2015b). This development typically begins with a growth of a polyp, a benign (non-cancerous) tumor on the inner lining of the colon or rectum (ACS, 2015b). Although benign in nature, some polyps may become cancerous and eventually begin to grow into the wall of the colon or rectum initiating their travel to distant parts of the body (ACS, 2015b). Several risk factors can expedite the development of colorectal polyps or CRC including: diet that is high in red or processed meats, obesity, physical inactivity, smoking, older age, personal history of colorectal polyps or CRC, personal history of inflammatory bowel disease (IBD) which includes ulcerative colitis and Crohn's Disease, and family history of CRC (ACS, 2015c; Centers for Disease Control and Prevention [CDC], 2014a). Although the exact cause of CRC continues to be researched, it is understood that one of the most powerful ways to prevent CRC is through regular colorectal cancer screening practice (CCSP) (ACS, 2015d).

Colorectal Cancer Screening Recommendations

Screening Modalities

Screening involves detection of abnormal tissue or cancer in an asymptomatic individual

which allows for early detection and removal of precancerous polyps (NCI, 2015b). This health promoting behavior is particularly important for CRC because individuals with early CRC often do not experience any symptoms (ACS, 2014). As such, screenings play a powerful role in CRC prevention by finding polyps and having them removed before they turn into cancer and/or early detection by finding CRC early when treatment is most effective (CDC, 2014b).

What makes CRC screening unique is that there are options in screening modalities, each requiring an individual's active participation in preparation of the procedures. It is important to note that the U.S. Preventive Services Task Force (USPSTF, 2015) has updated its 2008 recommendation, which was its most recent guideline, on CRC screening. Although other modalities are available including but not limited to double contrast barium enema (DCBE) and virtual colonoscopy/ computed tomographic (CT), the 2008 CRC screening guideline by USPSTF graded the following three modalities: high-sensitivity fecal occult blood testing (FOBT), flexible sigmoidoscopy (FSIG), and colonoscopy an "A" based on the sufficient evidence of their respective effectiveness and high certainty that the net benefit is substantial (2015).

Fecal occult blood test. The FOBT is recommended once a year and is non-invasive, using chemical guaiac to detect blood in the stool. The FOBT test kit is provided to the individual by their healthcare provider and the provider may recommend the individual to follow a special diet prior to taking the FOBT. At home, the individual uses the stick or brush included in the tool kit to obtain a small amount of stool, possibly for several bowel movements in a row. The test is then returned to the doctor or a lab, where the stool samples are checked for blood. If anything unusual is found, the healthcare provider will recommend a follow-up colonoscopy (CDC, 2014c).

Sigmoidoscopy. The sigmoidoscopy is recommended every three years or every five years if done in combination with a FOBT. This procedure requires bowel preparation including possible dietary restrictions (e.g. liquid diet) and the ingestion of a laxative and/or enema to clean out the colon the evening before the test. No sedation is required and the procedure is completed at the doctor's office using a short, thin, flexible lighted tube to check for polyps or cancer in the rectum and the lower third of the colon. If anything unusual is found, the healthcare provider will recommend a follow-up colonoscopy. Individuals are typically able to resume their normal diet and activities after the procedure (CDC, 2014c).

Colonoscopy. The colonoscopy is recommended every 10 years and requires longer bowel preparation including dietary restrictions (e.g. liquid diet) and the ingestion of a laxative and/or enema to clean out the colon, as well as arrangement for a ride home after the procedure as the recovery experience and length can vary. During the procedure, medication is given to the individual to increase comfort. This procedure uses a similar tool to the sigmoidoscopy except that it checks for polyps or cancer in the rectum and the entire colon. As this modality is also used as a follow-up test and/or diagnostic tool, if a polyp is found, it can be removed during the screening procedure. (CDC, 2014c).

Updated Colorectal Cancer Screening Recommendations

The current USPSTF 2015 recommendation is that average-risk men and women get screened for CRC starting at age 50 and continue getting screened regularly until age 75. Average-risk individuals typically refer to those who do not have personal or family CRC histories and no genetic predisposition to CRC (CDC, 2014b). The USPSTF 2015 CRC screening guideline emphasis is not on recommending any specific screening modality, but rather, highlighting the fact that CRC screening is underutilized in the U.S., and that undergoing

CRC screening can save lives (USPSTF, 2015). This was accomplished by providing a detailed "menu of option" of various screening modalities on their CRC screening guideline to optimize the shared decision making process between the physician and patient when aiming to select a screening that the patient has increased likelihood of completing (Ransohoff & Sox, 2016).

Colorectal Cancer Screening

Although adherence to routine screening plays a pivotal role in preventing and reducing CRC incidences and death rates, many in the U.S. do not adhere to this health promoting behavior (Stanley, King, Thomas, & Richardson, 2013; Yang, Gross, Soulos, & Yu, 2014). In fact, only 59% of adults aged 50-75 were screened for CRC in 2010 (Office of Disease Prevention and Health Promotion, 2015) despite findings indicating screenings' high-impact and cost-effective service (Maciosek, Solberg, Coffield, Edwards, & Goodman, 2006). This falls below Healthy People 2020's CRC screening objective to increase the nationwide CRC screening rate to 70.5% (Health People 2020, 2017). As a response to this suboptimal national screening rate, an initiative was developed from the National Colorectal Cancer Roundtable (NCCR), a national coalition of public, private, and voluntary organizations committed to raising awareness about the prevention and early detection of CRC, to increase CRC screening rates to 80% by 2018 and to eliminate CRC as a national public health problem (NCCR, 2015). Meester et al. (2015, p. 2283) study focusing on estimating the potential benefit of achieving the NCCR 80% by 2018 goal suggested that "achieving this goal may produce a reduction of 22% in CRC incidence rates and 33% in CRC mortality rates by 2030, which translates to approximately 280,000 averted new cases and 200,000 averted deaths from 2013-2030."

Colorectal Cancer Screening Disparity among Asian Americans

Colorectal Cancer Screening Rate

Among all the ethnic/racial groups in the nation, AA continue to receive the lowest rate in CRC screenings (Lee et al., 2011; Liss & Baker, 2014; Oh, Zhou, Kreps, & Ryu, 2012). A study by Wong et al., (2005) explored screening rates among AA as a group and AA subgroups using the 2001 California Health Interview Survey (CHIS) data and found that AA generally screen at a lower rate for FOBT (38%), endoscopy (42%), and any CRC screening – either FOBT or endoscopy (58%) compared to non-Hispanic Whites 58%, 57%, and 75% respectively. The aggregated group's lower screening rates were supported in a later study using data from the 2001, 2003, and 2005 CHIS and found that AA CRC screening (46.8%) continued to be lower than non-Hispanic Whites (57.7%) (Lee et al., 2011). These findings fall in line with the low AA screening rates detected by Healthy People 2020 (Healthy People 2020, 2017). For instance, in 2015, only 52.7% of AA had undergone screening compared to 60.6% African Americans and 65.4% non-Hispanic White (Healthy People 2020, 2017).

Disaggregating the AA population further revealed screening disparities in specific subgroups as well as by screening modality. For instance, Koreans were shown to have the lowest screening rates for FOBT (23%) and any CRC screening (49%) compared to other Asian sub-groups (Wong et al., 2005). Other studies' findings were similar in that Koreans had the lowest screening prevalence of nearly every type of screening including endoscopy, FOBT, and the two combined (McCracken et al., 2007; Maxwell & Crespi, 2008). As such, studies have consistently concluded Koreans as the most disadvantaged AA subgroup with respect to CRC screening adherence (Lee et al., 2011; Oh & Jacobsen, 2014; Wong et al., 2005). On the other end of the spectrum, studies have indicated that Japanese have similar CRC screening rates to non-Hispanic Whites (McCracken et al., 2007; Wong et al., 2005) and the highest screening prevalence of all AA (Maxwell & Crespi, 2008). The model minority stereotype, a stereotype

that can be perceived as "positive" in presentation, is controversial and has been used to explain the negative social and health implications of AA (Yi, Kwon, Sacks, & Trinh-Shevrin, 2016), and more specifically, the suboptimal CRC screening rates experienced in this population (Ibaraki, Hall, & Sabin, 2014). Mkwj

Conceptual Framework

The conceptual framework for this dissertation proposal is based on the Expanded Health Belief Model (EHBM) (Burns, 1992) and Andersen's Healthcare Utilization Model (Andersen, 1995). These theoretical frameworks are informed by existing literature on CCSP (Honda, 2004; Lee et al., 2011; Stanley, King, Thomas, & Richardson, 2013; Wong et al., 2005).

The most commonly adopted theoretical model for predicting compliance with preventive health promoting behaviors and that focuses on the intrapersonal level of influence is the original Health Belief Model (HBM) (Becker & Maiman, 1975; Beydoun & Beydoun, 2008; Rosenstock, Strecher, & Becker, 1988). Similar in many fundamental ways to its predecessor Social Cognitive Theory (Rosenstock et al., 1988), HBM was originally formulated by Irwin M. Rosenstock and was developed to explain why people did not take advantage of screening and immunization programs (Beydoun & Beydoun, 2008). Since its inception, it has been shown to be a good fit for preventive health behaviors undertaken by asymptomatic people. (Beydoun & Beydoun, 2008). The HBM contains the following cognitive constructs: 1) *perceived susceptibility*, subjective assessment of risk of developing health condition (CRC), 2) *perceived severity*, subjective assessment of the severity of the health condition (CRC) and its potential consequences, 3) *perceived threat*, collective effect of perceived susceptibility and perceived severity, 4) *perceived benefits*, subjective assessment of the value or efficacy in engaging in a health promoting behavior (CRC screening) to decrease risk of health condition (CRC), 5)

perceived barriers, subjective obstacles to behavior change (CRC screening), 6) *cues to action*: internal stimuli, physiological cues or symptoms (bloody stool; abdominal pains, etc.) and external stimuli, information and events (physician's recommendation, reminder notice for CRC screening, family history and/or illness) that remind the person of the need to change and that trigger action, and 7) *self efficacy*, one's belief about their ability to successfully accomplish the health behavior (CRC screening) (Beydoun & Beydoun, 2008).

With respect to the model, appropriate critiques have been made which includes: 1) lack of operational definitions of the variables which leads to the possibility that the concepts being measured may vary from study to study; stability and reliability of beliefs; genesis of the belief or the conditions under which the beliefs were acquired; need for experimental studies to determine the causal role of the relevant health beliefs; and further research in the role of health habits that may guide the adult's behavior (Rosenstock, 2005). Nevertheless, the strengths of the model appear to account for major behavioral differences in varying groups in a variety of settings; and it appears to be capable of application to a wide variety of health actions and beliefs (Rosenstock, 2005).

Although the original HBM framework gained enough support to retain its original constructs (Burns, 1992), its inception nevertheless, paved the way for revised models to emerge. The EHBM is one such example and is comprised of three main stages: 1) *threat assessment*, person's evaluation of the risk associated with an illness (CRC), 2) *action assessment*, person's evaluation of options in remedies in respect to their respective efficacy and perceived benefits and costs, and finally, upon selecting and implementing an action, the individual makes a 3) *outcome assessment* (Burns, 1992). Notable emphasis in the EHBM includes the socio-psychological factors which are external to the individual that influences their knowledge and

perceptions about the health issue (Burns, 1992). These factors include: *cues to action*, external signals (e.g., public health officials' statements, news stories, pamphlets, and other educational communications) that initiate a person's realization that they are at health risk; and *social influence*, influential role and pressure from healthcare providers and social support (e.g., family and peers) (Burns, 1992). The addition of a non-cognitive construct, *emotional response*, can add to the predictive power of the HBM as well as to the explanatory power of why people do not initiate and/or adhere to screening practice (Burns, 1992). Finally, the inclusion of a normative factor, *behavioral norm*, "socially acceptable" response to health condition was included due to its strong influence on human behavior (Burns, 1992). Since its inception and through its various adaptations, many studies have continued to use HBM and its adaptations to identify factors that can predict CRC screening (Beydoun & Beydoun, 2008; Stanley, King, Thomas, & Richardson, 2012).

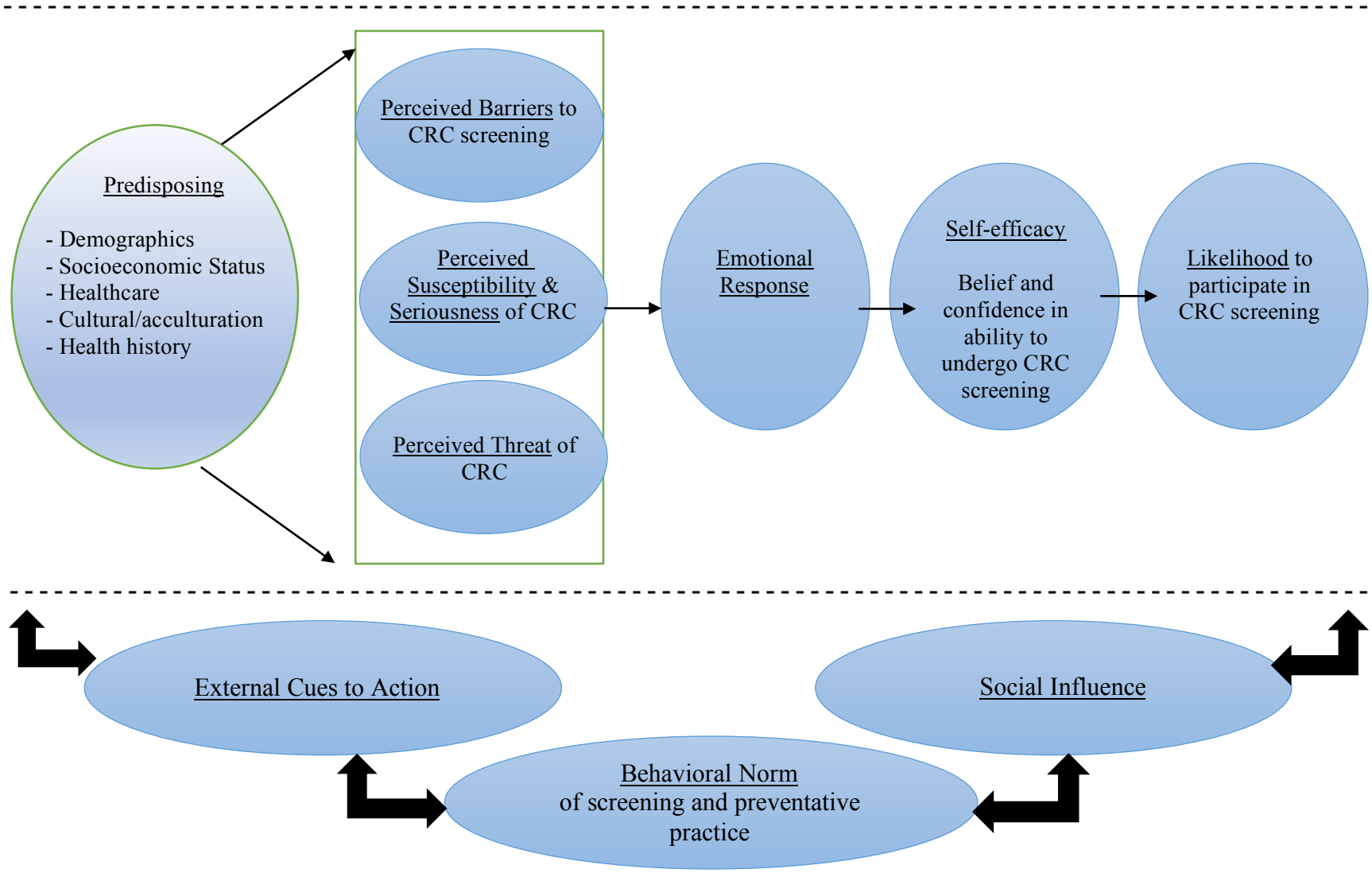
Another framework that is frequently used for examining patient utilization of healthcare services is the model developed by Ronald M. Andersen (Phillips, Morrison, Andersen, & Aday, 1998). Healthcare Utilization Model (HUM) was developed in the late 1960s by Andersen to assist in answering why individuals use health services (Andersen, 1995). The initial model suggested three constructs that can lead to use of health services (CRC screening), 1) individual's *predisposition* to use health services (CRC screening) which can be broken down to three main factors: a) demographic, biological imperatives (i.e., age, gender, marital status, etc.), b) social structure, factors that determine the individual's status in society (i.e., education, occupation, ethnicity, etc.), and c) health beliefs, attitudes, values, and knowledge that people have about health (CRC) or health services (CRC screening); 2) *enabling factors*, factors which enable or challenges use and can be broken down to two factors: a) personal, having the means

and knowledge on how to get services (i.e., income, health insurance, regular source of care, travel and waiting times, etc.) and b) community, availability of health personnel and facilities; and 3) individual's *need* for care which can be broken down to two factors: a) perceived, how people perceive their own general health and functional state, how they experience symptoms of disease and feelings about their health, and whether they perceive their health problems to be important and severe enough to seek professional help; and b) evaluated, how professionals perceive individual's health status and their need for medical care (Andersen, 1995).

Figure 1.1 illustrates the conceptual model used for this dissertation. The *predisposing factors* (adapted from HUM) can help describe individuals' characteristics on an intrapersonal level. These factors can include: demographics (i.e., age, race/ethnicity, sex, marital status, etc.); socioeconomic status (i.e., education level, employment status, income level, etc.); healthcare (i.e., having healthcare, having usual source of care, etc.); cultural/acculturation (i.e., nativity, years in the U.S., language spoke at home, subjective perception of ability to speak English); and health status, history, and knowledge (i.e., past health experience, current health status, knowledge of disease, health literacy). Although the original HUM has a separate construct (*enabling*) that is composed of factors (i.e., income, usual source of care, health insurance, etc.) that can enable or challenge use of healthcare services, I combined these factors in the *predisposing* construct as they support the sociodemographic description of the individual. These *predisposing factors* influence the following three HBM cognitive constructs: *perceived barriers, perceived susceptibility* and *seriousness* (which is equivalent to *perceived threat*), and *perceived threat* to CRC screening. In turn, these perceptions trigger an *emotional response* which may be in favor or disfavor of the health promoting behavior (CRC screening). Finally, these cognitive and emotional constructs influence one's belief and confidence (*self-efficacy*)

that they would successfully be able to complete CRC screening, thus increasing or decreasing the likelihood to CRC screening. It is important to note that inevitable transactions are occurring between the individual and factors in the interpersonal level. Two stimulator and facilitator factors, *social influence* (e.g., pressure from family, spouse, and/or peers to do CRC screening) and *external cues to action* (e.g., media/educational campaigns promoting CRC screening), influences and can shape the perception constructs and emotional construct. In turn, the broader *behavioral norm* influences the stimulator and facilitator factors in terms of what and how health information is relayed to the individual based on the society/community's attitudes and beliefs of CCSP and whether CRC screening is perceived as a culturally and socially acceptable response to prevent CRC. The latter three constructs are outside of the immediate intrapersonal level as they are external stimuli that can trigger initiation to behavior action. However, because a transaction is occurring between the different levels, the intrapersonal level constructs are enclosed in the dashed circle rather than a solid circle.

Figure 1.1. Conceptual Framework



Determinants of Colorectal Cancer Screening

Although studies have gone underway to identify the association between CRC screening and various determinants, conflicting findings of key determinants to address when developing strategies to promote screening uptake have been reported (Ioannou et al., 2003). As such, examining determinants associated with CRC screening warrants particular attention as this cancer is unique from other cancers with regards to the significant impact it has regardless of one's gender, the requirement of individual preparation of the selected procedure, and options in screening modality.

Race/Ethnicity

The effects of race and ethnicity on odds of undergoing CRC screening have gone underway and have showcased screening disparities. For instance, a nationally representative study found that AA had lower odds of undergoing a CRC screening when compared to non-Hispanic White (Odds Ratio [OR] 0.78, 95% CI 0.63 – 0.96) (Trinh et al., 2016). Another nationally representative study aiming to identify factors that predict current CRC screening participation and by each screening modality found that even after adjusting for other covariates, Asian/Pacific Islander were less likely to undergo FOBT and more likely to undergo endoscopy than non-Hispanic White (Ioannou, Chapko, & Dominitz, 2003). Moreover, Jerant, Fenton, and Franks (2008) study aimed to address the limitations on minority/non-Hispanic White screening disparities in the literature and found that even after sequential adjustment of correlates of CRC screening behavior (e.g., basic demographics, socioeconomic variables, access and self-rated health, and language spoken at home and nativity), AA vs. non-Hispanic White disparities in combined CRC screening (e.g., FOBT and sigmoidoscopy or colonoscopy) remained statistically significant, whereas Black vs. non-Hispanic White and Hispanic vs. non-Hispanic White

disparities were eliminated. This indicated the variability in determinants of racial/ethnic CRC screening disparities (Jerant et al., 2008).

According to Lee et al. (2011), recent research on the disaggregated AA subgroups found disparities in CRC screening behaviors between AA subgroups. Their own study confirmed the heterogeneity of screening behaviors among AA subgroups as Filipinos, Koreans, and South Asians were less likely to receive CRC screening than Chinese, Japanese, and Vietnamese after controlling for confounding variables (Lee et al., 2011). Differences by screening modalities have been revealed as well. For instance, for ever having FOBT, Koreans were less likely to have undergone screening when compared to non-Hispanic Whites (Wong et al., 2005). For sigmoidoscopy/colonoscopy, Filipinos were less likely to have undergone either screenings (Wong et al., 2005). Adherence to the recommended CRC screening guidelines also differs within the AA population and by modality. For example, Chinese and Koreans had the lowest odds of being up to date with CRC screening (Homayoon et al., 2013). Specifically, by screening modality, Filipinos have been shown to be less likely up to date with sigmoidoscopy/colonoscopy (Wong et al., 2005).

Generally, AA have been found to experience similar influential factors that are correlated with cancer screening practices to those in the general population (Oh et al., 2012), however, it is critical to understand the determinants that influence healthcare utilization in identifying reasons for differences or disparities in utilization (Phillips et al., 1998). For instance, the concept of preventive practice and engagement in routine healthcare practices may be a foreign concept for many recent Asian immigrants; and navigating a new healthcare system may pose additional barriers and challenges (Thompson et al., 2014).

It is also important to note that AA subgroups' demographic, socioeconomic, cultural

characteristic, and access to healthcare vary substantially (Goel et al., 2003; Lin-Fu, 1988; McCracken et al., 2007; Stanley et al., 2013). With the understanding of the need to facilitate research on specific AA subgroups, recent studies have focused on examining ethnic specific differences in demographic and cultural factors (Ma, Shive, Wang, & Tan, 2009), as well as in knowledge, attitudes, and beliefs regarding CRC and CRC screening (Le et al., 2014). Moreover, the examination of determinants to CRC screening uptake among specific AA subgroups have been initiated, including but not limited to, Chinese (Sentell, Tsoh, Davis, Davis, & Braun, 2015; Sun et al., 2004; Teng, Friedman, & Green, 2006), Japanese (Honda, 2004), Korean (Jo, Maxwell, Wong, & Bastani, 2008; Oh & Jacobsen, 2014), and Vietnamese (Nguyen-Truong, Lee-Lin, & Gedaly-Duff, 2013), thus, revealing important differences in subgroups' CRC screening utilization and screening predictors.

Culture

Conceptualizing the multifaceted concept of culture poses challenges; however, its dimensions' impacts on health belief, communication, attitudes, and health behavior cannot be underestimated (Giuliano et al., 2000). According to Kagawa-Singer (2012), differences exist in how culture is operationalized in current literature. However, four basic features are contained when defining culture: 1) learned from birth through the processes of language acquisition and socialization, 2) shared by all members of the same cultural group, 3) adapted to specific environmental and technical conditions, and therefore, 4) maintains a dynamic, ever-changing process (Kagawa-Singer, 2012). As culture is both innate and learned by the individual, it influences human behavior, and ultimately, ensures a group's survival (Kagawa-Singer, 2012).

In respect to the differences in ethnic group's immigration experience, appropriate cultural/acculturation measurements should be considered to accurately describe AA subgroup's

health (Goel et al, 2003; Salant & Lauderdale, 2003). Lee, Chen, Jung, Baezconde-Garbanati, and Juon's (2014) study focused on various acculturation variables using the revised version of the Suinn-Lew Asian Self Identity Acculturation scale (SL-ASIA) and cancer screening including CRC screening among AA subgroups. Their findings showed that those who were more acculturated as measured by "being categorized into the American cluster, speaking English and Asian language equally well, living longer length of residency in the U.S., and having a younger age at arrival" were positively associated with CRC screening (Lee et al., 2014, p. 206). As English proficiency can have an impact on health literacy, a growing body of literature has focused on its impact on health outcomes among immigrant population (Lee, Rhee, Kim, & Ahluwalia, 2015; Sentell et al., 2015). However, this contradicts May, Almario, Ponce, & Spiegel's (2015) study that found that English speaking Asian Americans were more likely not to receive CRC screening due to lack of provider screening recommendation than non-Hispanic Whites who speak English. Hence, the authors proposed that the effect of race on provider screening recommendation should be further explored (May et al., 2015). Another study found the following factors to be associated with inadequate CRC screening including, minority populations including Asian and Hispanic persons, new immigrants, individuals born outside the U.S., persons less acculturated to the U.S., and those with limited English proficiency (Goel et al., 2003). These are also the groups that are least likely to be aware of the need for CRC screening (Holden et al., 2010).

Gender

Although women generally have a higher utilization of healthcare and preventive services than men (Chacko, Macaron, & Burke, 2015), studies exploring gender's role in CCSP generally indicated higher screening rate for men compared to women (Chacko et al., 2015; Slattery,

Kinney, & Levin, 2004), particularly for endoscopic procedures (Friedemann-Sanchez, Griffin, & Partin, 2007). According to Lee and Im (2013), gender impacts screening rates. In addition, study findings have indicated clear gender differences on screening knowledge and barriers and facilitators to screening which may contribute to decisions to undergo screening (Burke, Beeker, Kraft, & Pinsky, 2000; Callcut, Kaufman, Stone-Newsom, Remington, & Mahvi, 2006; Friedemann-Sanchez et al., 2007; Ritvo et al., 2013; Robb, Miles, & Wardle, 2004; Wong et al., 2013). Although gender has been examined as a key determinant in screening practice among non-Hispanic White, gender influences on screening practices is still under-researched especially among Asian population (Lee & Im, 2013). Potential gender-specific facilitators and barriers to CRC screening warrants further investigation.

Socioeconomic Status

The "bipolar pattern" in socioeconomic (i.e., groups having high income and groups in poverty) and health of AA needs to be acknowledged (Lin-Fu, 1988, p. 20). Notably in the U.S., socioeconomic status (SES) is known to account for a certain degree of racial/ethnic health disparities for various diseases (Chien, Morimoto, Tom, Li, 2005). Having a higher education level (Slattery et al., 2004; Wong, 2005) and higher household income (Holden, Jonas, Porterfield, Reuland, & Harris, 2010; Shapiro et al., 2012) can serve as facilitators to CRC screening. Beydoun and Beydoun's (2008) study support this notion as their findings showed that even among those who are insured, individuals with the lowest educational attainment and income levels, among whom the CRC burden is the highest, have the lowest CRC screening rates.

Provider-Related Networks

The following *external cues to action* or *evaluated* variables were associated with higher

rates of CRC screening: having a physician recommendation for screening, having effective patient-provider communication, using reminder systems, helping patients keep appointments, and having non-clinician support for screening (Holden et al., 2010). In turn, the healthcare cost and general lack of access to health care/no healthcare insurance were associated with lower receipt of CRC screening (Holden et al., 2010). As such, access to healthcare has been regarded as one of the most influential factors for whether people are screened for CRC (Stanley et al., 2013). A study by Lee et al. (2011) focusing on AA subgroups also supported the latter associations between healthcare variables and CRC screening, presenting that access to healthcare and usual source of care (SOC) were the strongest predictors to CRC screening uptake.

Healthcare providers play a critical role in supporting screening among their patients. A study reiterated this important factor as their findings showed that a physician's recommendation for CRC screening increases the likelihood of screening (Teng et al., 2006) among both insured and uninsured individuals (Doubeni et al., 2010). Hence, provider recommendation to screening has been identified as one of the strongest predictors with screening compliance (Chacko et al., 2015). The role of language concordance on cancer screening among AA has also been shown to have mixed results. For instance, a study using data from electronic health records showed lower CRC screening completion among patient-provider language discordant pairs (Thompson et al., 2014); however, a cross-sectional study using a representative sample of California indicated no significant association between language concordant provider and CRC screening among those with limited English proficiency (LEP) (Sentell et al., 2015). These mixed findings indicate that language concordant providers may not be sufficient to address the CRC screening disparities among those with LEP (Sentell et al., 2015).

Health Belief Model Constructs

Finally, personal barriers related to lack of knowledge of the CRC screening modalities in the general population have been shown to be associated with decreased receipt of CRC screening (Sun, Basch, Wolf, & Li, 2004). Different HBM constructs have been found to be associated with CRC screening uptake depending on the modality. For instance, a study on urban Japanese Americans revealed that low perceived cost had independent effects on uptake of both FOBT and sigmoidoscopy/colonoscopy (Honda, 2004). On the other hand, perceived risk of developing CRC did not predict obtaining FOBT, sigmoidoscopy, or colonoscopy among Chinese Americans (Teng et al., 2006), nor among Korean Americans (Oh, Kreps, & Jun, 2013). In addition, psychological and emotional factors have been shown to be barriers to CRC screening, including fear and embarrassment of participating in the procedures (Beydoun & Beydoun, 2008; O'Malley, Beaton, Yabroff, Abramson, & Mandelblatt, 2004). Furthermore, a later study by Honda and Kagawa-Singer (2006) highlighted the importance of subjective norms among friends and family over attitudinal factors in CRC screening engagement among Japanese Americans.

Statement of Problem

The 2010 Census reported that the AA population (both AA alone and AA in combination with another race) grew faster than any other race group in the U.S between 2000-2010 (Hoeffel, Rastogi, Kim, & Shahid, 2012) and continue to be the fastest growing racial group in the U.S. making up the largest share of recent immigrants (Pew Research Center, 2015). The U.S. Office of Management and Budget (OMB) defines Asian as a person having origins in the Far East, Southeast Asia, or the Indian subcontinent (Hoeffel et al., 2012). This definition is also used by the U.S Census Bureau. Currently, six subgroups comprise the majority of the AA

population: Chinese, Asian Indian, Filipino Vietnamese, Korean, and Japanese (Pew Research Center, 2015; U.S Census Bureau, 2014).

Despite the staggering current and anticipated growth in population, AA has been identified as one of the most understudied (Lin-Fu, 1988) and misunderstood racial groups in the U.S. in relation to health research (Chen, 2005; Holland & Palaniappan, 2012; Lin-Fu, 1988). There is a need to disaggregate AA data to more accurately reflect its subgroups' realities and masked needs. This notion has been acknowledged on the federal level: in 2009 the White House Initiative on Asian American and Pacific Islanders (WHIAAPI) was initiated to advance disaggregated data collection, analysis, and dissemination on the AAPI community to improve their quality of life (the White House, n.d.). This is a step in the right direction as national datasets have historically aggregated the AA and Pacific Islander population which masks the heterogeneity of the AA group that comprise this population (Oh et al., 2012). Moreover, when AA are disaggregated from AAPI in national health surveys, information on AA are oftentimes omitted in research reports or reported as an aggregated group denying the heterogeneity of the AA population (Holland & Palaniappan, 2012). When national reports do report on AA health, it is typically limited to one AA subgroup alone, which then tends to be "inappropriately interpreted and extrapolated" to all other subgroups (Holland & Palaniappan, 2012, p. 402).

In the U.S., AA comprise a large diverse racial minority (Le et al., 2014) whose origins encompass a wide geographic scope of more than 20 countries of origin, 30 ethnic groups, and 200 languages or dialects (Chen, 2005). As such, their differences with regards to culture, languages and dialects spoken, time since immigration, socioeconomic profiles, and risk factors (Chien et al., 2005; McCracken et al., 2007) must be taken into consideration when examining their health and health behavior. As one of the fastest growing racial/ethnic populations, AAs are

documented to have a cancer burden disproportionate to other populations (Chen, 2005). This disproportionality deserves special attention. More specifically, focused research on AA subgroups and their screening practices are needed. Although examination of individual AA subgroup on CRC screening have gone underway, there is a need for research that focuses on differences both between and within AA subgroups to achieve more accurate and reflective information on CCSP This, in turn, can promote tailored strategies and more effective interventions to address the CRC screening disparity among AA subgroups.

Purpose of the Three Article Dissertation

The purpose of this dissertation is to examine the determinants of CRC screening among the disaggregated AA population. Determinants of health is defined as the interrelationships among personal, social, economic, and environmental factors that affect individuals' health status (Healthy People 2020, 2016).

The aim of the first study is to conduct a systematic literature review of the determinants of CRC screening among AA. The following subgroups will be considered: Chinese, Korean, Japanese, and Filipino.

The aim of the second study is to 1) disaggregate the AA population and examine CRC screening rates among the three largest AA subgroups in Hawai‘i: Japanese, Filipino, and Chinese, 2) identify ethnic and gender variance in CRC screening practices, and 3) identify barriers and facilitators to CRC screening practices among the aggregated AA as well as within each AA subgroup.

The aim of the third study is to 1) examine the proportion of adults who had not received a physician's recommendation for CRC among Japanese, Filipino, Chinese, Korean, and Vietnamese, 2) examine ethnic variances in physician's recommendation, and 3) examine

barriers and facilitators to physician's recommendation on CRC screening.

References

American Cancer Society (ACS). (2014). Colorectal Cancer Facts & Figures 2014-2016. Atlanta: American Cancer Society. Retrieved from http://www.cancer.org/acs/groups/content/documents/document/acspc-042280.pdf

ACS. (2015a). Learn About Cancer: What is Cancer? Retrieved from http://www.cancer.org/cancer/cancerbasics/what-is-cancer

ACS. (2015b). What is Colorectal Cancer? Retrieved from http://www.cancer.org/cancer/colonandrectumcancer/detailedguide/colorectal-cancer-what-is-colorectal-cancer

ACS. (2015c). What Are the Risk Factors for Colorectal Cancer? Retrieved from http://www.cancer.org/cancer/colonandrectumcancer/detailedguide/colorectal-cancer-risk-factors

ACS. (2015d). Can Colorectal Cancer be Prevented? Retrieved from http://www.cancer.org/cancer/colonandrectumcancer/detailedguide/colorectal-cancer-prevention

American Network for Cancer Awareness, Research, and Training (AANCART). (2012). Asian American Cancer Health Disparities. Retrieved from http://www.aancart.org/cancer-research/publications/asian-american-cancer-health-disparities

Andersen, R. M. (1995). Revisiting the behavioral and access to medical care: Does it matter? *Journal of Health and Social Behavior*, *36*, 1-10.

Becker, M. H., & Maiman, L. A. (1975). Sociobehavioral determinants of compliance with health and medical care recommendations. *Medical Care*, *13*(1), 10-24.

Beydoun, H. A. & Beydoun, M. A. (2008). Predictors of colorectal cancer screening behaviors among average-risk older adults in the United States. *Cancer Causes & Control*, *19*(4), 339-359.

Burke, W., Beeker, C., Kraft, J., & Pinksy, L. (2000). Engaging women's interest in colorectal cancer screening: A public health strategy. *Journal of Women's Health & Gender-Based Medicine, 9*(4), 363-371.

Burns, A. C. (1992). The expanded health belief model as a basis for enlightened preventive health care practice and research. *Journal of Health Care Marketing*, *12*(3), 32-45.

Callcut, R. A., Kaufman, S., Stone-Newsom, R., Remington, P., & Mahvi, D. (2006). Gender disparities in colorectal cancer screening: True or false? *Journal of Gastrointestinal Surgery, 10*(10), 1409-1417. doi: 10.1016/j.gassur.2006.06.006

Centers for Disease Control and Prevention (CDC). (2014a). What Are the Risk Factors for Colorectal Cancer? Retrieved from http://www.cdc.gov/cancer/colorectal/basic_info/risk_factors.htm

CDC. (2014b). What is Colorectal Cancer Screening? Retrieved from http://www.cdc.gov/cancer/colorectal/basic_info/screening/index.htm

CDC. (2014c). Colorectal Cancer Screening Tests. Retrieved from http://www.cdc.gov/cancer/colorectal/basic_info/screening/tests.htm

Chacko, L., Macaron, C., & Burke, C. A. (2015). Colorectal cancer screening and prevention in women. *Digestive Diseases and Sciences, 60*(3), 698-710. doi: 10.1007/s10620-014-3452-4

Chen, M. S. (2005). Cancer health disparities among Asian Americans. *Cancer, 104*(S12), 2895-2902. doi: 10.1002/cncr.21501

Doubeni, C. A., Laiyemo, A. O., Young, A. C., Klabunde, C. N., Reed, G., Field, T. S., & Fletcher, R. H. (2010). Primary care, economic barriers to health care, and use of colorectal cancer screening tests among medicare enrollees over time. *Annals of Family Medicine*, *8*(4), 299-307. doi: http://doi/org/10.1370/afm.1112

Friedemann-Sanchez, G., Griffin, J. M., & Partin, M. R. (2007). Gender differences in colorectal cancer screening barriers and information needs. *Health Implications*, *10*(2), 148-160. doi: 10.1111/j.1369-7625.2006.00430.x

Giuliano, A. R., Mokuau, N., Hughes, C., Tortolero-Luna, G., Risendal, B., Ho, R. C. S., & Prewitt, T. E. (2000). Participation of minorities in cancer research: The influence of structural, cultural, and linguistic factors. *Annals of Epidemiology, 10*(8), S22-S34.

Goel, M., Wee, C., McCarthy, E., Davis, R., Ngo-Metzger, Q., & Phillips, R. (2003). Racial and ethnic disparities in cancer screening the importance of foreign birth as a barrier to care. *Journal of General Internal Medicine*, *18*(12), 1028-1035.

Hastings, K. G., Powell, J. O., Kapphahn, K. I., Frank, A. T. H., Goldstein, B. A., Thompson, C. A., Eggleston, K. Cullen, M. R., & Palaniappan, L. P. (2015). Leading causes of death among Asian American subgroups (2003-2011). *PLoS ONE*, *10*(4). doi: 10.1371/journal.pone.0124341

Healthy People 2020. (2016). Determinants of health. Retrieved from https://www.healthypeople.gov/2020/about/foundation-health-measures/Determinants-of-Health

Healthy People 2020. (2017). Cancer. Retrieved from https://www.healthypeople.gov/2020/data search/Search-the-Data#srch=colorectal%20cancer%20screening;

Hoeffel, E. M., Rastogi, S., Kim, M. O., & Shahid, H. (2012). The Asian population: 2010.

Washington, DC: U.S Department of Commerce, U.S. Census Bureau, 2010.

Holland, A. T. & Palaniappan, L. P. (2012). Problems with the collection and interpretation of Asian-American health data: Omission, aggregation, and extrapolation. *Annals of Epidemiology*, *22*(6), 397-405. doi: 10.1016/j.annepidem.2012.001

Homayoon, B. B., Shahidi, N. C., & Cheung, W. Y. (2013). Impact of Asian ethnicity on colorectal cancer screening: A population-based analysis. *American Journal of Clinical Oncology*, *36*(2), 167-173. doi: 10.1097/COC.0b013e3182439068

Honda, K. (2004). Factors associated with colorectal cancer screening among the U.S. urban Japanese population. *American Journal of Public Health*, *94*(5), 815-822.

Honda, K. & Kagawa-Singer, M. (2006). Cognitive mediators linking social support networks to colorectal cancer screening adherence. *Journal of Behavioral Medicine*, *29*(5), 449-460. doi: 10.1007/s10865-006-9068-1

Ibaraki, A. Y., Hall, G. C. N., & Sabin, J. A. (2014). Asian American cancer disparities: The potential effects of model minority stereotypes. *Asian American Journal of Psychology, 5*(1), 75-81.

Ioannou, G. N., Chapko, M. K., & Dominitz, J. A. (2003). Predictors of colorectal cancer screening participation in the United States. *The American Journal of Gastroenterology*, *98*, 2082-2091. doi: 10.111/j.1572-0241.2003.07574.x

Jerant, A. F., Fenton, J. J., & Franks, P. (2008). Determinants of racial/ethnic colorectal cancer screening disparities. *Archives of Internal Medicine*, *168*(12), 1317-1324. doi: 10.1001/archinte.168.12.1317

Jo, A. M., Maxwell, A. E., Wong, W. K., & Bastani, R. (2008). Colorectal cancer screening among underserved Korean Americans in Los Angeles County. *Journal of Immigrant and*

Minority Health, *10*(2), 119-126.

Jun, J. & Oh, K. M. (2013). Asian and Hispanic Americans' cancer fatalism and colon cancer screening. *American Journal Health Behavior*, *37*(2), 145-154. doi: 10.5993/AJHB.37.2.1

Kagawa-Singer, M. (2012). Applying the concept of culture to reduce health disparities through health behavior research. *Preventive Medicine, 55*(5), 356-361. doi: 10.1016/j.ypmed.2012.02.011

Lee, H. Y. & Im, H. (2013). Colorectal cancer screening among Korean American immigrants: Unraveling the influence of culture. *Journal of Health Care for the Poor and Underserved*, *24*(2), 579-598.

Lee, S., Lu, C., Jung, M. Y., Baezconde-Garbanati, L., & Juon, H. (2014). Acculturation and cancer screening among Asian Americans: Role of health insurance and having a regular physician. *Journal of Community Health*, *39*(2), 201-212. doi: 10.1007/s10900-013-9763-0

Lee, H. Y., Lundquist, M., Ju, E., Luo, X., & Townsend, A. (2011). Colorectal cancer screening disparities in Asian Americans and Pacific Islanders: Which groups are most vulnerable? *Ethnicity & Health*, *16*(6), 501-518. doi: 10.1080/13557858.2011.575219

Lee, H., Rhee, T., Kim, N., & Ahluwalia, J. (2015). Health literacy as a social determinant of health in Asian American immigrants: Findings from a population-based survey in California. *Journal of General Internal Medicine, 30*(8), 1118-1124.

Lin-Fu, J. S. (1988). Population characteristics and health care needs of Asian Pacific Americans. *Public Health Reports, 103*(1), 18-27.

Liss, D. T. & Baker, D. W. (2014). Understanding current racial/ethnic disparities in

colorectal cancer screening in the United States: The contribution of socioeconomic status and access to care. *American Journal of Preventive Medicine*, *46*(3), 228-236. doi: 10.1016/j.amepre.2013.10.023

Ma, G. X., Shive, S. E., Wang, M. Q., & Tan, Y. (2009). Cancer screening behaviors and barriers in Asian Americans. *American Journal of Health Behavior*, *33*(6), 650-660.

McCracken, M., Olsen, M., Chen Jr., M. S., Jemal, A., Thun, M., Cokkinides, V., Deapen, D., & Ward, E. (2007). Cancer incidence, mortality, and associated risk factors among Asian Americans of Chinese, Filipino, Vietnamese, Korean, and Japanese ethnicities. *A Cancer Journal for Clinicians*, *57*(4), 190-205. doi: 10.3322/canjclin.57.4.190

Maciosek, M. V., Solberg, L. I., Coffield, A. B., Edwards, N. M., & Goodman, M. J. (2006). Colorectal cancer screening: Health impact and cost effectiveness. *American Journal of Preventive Medicine*, *31*(1), 80-89. doi: 10.1016/j.amepre.2006.03.009

Maxwell, A. E. & Crespi, C. M. (2008). Trends in colorectal cancer screening utilization among ethnic groups in California: Are we closing the gap? *Cancer Epidemiology Biomarkers Prevention*, *18*(3), 752-759.

May, F. P., Almario, C. V., Ponce, N. & Spiegel, B. M. R. (2015). Racial minorities are more likely than Whites to report lack of provider recommendation for colon cancer screening. *The American Journal of Gastroenterology*, *110*(10), 1388-1394.

Meester, R. G. S., Doubeni, C. A., Zauber, A. G., Goede, S. L., Levin, T. R., Corley, D. A., Jemal, A., & Lansdorp-Vogelaar, I. (2015). Public health impact of achieving 80% colorectal cancer Screening rates in the United States by 2018. *Cancer*, *121*(13), 2281-2285. doi: 10.1002/cncr.29336

Miller, B. A., Chu, K. C., Hankey, B. F., & Ries, L. A. G. (2008). Cancer incidence and

mortality patterns among specific Asian and Pacific-Islander population in the U.S. *Cancer Causes Control, 19*, 227-256. doi: 10.1007/s10552-007-9088-3

National Cancer Institute (NCI). (2015a). Colon Cancer Treatment: General Information about Colon Cancer. Retrieved from http://www.cancer.gov/types/colorectal/patient/colon-treatment-pdq

NCI. (2015b). Colorectal cancer screening: What is screening? Retrieved from http://www.cancer.gov/types/colorectal/patient/colorectal-screening-pdq

NCI. (n.d.). SEER: Cancer Statistics Factsheets: Colon and Rectum Cancer. Bethesda, MD. Retrieved from http://seer.cancer.gov/statfacts/html/colorect.html

National Colorectal Cancer Roundtable (NCCR). (2015). Tools & Resources – 80% by 2018. Retrieved from http://nccrt.org/tools/80-percent-by-2018/

Nguyen-Truong, C. K. Y., Lee-Lin, F., & Gedaly-Duff, V. (2013). Contributing factors to colorectal cancer and hepatitis B screening among Vietnamese Americans. *Oncology Nursing Forum*, *40*(3), 238-251.

Office of Disease Prevention and Health Promotion. (2015). Colorectal Cancer Screening, Adults, 2010. Retrieved from http://www.healthypeople.gov/2020/topics-objectives/national-snapshot/colorectal-cancer-screening-adults-2010

Oh, K. & Jacobsen, K. (2014). Colorectal cancer screening among Korean Americans: A systematic review. *Journal of Community Health*, *39*(2), 193-200. doi: 10.1007/s10900-013-9758-x

Oh, K. M., Kreps, G. L., & Jun, J. (2013). Colorectal cancer screening knowledge, beliefs, and practices of Korean Americans. *American Journal of Health Behavior, 37*(3), 381-394.

Oh, K. M., Zhou, Q., Kreps, G. L., & Ryu, S. K. (2012). Breast cancer screening practices

among Asian Americans and Pacific Islanders. *Journal of American Health Behavior*, *36*(5), 711-722. doi: http://dx.doi.org/10.5993/AJHB.36.5.13

O'Malley, A. S., Beaton, E., Yabroff, K. R., Abramson, R., & Mandelblatt, J. (2004). Patient and provider barriers to colorectal cancer screening in the primary care safety-net. *Preventive Medicine*, *39*(1), 56-63. doi: 10.1016/j.ypmed.2004.02.022

Pew Research Center. (2015). The Rise of Asian Americans. Retrieved from http://www.pewsocialtrends.org/asianamericans-graphics/

Phillips, K. A., Morrison, K. R., Andersen, R., & Aday, L. A. (1998). Understanding the context of healthcare utilization: Assessing environmental and provider-related variables in the behavioral model of utilization. *Health Services Research*, *33*(3), 571-596.

Ransohoff, D. F. & Sox, H. C. (2016). Clinical practice guidelines for colorectal cancer screening: New recomendations and new challenges. *JAMA, 315*(23), 2529-2531.

Ritvo, P., Myers, R, E., Paszat, L., Serenity, M., Perez, D. F., & Rabeneck, L. (2013). Gender differences in attitudes impeding colorectal cancer screening. *BioMed Central Public Health, 13*(1), 1-14. doi: 10.1186/1471-2458-13-500

Robb, K. A., Miles, A., & Wardle, J. (2004). Demographic and psychosocial factors associated with perceived risk for colorectal cancer. *Cancer Epidemiology, Biomarkers, & Prevention*, *13*(3), 366-372.

Rosenstock, I. M. (2005). Why people use health services. *The Milbank Quarterly, 83*(4). doi: 10.1111/j.1468-0009.2005.00425.x

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the health belief model. *Health Education Quarterly, 15*(2), 175-183.

Salant, T. & Lauderdale, D. S. (2003). Measuring culture: A critical review of acculturation

and health in Asian immigrant populations. *Social Science & Medicine*, *57*(1), 71-90. doi: 10.1016/S0277-9536(02)00300-3

Sentell, T. L., Tsoh, J. Y., Davis, T., Davis, J., & Braun, K. L. (2015). Low health literacy and cancer screening among Chinese Americans in California: A cross-sectional analysis. *BMJ Open*, *5(*1). doi: 10.1136/bmjopen-2014-006104

Sequist, T. D., Zaslavsky, A. M., Marshall, R., Fletcher, R. H., & Ayanian, J. Z. (2009). Patient and physician reminders to promote colorectal cancer screening: A randomized controlled trial. *Archive Internal Medicine*, *169*(4), 364-371. doi: 10.1001/archinternmed.2008.564

Shapiro, J. A., Klabunde, C. N., Thompson, T. D., Nadel, M. R., Seeff, L. C., & White, A. (2012). Patterns of colorectal cancer test use, including ct colonography, in the 2010 National Health Interview Survey. *Cancer Epidemiology Biomarkers Prevention, 21*(6), 895-904. doi: 10.1158/1055-9965.EPI-12-0192

Slattery M. L, Kinney A. Y, & Levin T. R (2004). Factors associated with colorectal cancer screening in a population-based study: The impact of gender, healthcare source, and time. *Preventive Medicine*, *38*(3), 276-283. doi: 10.1016/j.ypmed.2003.11.009

Stanley, S. L., King, J. B., Thomas, C. C., & Richardson, L. C. (2013). Factors associated with never being screened for colorectal cancer. *Journal of Community Health*, *38*, 31-39. doi: 10.1007/s10900-012-9600-x

Sun, W. Y., Basch, C. E., Wolf, R. L., & Li, X. J. (2004). Factors associated with colorectal cancer screening among Chinese-Americans. *Preventive Medicine*, *39*(2), 323-329. doi: 10.1016/j.ypmed.2004.04.029

Teng, E. J., Friedman, L. C., & Green, C. E. (2006). Determinants of colorectal cancer screening

behavior among Chinese Americans. *Psycho-Oncology, 15*, 374-381. doi: 10.1002/pon.958

The White House. (n.d.). Initiative on Asian Americans and Pacific Islanders: Issues and facts. Retrieved from https://www.whitehouse.gov/administration/eop/aapi/data/data

Thompson, C. A., Gomez, S. L., Chan, A., Chan, J. K., McClellan, S. R., Chung, S., Olson, C., Nimbal, V., & Palaniappan, L. P. (2014). Patient and provider characteristics associated With colorectal, breast, and cervical cancer screening among Asian Americans. *Cancer Epidemiology Biomarkers & Prevention, 23*, 2208-2217. doi: 10.1158/1055-9965.EPI-14-0487

Trinh, Q. D., Li, H., Meyer, C. P., Hanske, J., Choueiri, T. K., Reznor, G., Lipsitz, S. R., Kibel, A. S., Han, P. K., Nguyen, P. L., Menon, M., & Sammon, J. D. (2016). Determinants of cancer screening in Asian-American. Cancer Causes Control, 27, 989 – 998. doi: 10.1007/s10552-016-0776-8

U.S. Census Burearu. (2014). 2010-2014 American community survey 5-year estimates. Retrieved from http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_14_5YR_B02006&prodType=table

United States Preventive Services Task Force (USPSTF). (2015). Colorectal Cancer: Screening. Retrieved from http://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/colorectal-cancer-screening?ds=1&s=colorectal%20cancer

Wong, R. K., Wong, M. L., Chan, Y. H., Feng, Z., Wai, C. T., & Yeoh, K. G. (2013). Gender differences In predictors of colorectal cancer screening uptake: A national cross sectional

study based on the health belief model. *BioMed Central*, *13*, 677.

Wong, S. T., Gildengorin, G., Nguyen, T., & Mock, J. (2005). Disparities in colorectal cancer screening rates among Asian Americans and non-Latino Whites. *Cancer*, *104*(12), 2940-2947. doi: 10.1002/cncr.21521

World Health Organization [WHO]. (2015a). Cancer. Retrieved from http://www.who.int/topics/cancer/en

WHO. (2015b). Globocon 2012: Estimated Cancer Incidence, Mortality and Prevalence Worldwide in 2012. Retrieved from http://globocan.iarc.fr/Pages/burden_sel.aspx

Yang, D. X., Gross, C. P., Soulos, P. R., & Yu, J. B. (2014). Estimating the magnitude of colorectal cancers prevented during the era of screening: 1976-2009. *Cancer*. *120*, 2893-2901.

Yi, S. S., Kwon, S. C., Sacks, R., & Trinh-Shevrin, C. (2016). Commentary: Persistence and health-related consequence of the model minority stereotype for Asian Americans. *Ethnicity & Disease, 26*(1), 133-138.

Chapter 2: Unraveling the Determinants to Colorectal Cancer Screening among Asian Americans: A Systematic Literature Review

Introduction

Asian Americans (AA) continue to be the fastest growing racial group in the U.S. making up approximately 15.5 million of the total U.S. population (American Community Survey, 2012) and the largest share of recent immigrants (Pew Research Center, 2015). The U.S. Office of Management and Budget (OMB) and U.S. Census Bureau defines Asian as a person having origins in the Far East, Southeast Asia, or the Indian subcontinent (U.S. Census Bureau, 2014). Six subgroups comprise majority of the AA population: Chinese (3,551,337), Asian Indian (3,111,333), Filipino (2,653,959), Vietnamese (1,681,643), Korean (1,453,807), and Japanese (779,141) (Pew Research Center, 2015; U.S Census Bureau, 2014).

When examining AA's health statistics, there is a need for data disaggregation to more accurately reflect AA sub-groups' realities and needs (Asian American Network for Cancer Awareness, Research, and Training [AANCART], 2012). This is imperative as AA comprise a large diverse racial minority (Le et al., 2014). Their differences with regards to culture, languages and dialects spoken, time since immigration, socioeconomic profiles, and risk factors (McCracken et al., 2007) must be taken into consideration when examining their health and health behaviors. Unique from other racial/ethnic groups, cancer is the leading cause of death for the aggregated AA population (AANCART, 2012). A study examining national mortality records for Asian Indian, Chinese, Filipino, Japanese, Korean, and Vietnamese found that cancer is the leading cause of death in AA females and males collectively (Hastings et al., 2015). When AA is disaggregated, cancer is still the leading cause of death for all the aforementioned AA female subgroups except for Asian Indians (Hastings et al., 2015). Further disaggregation of AA

subgroups, continues to show cancer to be the leading cause of death for Chinese, Korean, and Vietnamese males (Hastings et al., 2015).

A study examining cancer incidences among AA in major metropolitan areas in the U.S. found that colorectal cancer (CRC) is one of the top three cancers experienced among AA men and women (Jin, Pinheiro, Xu, & Amei, 2016). A report on cancer incidence, mortality, and stage distributions among Asians and Pacific Islanders found that Japanese men and women have the highest CRC incidence and mortality rate when compared to the other AA subgroups (McCracken et al., 2007; Miller et al., 2008). Japanese CRC incidence rate was found to even exceed the rate in non-Hispanic White (Miller et al., 2008). As Japanese Americans had a longer time since immigration in the U.S. compared to the other subgroups, dietary and behavioral factors associated with "westernization" is suggested to play a role in CRC incidence rate among Japanese (McCracken et al., 2007). Although CRC incidence rates have been generally decreasing in the U.S. for all racial groups (CDC, 2013), an increasing trend has been observed only among Korean men and women (Gomez et al., 2013; Oh & Jacobsen, 2014). This implies a need for a closer examination of the variation in the AA subgroups' colorectal cancer screening practice (CCSP) and factors associated with it including sociodemographic characteristics, time since immigration, access to healthcare, and behavioral risk factors (Lee, Lundquist, Ju, Luo, & Townsend, 2011).

One effective way to decrease incidence and mortality from CRC is the adherence of regular CCSP. According to the U.S. Preventive Services Task Force (USPSTF, 2015), it is currently recommended that average-risk individuals adhere to regular CCSP using the following three screening modalities: high-sensitivity fecal occult blood testing (FOBT) (annually), flexible sigmoidoscopy (FSIG) (5x/year), and colonoscopy (once every 10 years). Although there are

options in screening modalities, many do not get screened regularly (Stanley, King, Thomas, & Richardson, 2013; Yang, Gross, Soulos, & Yu, 2014). In fact, AA continue to receive the lowest screening rates compared to other racial/ethnic groups (Lee et al., 2011; Liss & Baker, 2014; Oh, Zhou, Kreps, & Ryu, 2012; Wong, Gildengorin, Nguyen, & Mock, 2005). When disaggregating the group, further disparities exists. For instance, Japanese had screening rates similar to non-Hispanic White; while Koreans (Lee et al., 2011; Maxwell & Crespi, 2009; Wong et al., 2005) and Filipinos (McCracken et al., 2007) have the lowest screening rates and have been identified as groups least likely to adhere to CCSP.

Examination of cancer screening behaviors and facilitators and barriers to cancer screening practice among AA subgroups is fairly recent with studies emerging in the early 2000s (Lee et al., 2011). In addition, there appears to be no published papers that systematically synthesized this information among AA subgroups except for Korean Americans (Oh & Jacobsen, 2014). As such, the aim of this paper is to expand on current knowledge and to examine the facilitators (i.e., factors that positively affect screening uptake) and the barriers (i.e., factors that negatively affect screening uptake) among multiple AA subgroups: Chinese Americans (CA), Filipino Americans (FA), Korean Americans (KA), and Japanese Americans (JA) using a systematic literature review method. Findings from this study can help to inform targeted areas when developing interventions to promote screening uptake for AA ethnic subgroups.

Health Belief Model

The Health Belief Model (HBM) was used as the primary theoretical framework for this paper and further utilized to organize and synthesize the facilitators and barriers to CCSP identified in this review. HBM was developed to understand compliance with preventive health

promoting behaviors on an intrapersonal level (Becker & Maiman, 1975; Beydoun & Beydoun, 2008). *Predisposing characteristics*, a concept in Andersen's Healthcare Utilization Model (HUM) was also included in this review. The HUM is another commonly used theoretical framework aimed to help understand how and why families use health services. This framework suggests that "health services use is a function of people's predisposition to use services, factors that enable or impede use, and their need for care" (Andersen, 1995, p. 1). *Predisposing characteristics* has evolved and can include various intrapersonal level characteristics including sociodemographic factors, cultural factors, healthcare-related factors, and knowledge related to health and health services (Andersen, 1995). The multiple components within *predisposing characteristics* is indicative of how an individual's predisposition to utilize health services can be broad in range and measured in various ways.

As such, this paper will further code and organize the facilitators and barriers identified in this study by the following dimensions within the *predisposing characteristics*: sociodemographic factors, cultural factors, personal health factors (i.e. knowledge related to health and health services), and healthcare-related factors (i.e., access to healthcare, usual source of care, etc.). The HBM concepts used in this study include *psychological constructs* (i.e., perceived susceptibility to the disease, perceived benefits of undergoing health behavior, perceived barriers to health behavior, and emotional response to health behavior/disease*)*. Although the HBM referred this as cognitive constructs, later adaptations of the model incorporated socio-psychological factors including emotional response and *cues to action* (i.e. public service announcement, media/educational campaigns, social support including family, friends, physicians). Examining the facilitators and barriers to CCSP that is categorized using the HBM's constructs can support areas of focus when developing interventions to promote

screening uptake among specific AA groups.

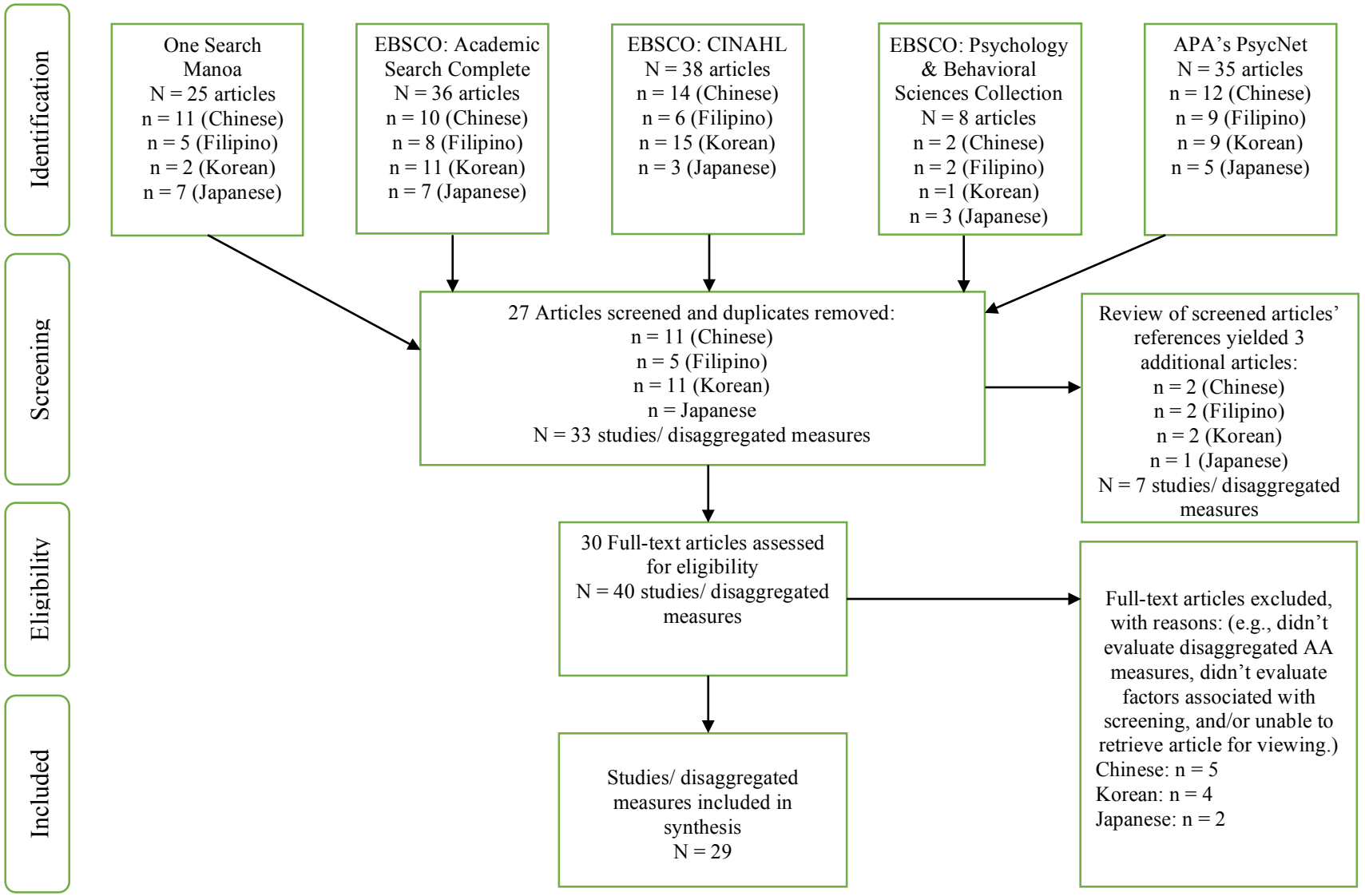
Methodology

A systematic literature review was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009). Five databases in total, OneSearchManoa, three EBSCO databases: Academic Search Complete, Cumulative Index to Nursing and Allied Health (CINAHL), and Psychology and Behavioral Sciences Collection, and the American Psychological Association's PsycNet were examined using the search string "colorectal cancer AND screening AND [Chinese (CA), Filipino (FA), Korean (KA), and Japanese (JA)] American." Each ethnic subgroup was searched independently from the other subgroups in each of the databases. The search was conducted in August 2016 and initially yielded a total of 142 articles: CA (49), FA (30), KA (38), and JA (25). After 27 duplicate articles were removed and titles and abstracts were screened for appropriateness for this review, the search yielded 33 studies (or examinations of AA subgroups): CA (11), FA (5), KA (11), and JA (6) for full text review. Appropriateness for review was determined by screening the articles' titles and abstracts and confirming that the studies evaluated factors associated with CRC screening among distinct AA subgroups. This task was important because several articles examined multiple AA subgroups in their analyses as well as other type of cancers in addition to CRC. A review of these abstract-screened articles' references yielded an additional 3 articles for full text review, which equated to 7 additional examinations of AA subgroups: CA (2), FA (2), KA (2), and JA (1). In total, 30 articles (40 disaggregated studies) were fully screened using the pre-established inclusion criteria: studies conducted in the U.S.; studies must evaluate factors associated with CRC screenings as their outcome measure; the AA subgroups (CA, FA, KA, and JA) as a disaggregated measure must be

included in the studies; and no publication date restriction was imposed. Upon the completion of full text reviews, 11 studies were excluded because they did not evaluate disaggregated AA subgroup and/or factors associated with CRC screening. Finally, 22 articles were included for critical appraisal and synthesis. The 22 articles included 29 studies CA (9), FA (7), KA (8), and JA (5). Data was extracted based on the study design, sample characteristics, and facilitators and barriers to CRC screening. (Refer to Figure 1.2.)

Figure 1.2. Flow Diagram

Search terms: "colorectal cancer AND screening AND (Chinese, Filipino, Korean, Japanese) American"



Results

Study and Sample Characteristics

In total, 22 articles yielded the 29 studies that provided disaggregated measures of each of the AA subgroups: CA (9), FA (7), KA (8), and JA (5). Table 1.1 summarizes the characteristics of the 29 studies. Majority of the articles (n = 17), used cross-sectional designs and used self-report questionnaires, surveys, or interviews for data collection, 3 analyzed various waves from the California Health Interview Survey (CHIS) ranging from years 2001-2009 (Homayoon, Shahidi, & Cheung, 2013; Maxwell, Crespi, Antonio, & Lu, 2010; Ryu, Crespi, & Maxwell, 2014), 1 pilot survey collected data via telephone interviews and focus groups (Bastani, Gallardo, & Maxwell, 2001), and 1 used a randomized controlled intervention trial design with aims to increase CRC screening among FA (Maxwell, Bastani, Crespi, Danao, & Cayetano, 2011). Majority of the age range in the studies was in concordance to the USPSTF recommended age group for screening 50-75 except for several publications that included younger age for reasons including to be more inclusive, to better capture hard to reach populations, and due to their study's inclusion of other cancer screenings in addition to CRC (Harmon et al., 2014; Honda, 2004; Jo, Maxwell, Wong, & Bastani, 2008; Kim, Yu, Chen, Kim, & Brintnall, 1998; Oh, Kreps, & Jun, 2013; Yu, Kim, Chen, Brintnall, & Liu, 2001). Nearly all the articles included both men and women samples and reported the respective frequencies/percentages, except for 3 that collected data on women only (Maxwell, Bastani, & Warda, 2000; Tang, Solomon, & McCracken, 2001; Wang et al., 2006). Majority of the samples across the ethnic groups were female, however, 2 publications did not report the gender breakdown of their samples (Harmon et al., 2014; Maxwell et al., 2010).

Table 1.1. Summary of Included Studies

Chinese Americans (n = 9)

Reference	Study Design	Recruitment Location	Data Collection Year(s)	Sample Size (Ethnicity)	Gender (sample)	Age
Teng et al. (2006)	Self-administered questionnaire	San Francisco & Houston (senior centers and church organizations)	Fall 2002 – Summer 2003	N = 194 (CA)	Men (44%) and women (56%)	50 and older
Yu et al. (2001)	Survey	Chicago's Chinatown	NA	N = 644 (CA)	Men (48%) and women (52%)	40-69 years
Tang et al. (2001)	Self-administered survey	2 major cities on the East Coast (7 senior centers)	NA	N = 100 (CA)	Women (100%)	60-102 years
Bastani et al. (2001)	Pilot survey with telephone interview and focus group	Downtown Chinatown area of Los Angeles, CA (Chinese service center)	September – December 1998	N = 14 (CA)	Men (57%) and women (43%)	50-85 years
Sun et al. (2004)	Survey	New York City, NY (3 major Chinese senior centers)	December 1, 1999 – March 15, 2000	N = 203 (CA)	Men (56.2%) and women (43.8%)	50 and older
Kim et al. (2012)	Prospective, cross-sectional design with convenience sampling	Chicago, Illinois (Health fairs held by a Chinese American community-based organization)	NA	N = 113 (CA)	Men (35%) and women (65%)	50 and older
Homayoon et al. (2013)	2007 California Health Interview Survey	California	2007	N = 677 (CA)	Men (45.1%) and women (54.9%)	50 and older
Wang et al. (2006)	Structured telephone interview	Washington, DC metropolitan area (the District of Columbia, Fairfax County in Virginia, and Montgomery and Prince George's	NA	N = 433 (CA)	Women (100%)	50 and older

		Counties in Maryland).				
Maxwell et al. (2010)	2001 – 2005 California Health Interview Survey	California	2001 - 2005	N = 1, 432	NA	50 and older

Filipino Americans (n = 7)

Reference	Study Design	Recruitment Location	Data Collection Year(s)	Sample Size (Ethnicity)	Gender (sample)	Age
Francisco et al. (2014)	Cross-sectional study	Southern California (three community Churches)	September – November 2011	N = 188 (FA)	Men (39.9%) and women (60.1%)	50 and older
Maxwell et al. (2008)	Survey (phone or in-person)	Los Angeles County (31 community-based organizations)	July 2005 – October 2006	N = 487 (FA)	Men (42%) and women (58%)	50 – 75 years
Maxwell et al. (2000)	Face-to-face interviews with convenience sample	Los Angeles, CA (1 community-based social service organizations and 1 church congregation)	October 1995 – April 1996	N = 218 (FA)	Women (100%)	50 and older
Maxwell et al. (2011)	Randomized controlled intervention trial	Los Angeles County (45 community-based organizations and churches)	N/A	N = 432 (FA)	Men (33%) and women (67%)	50 – 70 years
Ferrer et al. (2010)	Cross-sectional design	CA (locate of the study with few responses from several other states)	Spring 2006	N = 117 (FA)	Men (36%) and women (64%)	50 and older
Homayoon et al. (2013)	2007 California Health Interview Survey	California	2007	N = 323 (FA)	Men (40%) and women (60)%	50 and older
Maxwell et al. (2010)	2001 – 2005 California Health Interview Survey	California	2001 - 2005	N = 753 (FA)	N/A	50 and older

Korean Americans (n = 8)

Reference	Study Design	Recruitment Location	Data Collection Year(s)	Sample Size (Ethnicity)	Gender (sample)	Age
Jo et al. (2008)	Face-to-face in-person interviews utilizing questionnaire.	LA, CA (Korean Health Education, Information, and Research Center [KHEIR] community-based organization)	March – September 2003	151 (KA)	Men (32%) and women (68%)	40-70
Homayoon et al. (2013)	2007 California Health Interview Survey	California	2007	340 (KA)	Men (42%) and women (58%)	50 and older
Lee & Im (2013)	Cross-sectional Structured questionnaire	New York metropolitan area (2 Korean senior centers and 2 Korean churches)	2009	281 (KA)	Men (54%) and women (46%)	50 - 88
Maxwell et al. (2000)	Face-to-face interviews with convenience sample	Los Angeles, CA (1 community-based social service organizations and 1 church congregation)	October 1995 – April 1996	N = 229 (KA)	Women (100%)	50 and older
Kim et al. (1998)	Prospective study using a modified version of the 1987 Cancer Control Supplement Questionnaire of the National Health Interview Survey	Uptown area of Chicago, IL	N/A	N = 263 (KA)	Men (40%) and women (60%)	40 – 69
Ryu et al. (2014)	2009 California Health Interview Survey	California	2009	N = 519 (KA)	Men (38%) and women (62%)	50 and older

Oh et al. (2013)	Cross-sectional, community-based survey	Washington DC metropolitan area (Korean churches, senior resource centers, and community-based organizations)	2006 – 2007	N = 254 (KA)	Men (41%) and women (59%)	40 and older
Maxwell et al. (2010)	2001 – 2005 California Health Interview Survey	California	2001 - 2005	N = 675	N/A	50 and older

Japanese Americans (n = 5)

Reference	Study Design	Recruitment Location	Data Collection Year(s)	Sample Size (Ethnicity)	Gender (sample)	Age
Honda (2004)	Cross-sectional survey	Major metropolitan areas in Illinois, Massachusetts, New Jersey, and Washington	June – August 2001	N = 306 (JA)	Men (61%) and women (39%)	30 and older
Harmon et al. (2014)	Multiethnic Cohort (MEC) prospective cohort	Hawaii or California (primarily Los Angeles County)	1993 - 1996	N = 44,025 (JA)	NA (no gender breakdown)	45 - 75
Homayoon et al. (2013)	2007 California Health Interview Survey	California	2007	314 (JA)	Men (34%) and women (66%)	50 and older
Honda & Kagawa-Singer (2006)	Cross-sectional survey	Greater New York region (NY, NJ, CT)	N/A	N = 341 (JA)	Men (37%) and women (63%)	50 - 92
Maxwell et al. (2010)	2001 – 2005 California Health Interview Survey	California	2001 - 2005	N = 619 (JA)	N/A (no gender breakdown)	50 and older

Self-Reported Colorectal Cancer Screening

Table 1.2 summarizes the timeframe of self-reported screening practice and by screening modality: FOBT, FSIG, and colonoscopy for CA, FA, KA, and JA. Although the digital rectal exam (DRE) is not one of USPSTF's recommended screenings, it was included in this analysis to capture a more comprehensive picture of the screening behaviors of these groups. The proportion of the aggregated AA participants who reported ever undergoing FOBT ranged from 8% - 81% and 5% - 29% reported being up to date with screening (UTDS) for FOBT. For FSIG, 21% - 31% reported ever having it and 6% - 97% were reportedly UTDS. For colonoscopy, 22% - 40% reported ever having had this screening and 8% - 50% were reported to be UTDS. Only one study assessed for the combination of modalities, FOBT and FSIG among CA (Sun, Basch, Wolf, & Li, 2004) and 22% reported to be UTDS. Screening practice of ever having any one of the three modalities revealed a range of 34% - 81% (Maxwell et al., 2010) and a range of 52% - 66% of those who were UTDS (Homayoon et al., 2013; Oh et al., 2013; Wang et al., 2006). For either endoscopic procedures 4% - 40% of study participants reported having had one of the screenings (Lee & Im, 2013; Maxwell et al., 2000; Maxwell et al., 2011) and 6% - 26% were reported to be UTDS with either one of the endoscopic procedures (Francisco, Rankin, & Kim, 2014; Honda, 2004; Maxwell et al., 2000; Maxwell et al., 2008). Two studies that assessed for participation in DRE showed that the proportion of participation ranged from 5% - 17% that ever had the screening (Kim et al., 1998; Yu et al., 2001).

Table 1.2. Self-Reported CRC Screening Rates (CA)

Screening Modality	Timeframe	Age	Proportion % (sex)	References
FOBT	Ever tested (among those who have no history of colon cancer)	Over 50	29% (M) 35% (F)	Teng et al. (2006)
	Ever tested (for screening purpose)	40-69	8.0% (M) 9.0% (F)	Yu et al. (2001)
	Participated in FOBT	50 and older	80% (M) 67.1% (F)	Kim et al. (2012)
	Had test at least once	60-102	25% (F)	Tang et al. (2001)
	UTDS (within past 5 years)	60-102	42% (F)	Tang et al. (2001)
	UTDS (within past year)	50 and older	15.8% (M & F)	Sun et al. (2004)
FOBT & FSIG	UTDS (FOBT in past year & FSIG within past 5 years)	50 and older	22.2% (M & F)	Sun et al. (2004)
FSIG	Ever tested (among those who have no history of colon cancer)	Over 55	31% (M) 22% (F)	Teng et al. (2006)
	Had test at least once	60-102	31% (F)	Tang et al. (2001)
	UTSD (within past 5 years)	60-102	97% (F)	Tang et al. (2001)
Colonoscopy	Ever tested (among those who have no history of colon cancer)	Over 60	22% (M) 29% (F)	Teng et al. (2006)
FOBT or FSIG or Colonoscopy	UTDS (FOBT in past year; FSIG within past 5 years; colonoscopy within past 10 years)	50 and older 50 and older	53.2% (M & F) 57% (F)	Homayoon et al. (2013) Wang et al. 2006
	Ever had test	50 and older	59% (01 M & F) 63% (03 M & F) 64% (05 M & F)	Maxwell et al. (2010)
	Had test for screening	40-69	11.5% (M) 16.6% (F)	Yu et al. (2001)

CA – Chinese American; DRE – Digital rectal examination; FOBT – Fecal Occult Blood Test; FSIG – Flexible Sigmoidoscopy; UTDS – Up to date screening

Self-Reported CRC Screening Rates (FA)

Screening Modality	Timeframe	Age	Proportion % (sex)	References
FOBT	Have had test	50 and over	34.6% (M & F)	Francisco et al. (2014)
		50-70 years	19% (M & F)	Maxwell et al. (2011)
	UTDS (within past year)	50-75	16% (M & F)	Maxwell et al. (2008)
		50 and older	12% (F)	Maxwell et al. (2000)
		50 and older	29% (M & F)	Ferrer et al. (2010)
FSIG	Have had test	50 and over	21% (M & F)	Francisco et al. (2014)
	UTDS (within past 5 years)	50 and over	35.9% (M & F)	Ferrer et al. (2010)
Colonoscopy	Have had test	50 and over	40.4% (M & F)	Francisco et al. (2014)
	UTDS (within past 10 years)	50 and over	42% (M & F)	Ferrer et al. (2010)
FSIG or Colonoscopy	Ever had test	50-70 years	4% (M & F)	Maxwell et al. (2011)
	UTDS (FSIG within past 5 years or colonoscopy within past 10 years)	50 and over	49.5% (M & F)	Francisco et al. (2014)
		50 and older	6% (F)	Maxwell et al. (2000)
FSIG or Colonoscopy (with or without FOBT)	UTDS (FSIG within past 5 years or colonoscopy within past 10 years)	50 -75	31% (M & F)	Maxwell et al. (2008)
FOBT or FSIG or Colonoscopy	UTDS (FOBT within past year; FSIG within past 5 years; colonoscopy within past 10 years	50 and older	65.9% (M & F)	Homayoon et al. (2013)
	Ever had test	50 and older	56% (01 M & F) 54% (03 M & F) 65% (05 M & F)	Maxwell et al. (2010)

FA – Filipino American; DRE – Digital rectal examination; FOBT – Fecal Occult Blood Test; FSIG – Flexible Sigmoidoscopy; UTDS – Up to date screening

Self-Reported CRC Screening Rates (KA)

Screening Modality	Timeframe	Age	Proportion % (sex)	References
FOBT	Ever had test	50 – 88	46.4% (M) 51.6% (F)	Lee & Im (2013)

		50 and older	8%	Maxwell et al. (2000)
		40 – 69	5.8% (M) 3.8% (F)	Kim et al. (1998)
	UTDS (within past year)	40 – 70	5% (M & F)	Jo et al. (2008)
		50 and older	14% (F)	Maxwell et al. (2000)
		50 and older	8.9% (M & F)	Ryu et al. (2014)
FSIG	UTDS (within past 5 years)	40 – 70	11% (M & F)	Jo et al. (2008)
		50 and older	5.9% (M & F)	Ryu et al. (2014)
Colonoscopy	UTDS (within past 5 years)	40 – 70	8% (M & F)	Jo et al. (2008)
		50 and older	50.2% (M & F)	Ryu et al. (2014)
FOBT or FSIG or Colonoscopy	Ever had test	50 and older	49% (01 M & F) 40% (03 M & F) 34% (05 M & F)	Maxwell et al. (2010)
	UTDS (FOBT within past year; FSIG within past 5 years; colonoscopy within past 10 years)	50 and older	52.1% (M & F)	Homayoon et al. (2013)
	UTDS (FOBT within past year; FSIG & Colonoscopy within past 5 years)	40 and older	45% (M) 43% (F)	Oh et al. (2013)
FSIG or Colonoscopy	Ever had test	50 – 88	34.4% (M) 35.9% (F)	Lee & Im (2013)
		50 and older	40%	Maxwell et al. (2000)
DRE	Ever had test	40 - 69	4.8% (M) 5.0% (F)	Kim et al. (1998)

KA – Korean American; DRE – Digital rectal examination; FOBT – Fecal Occult Blood Test; FSIG – Flexible Sigmoidoscopy; UTDS – Up to date screening

Self-Reported CRC Screening Rates (JA)

Screening Modality	Timeframe	Age	Proportion % (sex)	References
FOBT	Within past 2 years	30 and older	37% (M & F)	Honda (2004)
	UTDS (within past year)	50 – 92	9% (M & F)	Honda & Kagawa-Singer (2006)

FSIG	UTDS (within past 5 years)	50 – 92	7% (M & F)	Honda & Kagawa-Singer (2006)
FSIG or Colonoscopy	UTDS (within past 5 years)	30 and older	26% (M & F)	Honda (2004)
Colonoscopy	Ever had test	45-75	38.1% (M & F)	Harmon et al. (2014)
	UTDS (within past 10 years)	50 - 92	23% (M & F)	Honda & Kagawa-Singer (2006)
FOBT or FSIG or Colonoscopy	Ever had test	50 and older	74% (01 M & F) 74% (03 M & F) 81% (05 M & F)	Maxwell et al. (2010)
	UTDS (FOBT within past year; FSIG within past 5 years; colonoscopy within past 10 years)	50 and older	65.8% (M & F)	Homayoon et al. (2013)

JA – Japanese American; DRE – FOBT – Fecal Occult Blood Test; FSIG – Flexible Sigmoidoscopy; UTDS – Up to date screening

Facilitators to CRC Screening among Asian Americans

Table 1.3 summarizes the facilitators to CRC screening across the AA subgroups and screening modalities. Variables were identified as facilitators if there were significantly associated with increasing CRC screening uptake/rates via bivariate or multivariate analyses at $p \leq .05$ or if identified as facilitators in descriptive or qualitative results.

Predisposing characteristics. When aggregating the AA group, various factors were shown to influence screening uptake. The following sociodemographic factors facilitated screening uptake: older age across all screening modalities (FOBT, FSIG, or colonoscopy) for FA and JA (Francisco et al., 2014; Ferrer, Ramirez, Danao, & Ashing-Giwa, 2011; Honda, 2004; Maxwell et al., 2000; Maxwell et al., 2008), male gender across screening modalities for JA (Honda, 2004; Harmon et al., 2014), married/cohabiting for FOBT for JA (Honda, 2004), higher education attainment across modalities for CA (Sun et al., 2004 & Yu et al., 2001), and income varied from lower annual income ($20,000 - $50,000) (Maxwell et al., 2008) to higher annual

income (Maxwell et al., 2008; Honda & Kagawa-Singer, 2006) and higher monthly income ($600 - $1400) (Lee & Im, 2013) across all screening modalities for FA, KA, and JA.

Table 1.3. Facilitators to CRC Screening

HBM Constructs: -Predisposing Characteristics -Psychological Constructs -Cues to Action	Facilitator	Ethnicity	References	Screening Modality
Predisposing Characteristics	Acculturation		Tang et al. (2001)	FOBT
			Tang et al. (2001)	FSIG
	Having a PCP		Kim et al. (2012)	FOBT
	Higher level education		Sun et al. (2004)	FOBT & FSIG
			Yu et al. (2001)	DRE
Psychological Constructs	Perceived susceptibility	CA	Sun et al. (2004)	FOBT; FOBT & FSIG
			Bastani et al. (2001)*	FOBT & FSIG
			Wang et al. (2006)	FOBT or FSIG or Colonoscopy
Cues to action	Physician recommendation		Teng et al. (2006)	FOBT; FSIG; Colonoscopy
			Wang et al. (2006)	FOBT or FSIG or Colonoscopy
Predisposing Characteristics	Increased age	FA	Maxwell et al. (2008)	FOBT; FSIG or Colonoscopy
			Francisco et al. (2014)	FSIG or Colonoscopy
			Maxwell et al. (2000); Ferrer et al. (2010)	FOBT or FSIG or Colonoscopy
	Lower income ($20,000-$50,000)		Maxwell et al. (2008)	FOBT
	Higher income ($50,000 and higher)		Maxwell et al. (2008)	FSIG or Colonoscopy

	Having a relative with colon or rectal cancer		Francisco et al. (2014)	FSIG or Colonoscopy
	Increased % of lifetime in the U.S.		Maxwell et al. (2008)	FSIG or Colonoscopy
			Maxwell et al. (2000); Ferrer et al. (2010)	FOBT or FSIG or Colonoscopy
	Having heard of FOBT		Francisco et al. (2014)	FSIG or Colonoscopy
	Knowledge and awareness of CRC screening tests		Maxwell et al. (2011)	FOBT or FSIG or Colonoscopy
Psychological Constructs	Strong agreement with benefit of screening procedures reducing worry about CRC		Francisco et al. (2014)	FSIG or Colonoscopy
Cues to action	Very easy communication with healthcare provider		Francisco et al. (2014)	FSIG or Colonoscopy
	Patient-provider communication		Maxwell et al. (2011)	FOBT or FSIG or Colonoscopy
	Doctor's recommendation		Ferrer et al. (2010)	FOBT or FSIG or Colonoscopy
Predisposing Characteristics	Higher monthly income ($600-$1400)	KA	Lee and Im (2013)	FOBT
	Cancer history		Lee and Im (2013)	FOBT
	Having insurance		Lee and Im (2013); Ryu et al. (2014)	FSIG or Colonoscopy
	English proficiency (speak English only)		Homayoon et al. (2013)	FOBT or FSIG or Colonoscopy
	Ever had a check-up		Maxwell et al. (2000)	FOBT or FSIG or Colonoscopy
	More times visits		Oh et al. (2013)	FOBT or FSIG or

	to healthcare			Colonoscopy
	Higher screening knowledge		Oh et al. (2013)	FOBT or FSIG or Colonoscopy
	Length of residence in U.S. (10 years or more)		Kim et al. (1998)	DRE
	Knowledge of 7 warning signs of cancer (at least 1)		Kim et al. (1998)	DRE
Psychological Constructs	Confidence		Lee & Im (2013)	FOBT; FSIG or Colonoscopy
	Seriousness		Lee & Im (2013)	FSIG or Colonoscopy
Cues to action	Received physician recommendation		Jo et al. (2008)	FOBT or FSIG or Colonoscopy
Predisposing Characteristics	Male	JA	Honda (2004) Harmon et al. (2014)	FOBT Colonoscopy
	Married/cohabiting		Honda (2004)	FOBT
	Language proficiency		Honda (2004) Homayoon et al (2013)	FOBT; FSIG or Colonoscopy FOBT or FSIG or Colonoscopy
	Personal screening history		Harmon et al. (2014)	Colonoscopy
	Comorbidity (angina, diabetes, heart disease, and high blood pressure)		Harmon et al. (2014)	Colonoscopy
	Age		Honda (2004)	FSIG or Colonoscopy
	HMO/commercial plan		Honda (2004)	FSIG or Colonoscopy
	Regular access to healthcare		Honda & Kagawa-Singer (2006)	FOBT or FSIG or Colonoscopy
	Income		Honda & Kagawa-Singer (2006)	FOBT or FSIG or Colonoscopy
Psychological Constructs	Low perceived cost		Honda (2004)	FOBT; FSIG or Colonoscopy
	Medium perceived cost		Honda (2004)	FSIG or Colonoscopy
	High perceived susceptibility		Honda (2004)	FSIG or Colonoscopy

	Perceived benefits	Honda &Kagawa-Singer (2006)	FOBT or FSIG or Colonoscopy
Cues to actions	Physician recommendation	Honda (2004)	FOBT; FSIG or Colonoscopy
	Patient-provider communication	Honda & Kagawa-Singer (2006)	FOBT or FSIG or Colonoscopy
	Emotional friends support	Honda & Kagawa-Singer (2006)	FOBT or FSIG or Colonoscopy

*descriptive or qualitative data

The following cultural factors facilitated screening uptake: higher acculturation level to the U.S. across screening modalities for CA (Tang et al., 2001), increased percentage of lifetime in the U.S. across all modalities for FA and KA (Maxwell et al., 2008; Maxwell et al., 2000; Ferrer et al., 2011), and higher English proficiency across screening modalities for JA and KA (Homayoon et al., 2013 & Honda, 2004).

The following personal health factors facilitated screening uptake: having comorbidity (angina, diabetes, heart disease, and high blood pressure) for colonoscopy for JA (Harmon et al., 2014), cancer history for FOBT for KA (Lee & Im, 2013), having a relative with CRC for FSIG or colonoscopy (Francisco et al., 2014), personal screening history for colonoscopy for JA (Harmon et al., 2014), knowledge of at least one warning sign of cancer for DRE for KA (Kim et al., 1998), and knowledge and awareness of CRC screening across all screening modalities for KA and FA (Francisco et al., 2014; Oh et al., 2013).

Finally, the following healthcare-related factors facilitated screening uptake: having a primary care physician for FOBT for CA (Kim et al., 2012), having health insurance for FSIG or colonoscopy for KA (Lee & Im, 2013; Ryu et al., 2014) and specifically having HMO/commercial plan for FSIG or colonoscopy for JA (Honda, 2004), regular access to healthcare across all modalities for JA (Honda & Kagawa-Singer, 2006), ever having check-up

across all modalities for KA (Maxwell et al., 2000), and more times visits to healthcare across all modalities for KA (Oh et al., 2013).

Psychological constructs. The following psychological factors facilitated screening uptake: perceived susceptibility to getting CRC across all modalities for CA and JA (Bastani et al., 2001; Honda, 2004; Sun et al., 2004; Wang et al., 2006), perceived benefits of CRC screening across all modalities for FA and JA (Francisco et al., 2014; Honda & Kagawa-Singer, 2006), confidence in ability to screening uptake across all modalities for KA (Lee & Im, 2013), seriousness of CRC for FSIG or colonoscopy for KA, and low-medium perceived costs of screening uptake across all modalities for JA (Honda, 2004).

Cues to action. The following cues to action facilitated screening uptake: physician recommendation across all modalities and AA subgroups (Ferrer et al., 2010; Honda, 2004; Jo et al., 2008; Teng et al., 2006; Wang et al., 2006), patient-provider communication across all modalities for FA and JA (Honda & Kagawa-Singer, 2006; Maxwell et al., 2011), and specifically, ease of communication with healthcare provider for FSIG or colonoscopy for FA (Francisco et al., 2014), and emotional support from friends across all modalities for JA (Honda & Kagawa-Singer, 2006).

Barriers to CRC Screening among Asian Americans

Table 1.4 summarizes the barriers to CRC screening across the AA subgroups and screening modalities. Variables were identified as barriers if there were significantly associated with decreasing CRC screening uptake/rates via bivariate or multivariate analyses at $p \leq .05$ or if identified in descriptive or qualitative results.

Predisposing characteristics. The following sociodemographic factors were barriers to screening uptake: younger age (40-54) for FOBT for CA (Yu et al., 2001), having employment

across all modalities for KA (Maxwell et al., 2010), and lower monthly income for FSIG or colonoscopy for KA (Lee & Im, 2013).

The following cultural factors were barriers to screening uptake: preference for Eastern form of treatment and taboo discussing certain body parts for FOBT and FSIG for CA (Bastani et al., 2001), fatalism for FSIG or Colonoscopy for KA (Lee & Im, 2013), higher number of years of residency for FOBT for CA (Sun et al., 2004), and high English proficiency across all modalities for CA and FA (Homayoon et al., 2013).

The following personal health factors were also barriers to screening uptake: having no health problems and unawareness of screening tests across all modalities and AA subgroups (Maxwell et al., 2010), and specifically, being asymptomatic for FOBT and FSIG for CA (Bastani et al., 2001). Finally, the healthcare-related factor that was a barrier to screening uptake across modalities and AA subgroups was having insurance (Homayoon et al., 2013).

Psychological constructs. The following psychological factors were barriers to screening uptake: worries or fears of receiving a positive screening result across modalities for CA (Bastani et al., 2001; Sun et al., 2004), general sense of embarrassment or discomfort at getting screened for FOBT and FSIG for CA (Bastani et al., 2001), fear of embarrassment or pain across modalities and for CA, KA, and JA (Bastani et al., 2001; Maxwell et al., 2010), and helplessness for FSIG or colonoscopy for KA (Lee & Im, 2013).

Table 1.4. Barriers to CRC Screening

HBM Constructs: -Predisposing Characteristics -Psychological Constructs -Cues to action	Barrier	Ethnicity	References	Screening Modality
Predisposing Characteristics	Age (40-54)	CA	Yu et al. (2001)	FOBT
	Higher number of years of residency		Sun et al. (2004)	FOBT
	Have no health problems*		Maxwell et al. (2010)	FOBT; FSIG or Colonoscopy
	Unaware of test*		Maxwell et al. (2010)	FOBT: FSIG or Colonoscopy
	Asymptomatic*		Bastani et al. (2001)	FOBT & FSIG
	Preference for Eastern form of treatment*		Bastani et al. (2001)	FOBT & FSIG
	Taboo discussing certain body parts*		Bastani et al. (2001)	FOBT & FSIG
	Have insurance		Homayoon et al. (2013)	FOBT or FSIG or Colonoscopy
	English proficiency (speak English only)		Homayoon et al. (2013)	FOBT or FSIG or Colonoscopy
	Eastern view of care		Wang et al. (2006)	FOBT or FSIG or Colonoscopy
Psychological Constructs	Worries or fears of positive results*		Sun et al. (2004); Bastani et al. (2001)	FOBT; FOBT & FSIG
	General sense of embarrassment or discomfort at getting screened for colon cancer*		Bastani et al. (2001)	FOBT & FSIG
	Fear of pain/embarrassed		Maxwell et al. (2010)	FSIG or Colonoscopy
Cues to action	Lack of physician recommendation		Tang et al. (2001)	FSIG
Predisposing Characteristics	Have no health problems*	FA	Maxwell et al. (2010)	FOBT; FSIG or Colonoscopy
	Unaware of test*		Maxwell et al. (2010)	FOBT; FSIG or Colonoscopy
	Have insurance		Homayoon et al. (2013)	FOBT or FSIG or Colonoscopy
	English		Homayoon et al.	FOBT or FSIG or

	proficiency (speak English only)		(2013)	Colonoscopy
Predisposing Characteristics	Have no health problems*	KA	Maxwell et al. (2010)	FOBT; FSIG or Colonoscopy
	Unaware of test*		Maxwell et al. (2010)	FOBT; FSIG or Colonoscopy
	Lower monthly income		Lee and Im, (2013)	FSIG or Colonoscopy
	Have insurance		Homayoon et al. (2013)	FOBT or FSIG or Colonoscopy
	Employment		Maxwell et al. (2010)	FOBT or FSIG or Colonoscopy
	Fatalism		Lee and Im (2013)	FSIG or Colonoscopy
Psychological Constructs	Helplessness		Lee and Im (2013)	FSIG or Colonoscopy
	Fear of pain/embarrassed*		Maxwell et al. (2010)	FSIG or Colonoscopy
Predisposing Characteristics	Have no health problems*	JA	Maxwell et al. (2010)	FOBT; FSIG or Colonoscopy
	Unaware of test*		Maxwell et al. (2010)	FOBT; FSIG or Colonoscopy
	Have insurance		Homayoon et al. (2013)	FOBT or FSIG or Colonoscopy
Psychological Constructs	Fear of pain/embarrassed*		Maxwell et al. (2010)	FSIG or Colonoscopy

*descriptive or qualitative data

Cues to action. The only cue to action that served as a barrier to screening uptake was lack of physician recommendation for FSIG among CA (Tang et al., 2001).

Facilitators and Barriers to CRC screening among Chinese Americans

Each of the dimensions from the predisposing construct were shown to influence CRC screening uptake, however, noteworthy dimensions were cultural and personal health factors. Regarding the cultural factors, higher acculturation level in general served as a facilitator for both FOBT and FSIG (Tang et al., 2001), however, specific proxies including higher number of years in the U.S., high English proficiency, preference for Eastern treatment, Eastern view of care, and taboo of discussing certain body parts were identified as barriers across all modalities (Bastani et al., 2001; Homayoon et al., 2013; Sun et al., 2004; Wang et al., 2006). This is an

indicator of the complex nature when measuring culture and when determining how culture is operationalized when determining its role in screening uptake. For personal health factors, the following were barriers across all modalities, having no health problems (Maxwell et al., 2010), asymptomatic (Bastani et al., 2001), and those who are unaware of screenings (Maxwell et al., 2010). Early stages of CRC do not typically include symptoms, as such, this hints at the possible unfamiliarity with the disease process of CRC and options in CRC screening modalities among CA.

Notable psychological factors included perceived susceptibility to CRC as a facilitator across all modalities (Bastani et al., 2001; Sun et al., 2004; Wang et al., 2006). Barriers included general sense of embarrassment/discomfort of getting screened for FOBT and FSIG (Bastani et al., 2001), fear of pain/embarrassed of getting screened for either endoscopic procedures (Maxwell et al., 2010), and worries or fears of receiving a positive result for FOBT and FSIG (Bastani et al., 2001; Sun et al., 2004).

Facilitators and Barriers to CRC screening among Filipino Americans

Variations in the predisposing construct were shown to facilitate CRC screening uptake across all modalities. Notable factors include: older age (Ferrer et al., 2010; Francisco et al., 2014; Maxwell et al., 2000; Maxwell et al., 2008), higher % lifetime in the U.S. (Ferrer et al., 2010; Maxwell et al., 2000; Maxwell et al., 2008), and having knowledge/awareness of CRC screening (Francisco et al., 2014; Maxwell et al., 2011).

One study found having higher English proficiency and insurance as distinct barriers to screening uptake (Homayoon et al., 2013), while having very easy communication with healthcare provider was a notable cue to action (Francisco et al., 2014). Interestingly, Francisco et al. (2014) was the only study in the entire analysis that included a variable in their study on the

quality of the encounter with physicians measured by ease of communication. This factor sheds light on the potential benefits of examining the overall quality and experience of FA patient's encounter with physician and whether that can enhance their knowledge/awareness of CRC screening to further support them in informed decision-making regarding CCSP.

Facilitators and Barriers to CRC screening among Korean Americans

Variations in the predisposing construct across all the dimensions were shown to influence CRC screening uptake. Notable sociodemographic factors include: employment and lower monthly income were barriers across modalities (Lee & Im, 2013; Maxwell et al., 2010); cultural factors: high English proficiency facilitated all modalities (Homayoon et al., 2013), while fatalism was a barrier for endoscopic procedures (Lee & Im, 2013); personal health factors: having a history of cancer facilitated FOBT (Lee & Im, 2013), CRC screening knowledge (Oh et al., 2013), and knowledge of at least 1 warning sign of cancer facilitated DRE (Kim et al., 1998); and healthcare-related factors across all modalities: yielded mixed findings in having insurance as a facilitator (Lee & Im, 2013; Ryu et al., 2014) and as a barrier (Homayoon et al., 2013). Ever having a check-up (Maxwell et al., 2000) and more visits to healthcare (Oh et al., 2013) were facilitators across modalities. The latter two variables shed light on the potential importance of in-person encounters with physicians. In turn, this can increase the likelihood of physical meetings with their physicians which has greater opportunities to initiate a dialogue of CRC and options in screening.

The following factors were psychological facilitators to endoscopic procedures: seriousness of cancer and confidence to screen (Lee & Im, 2013); and barriers to endoscopic procedures: helplessness and fear of pain/embarrassed (Lee & Im, 2013; Maxwell et al., 2010).

Facilitators and Barriers to CRC screening among Japanese Americans

Variations in the predisposing construct across all the dimensions were shown to influence CRC screening uptake across all modalities. These include the following sociodemographic factors as facilitators: older age (Honda, 2004), male (Harmon et al., 2014; Honda, 2004), married (Honda, 2004), and income (Honda & Kagawa-Singer, 2006). Cultural and personal health factors that were facilitators included: language proficiency (Homayoon et al., 2013; Honda, 2004) and having a personal screening history and comorbidity (angina, diabetes, heart disease, and high blood pressure) (Harmon et al., 2014). Healthcare-related factors that was a barrier was having insurance (Homayoon et al., 2013). However, having HMO/commercial healthcare (Honda, 2004) and having regular access to care (Honda & Kagawa-Singer, 2006) facilitated screening. This suggests the importance of specific types of healthcare insurance plans (i.e. HMO, PPO, public, etc.) and their respective roles in screening uptake.

Psychological factors included the following facilitators across modalities: lower perceived cost and high perceived susceptibility (Honda, 2004), as well as perceived benefits (Honda & Kagawa-Singer, 2006), whereas a barrier for endoscopic procedures was fear of pain/embarrassed (Maxwell et al., 2010).

In addition to physician recommendation, other cues to action included the following facilitators across all modalities: patient/provider communication and emotional friends support (Honda & Kagawa-Singer, 2006). This indicates the potential significance of the information-sharing source in JA's decision to undergo CRC screening.

Discussion

Facilitators and Barriers to CRC Screening among Aggregated Asian Americans

Across the AA subgroups, a wide array of predisposing constructs, psychological

constructs, and cues to action were found to facilitate and hinder screening uptake. This study revealed detailed sociodemographic profiles, composed of predisposing characteristics that are related to CRC screening among the aggregated AAs' screening behavior, specific psychological foci that may benefit from psychosocial intervention, and notable cues to action that warrants further investigation especially when investigating its role among the disaggregated AA group. Although great variations existed across the AA ethnic subgroups regarding the influence of the theoretical frameworks' constructs on screening uptake, what was consistent across all the subgroups was physician recommendation as a facilitator across all three recommended screening modalities. In turn, participants' unawareness of screening tests and those stating having no problems/symptoms of CRC were identified as a barrier to screening uptake across screening modalities and across AA ethnic subgroups. This study included personal health as a dimension within predisposing characteristics and included variables pertaining to general health status and knowledge on CRC and CRC screening. In Maxwell et al. (2010) study, those who were not up to date with screening were asked the reason for not receiving CRC screening; "being unaware of tests" and "having no health problems" were noted as the first and second most common reasons respectively. This confirms findings from Klabunde, Vernon, Nadel, Breen, and Brown's (2005) study on barriers to CRC screening among average-risk adults. More specifically, "having no health problems" as a barrier coincides with findings from a focus group study that showed participants' reluctance to visit a physician unless major symptoms were experienced (Bastani et al., 2001). This hints at a specific health belief that may be shared across several AA ethnic groups indicating less familiarity with the nature of Western preventative care and screening practice to detect health problems before the onset of symptoms. Findings from a qualitative study (Jo et al., 2009) confirm this notion as they revealed that Korean physicians

perceived their ethnic concordant patients' general perception of having no symptoms as equating to being in good health as a barrier to recommend CRC screening.

Both reasons for not undergoing screening hint at important personal health barriers to target across all the subgroups. Importantly, opportunities for increased education on CRC disease process and options in screening modalities are raised. Moreover, as physician's recommendation to screen has been noted as a facilitator to screening uptake, the role of physicians can be emphasized here to help address these two barriers, being unaware of screening tests and having no health problems. Individuals likely resort to their physician as their trusted source of health-related education, providing them with necessary information to assist them in making informed decisions on their personal healthcare decision. However, if they are not meeting with their physician due to being asymptomatic, it decreases the opportunity for them to receive information and to have quality discussions on CRC, options in screening, and the navigation of screening selection and adherence. Therefore, an important foundation in the decision-making process can be missed without the initial encounter with the physician. More work is needed on educating and informing AA ethnic groups on the disease process of CRC and the primary role of screening to prevent cancer. Additionally, the utilization of non-traditional but culturally appropriate and accepted sources should be considered as effective health promoters in lieu of traditional healthcare facilities. Studies have emphasized the potential significance of including media sources as an appropriate disseminator of health information for AA (Islam et al., 2016). For instance, one study noted variations in the use of health information sources among AA subgroups with print media sources (i.e., newspapers, magazines, and journals), television, and the internet being highly used by KAs and print media sources by CAs (Islam et al., 2016). Oh, Zhou, Kreps, and Kim (2014) study emphasized this notion among KAs

as they found that KAs were more likely to seek health information from newspapers, magazines, and the internet than native Koreans. Continued education is needed on CRC screening among AA with inclusion of recruiting culturally appropriate non-traditional health sources as trusted and effective health information disseminators.

Time constraints experienced by physicians have been noted as barriers when attempting to educate their patients about the concept of preventive medicine and screening practice, let alone the option in screening modalities and their respective risk and benefits (Jo, Maxwell, Rick, Cha, & Bastani, 2009). As such, it may not be feasible nor prioritized among physicians, thus, hindering them from recommending screening to their patients (Jo et al., 2009). This can prevent or delay opportunity for maximum cancer literacy to be achieved, and in turn, can have great impacts on whether an individual decides to undergo cancer screening (Oldach & Katz, 2014). As time has been consistently identified as a salient barrier (Yarnall, Pollak, Ostbye, Krause, & Michener, 2003) and challenges have been noted when balancing multiple and competing priorities in limited office visits (Heisler, Bouknight, Hayward, Smith, & Kerr, 2002), feasible and cost-effective systemic changes on the healthcare systems level needs to be placed in the forefront. Strategies to better support the PCP and the interdisciplinary healthcare team should be implemented that maximize their respective roles to advance shared and informed decision-making of the patients. This should be carefully considered as findings have indicated the value of having both CRC screening discussions and a physician's recommendation for a specific modality to increase the likelihood of adherence to screening guidelines (Laiyemo et al., 2014).

Facilitators and Barriers to CRC Screening among Chinese Americans

Culture was identified as a noteworthy dimension within the predisposing characteristics

for CA. Tang et al., (2001) study examined cultural barriers and used the Suinn-Lew Asian Self-Identity Acculturation Scale to measure levels of acculturation to Western culture that were associated with having undergone screening. Greater acculturation level was measured by higher mean score for each the dimensions of culture that was included in their measurement including generation/geographic history, and language usage and fluency (Tang et al., 2001). Interestingly, higher number of years in the U.S. and having higher English proficiency were identified as barriers to CRC screening for CA, while previous studies among the aggregated AA population have concluded the aforementioned factors as facilitators to screening (Juon, Han, Shin, Kim, & Kim, 2003; Lee, Chen, Jung, Baezconde-Garbanati, & Juon, 2014). This contradiction showcases the differences in the cultural dimensions' impact on CRC screening across AA subgroups and serves as a reminder to the multi-faceted nature of operationalizing culture. Nevertheless, it is important to note that unaddressed cultural barriers, in addition to, barriers in the U.S. healthcare system can make it very discouraging for AA ethnic subgroups to use screening and early detection services (Kagawa-Singer, Dadia, Yu, & Surbone, 2010). Community outreach, education efforts, and trusting partnerships with community-based organizations and traditional providers may be beneficial especially when aiming to increase CRC screening among CA. As ethnic groups tend to use their respective culture's healing/wellness practices alone or in conjunction with the U.S. biomedical system (Hsiao et al., 2006), it is imperative to give more serious considerations in the examination of how various health practices intersect and influence one's decision to undergo a Western form of preventive care.

Psychological constructs, if targeted, may promote success when attempting to optimize screening behavior among CA. Barriers to screen included specific emotional challenges ranging from fear, embarrassment, and worries throughout the entire spectrum of the screening process.

In turn, perceived susceptibility for CRC facilitated screening uptake. This is an indication of the beneficial impacts of providing psychoeducation of the CRC disease process and screening options and processes as a community outreach focus to potentially correct false beliefs and information that may be contributing to the psychological barriers associated with CRC screening. As patients typically meet with a physician to access the CRC screenings, it is important that the healthcare system is comprised of healthcare team members who are invested in and willing to enhance patient health literacy and supportive services to support their screening behavior.

Facilitators and Barriers to CRC Screening among Filipino Americans

Unique from the other studies in this sub-analysis, Francisco et al. (2014) study was the only study to include a variable describing the communication with healthcare provider among FA. Their multivariate logistic regression analysis revealed that "very easy communication with healthcare provider" was a significant predictor to CRC screening adherence. Previous studies have emphasized the importance of various dimensions within patient-provider relations (e.g., quality of communication with healthcare providers) in improving health management and outcomes (Heisler, Bouknight, Hayward, Smith, & Kerr, 2002) and in reducing ethnic disparities in healthcare (Clemans-Cope & Kenney, 2007). Attempts to examine health literacy among AA with consideration of those who have limited English proficiency have gone underway (Carcaise-Edinboro & Bradley, 2008; Sentell, Braun, Davis, & Davis, 2013; Todd & Hoffman-Goetz, 2011). A study in this review showed that respondents who speak English only, a skill that can support patient-provider communication, was a faciltiator to screening uptake (Homayoon et al., 2013). Examining other potentially significant dimensions of patient-provider relations (e.g., how and what information is relayed to the patients and patients' experiences

regarding the transaction of information) appears to be limited in cancer screening research among AA subgroups and deserves further investigation.

Facilitators and Barriers to CRC Screening among Korean Americans

All dimensions within the predisposing characteristics were shown to influence CRC screening; however, the healthcare-related factors warrant a closer look in this ethnic subgroup. Access to healthcare measured by having insurance yielded a facilitative role of healthcare insurance to CRC screening. It's important to note that previous findings have commonly cited having insurance as a facilitator to screening uptake (Emmons et al., 2009; Jinjuvadia, Lohia, & Ehrinpreis, 2012). However, high un-insurance rates have also been noted among KA compared to other AA ethnic subgroups (Kao, 2010). Focused strategies should be prioritized to increase access to healthcare for KA.

A systematic review examining the facilitators to CRC screening among KA revealed that less acculturation to the U.S. and high cost appear to be important barriers to undergoing screening (Oh & Jacobsen, 2014). Both of which can impact one's access to healthcare. This review showed that higher acculturation measured by higher English proficiency and longer length of U.S. residency facilitated screening for KA. It is imperative to understand that having healthcare insurance may just be a preliminary step in the right direction, however, it may be insufficient to guarantee whether one decides to undergo CRC screening. Moreover, challenges in understanding the specific type of health insurance coverage and respective benefits may be an important arena to investigate (Richman, Asch, Bhattacharya, & Owens, 2016) among AA subgroups.

Facilitators and Barriers to CRC Screening among Japanese Americans

Confirming previous study findings among the general population, similar

sociodemographic factors including age, male, married, and income were found to facilitate screening uptake (Jerant, Fenton, & Franks, 2008). This may not be so surprising as studies have found JA to have the highest screening rates out of the other AA ethnic groups and similar screening rates to non-Hispanic Whites (Lee et al., 2011). This appears to compliment Gomez et al. (2013) study using SEER dataset, which found statistically significant declines for CRC incidence between 1990 – 2008 among JA.

Important healthcare-related factors and cues to action were noted for this AA subgroup, and like FA, there was one study in this sub-analysis that touched on patient/provider communication as a significant predictor to screening uptake (Honda & Kagawa-Singer, 2006). This reinforces the potential benefits of examining the information sharing process and the experience of JA throughout the decision-making process to adhere to CRC screening.

As AA are generally considered to be comprised of sociocentric ethnic groups as opposed to individualistic, Honda and Kagawa-Singer (2006) study raised an interesting inquiry regarding the role of subjective norms and social support from friends for explaining CRC screening adherence. Interestingly, this was the only study in this review that examined the role of informal social support and revealed emotional friends support and subjective norm (i.e., the perceived social pressure to engage or not to engage in a health behavior) from family and friends as important factors that both directly and indirectly affected screening adherence (Honda & Kagawa-Singer, 2006). This finding highlights the potential benefits of understanding the difference between sociocentric and individualistic cultures and how behavioral norms such as undergoing cancer screening can be greatly influenced by subjective norms of the individual's informal social support (i.e., family and friends). The possible invitation and the inclusion of the screening eligible individual's family and friends may be beneficial throughout the entire

decision-making process to provide informational and emotional support to the individual. Further investigation of the influence of ethnic culture's behavioral norm is warranted especially in sociocentric groups such as AA ethnic subgroups. With this understanding, the roles of family and friends can be reinforced when aiming to promote an individual's CRC screening uptake.

Conclusion

To the author's knowledge, this is the first systematic review to examine the facilitators and barriers to CRC screening uptake across multiple AA subgroups. This study builds on prior research focusing on a single AA ethnic subgroup (Oh & Jacobsen, 2014) and this study findings confirms that there are similarities and differences in terms of the facilitators and barriers to CRC screening between and within AA ethnic subgroups.

It is imperative that a comprehensive approach is taken when addressing the CRC cancer disparities among AA. Great heterogeneity exists in regards to the sociodemographic profiles and cultural identities between and within AA ethnic groups. Particularly, the cultural influences on screening behaviors was notable in this review. Kagawa-Singer, Dadia, Yu, and Surbone (2010, p. 17) state one definition of culture as, "the core, fundamental, dynamic, responsive, adaptive, and relatively coherent organizing system of life designed to ensure the survival and wellbeing of its members and is shared always to find meaning and purpose throughout life and to communicate caring." This definition imposes a strength perspective of the cultural identity of ethnic groups; however, this review's findings displayed two cultural variables as facilitators to CCSP, higher acculturation and English language proficiency, of which the latter yielded different impacts across the subgroups. Both of these variables emphasize an acculturation to Western traditions and practice for health benefits, and noticeably, no mentions were made of any cultural variables that highlighted the unique strengths of each AA ethnic subgroups' culture

and traditional health practice. As a critical reminder, culture cannot be understood so simply as a collection of beliefs and values that can be easily exchanged with Eurocentric ideologies (Kagawa-Singer et al., 2010). The multifaceted definition of culture itself warrants deeper investigation when included as a construct in studies focusing on screening behaviors among distinct AA ethnic subgroups.

Tailored approach has been suggested when achieving to improve CCSP in AA ethnic subgroups. For example, outreach efforts in residential entities that cater to CA communities (i.e., Chinese grocery market) may be helpful when aiming to target less acculturated CA (Tang et al., 2001). In addition, when aiming to understand the most disadvantaged subgroup in need of immediate intervention, understanding the unique sociodemographic profiles and cultural identity of the AA ethnic groups is fundamental. Moreover, it should not be assumed that AA ethnic subgroups have the accessibility to resort to Western healthcare systems as their initial choice to seek health information and/or address health concerns. Building necessary rapport and partnerships with both traditional health information sharing sites (i.e., hospital) and non-traditional sites (i.e., faith-based organizations, community centers, etc.). In addition to the collaborative efforts between healthcare providers and various channels of information sources (i.e., newspapers, television, etc.), it appears to be critical in terms of acquiring effective and culturally appropriate CRC and screening knowledge and building the knowledge within the respective ethnic communities.

Entry into the Western healthcare system and to a physician may be a critical deciding factor for CRC screening uptake for the AA ethnic patient. However, access to healthcare must first be assured. When in the healthcare system, the mobilization of strategic and maximal efforts by each of the healthcare team members are warranted to further support the shared decision-

making process between the patient and provider. Sufficient time and attention are required to educate patients on CRC and screening options, correct and provide accurate information, and address psychological barriers and provide social support. Moreover, the inclusion of other identified support networks (i.e., family and friends) may be beneficial when discussing screening options and should be considered as a valid agent of change for the patient.

References

Alden, D. L., Friend, J. M., Lee, A. Y., De Vries, M., Osawa, R., & Chen, Q. (2015). Culture and medical decision making: healthcare consumer perspectives in Japan and the United States. *Health Psychology, 34*(12), 1133-1144.

American Community Survey. (2012). Key facts and figures on Asian Americans and Pacific Islanders. Retrieved from https://www.whitehouse.gov/administration/eop/aapi/data/facts-and-figures

Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior, 36*(1), 1-10.

Asian American Network for Cancer Awareness, Research, and Training [AANCART] (2012). Asian American Cancer Health Disparities. Retrieved from http://www.aancart.org/cancer-research/publications/asian-american-cancer-health-disparities

Bastani, R., Gallardo, N., & Maxwell, A. (2001). Barriers to colorectal cancer screening among ethnically diverse high and average-risk individuals. *Journal of Psychosocial Oncology, 19*(3-4), 65-84.

Becker, M. H., & Maiman, L. A. (1975). Sociobehavioral determinants of compliance with health and medical care recommendations. *Medical Care*, *13*(1), 10-24.

Beydoun, H. A. & Beydoun, M. A. (2008). Predictors of colorectal cancer screening behaviors among average-risk older adults in the United States. *Cancer Causes & Control*, *19*(4), 339-359.

Carcaise-Edinboro, P. & Bradley, C. J. (2008). Influence of patient-provider communication on colorectal cancer screening. *Medical Care, 46*(7), 738-745.

Centers for Disease Control and Prevention (CDC). (2013). CDC-Colorectal cancer trends. Retrieved from http://www.cdc.gov/cancer/colorectal/statistics/trends.htm

Clemans-Cope, L. & Kenney, G. (2007). Low income parents' reports of communication problems with health care providers: Effects of language and insurance. *Public Health Reports, 122*(2), 206-216.

Emmons, K. M., Lobb, R., Puleo, E., Bennett, G., Stoffel, E., & Syngal, S. (2009). Colorectal cancer screening: Prevalence among low-income groups with health insurance. *Health Affairs, 28*(1), 169-177.

Ferrer, R. R., Ramirez, M., Beckman, L. J., Danao, L. L., Ashing-giwa, K. T. (2011). The impact of cultural characteristics on colorectal cancer screening adherence among Filipinos in the United States: A Pilot Study. *Psycho-Oncology, 20*(8), 862-870.

Francisco, D., Rankin, L., & Kim, S. C. (2014). Adherence to colorectal cancer and polyps screening recommendations among Filipino Americans. *Gastroenterology Nursing, 37*(6), 384-390.

Gomez, S. L., Noone, A. M., Lichtensztajn, D. Y., Scoppa, S., Gibson, J. T., Liu, L., Morris, C., Kwong, S., Fish, K., Wilkens, L. R., Goodman, M. T., Deapen, D., & Miller, B. A. (2013). Cancer incidence trends among Asian American population in the United States, 1990-2008. *Journal of National Cancer Institute, 105*(15), 1096-1100. doi: 10.1093/jnci/djt157

Harmon, B. E., Little, M. A., Woekel, E. D., Ettienne, R., Long, C. R., Wilkens, L. R., Le Marchand, L., Henderson, B. E., Kolonel, L. N., Maskarinec, G. (2014). Ethnic differences and predictors of colonoscopy, prostate-specific antigen, and mammography screening participation in the multiethnic cohort. *Cancer Epidemiology, 38*(2), 162-167.

Hastings, K. G., Jose, P. O., Kapphahn, K. I., Frank, A. T. H., Goldstein, B. A., Thompson, C. A., Eggleston, K., Cullen, M. R., & Palaniappan, L. P. (2015). Leading causes of death among Asian American subgroups (2003-2011). *Plos ONE, 10*(4), 1-18. doi: 10.1371/journal.pone.0124341

Heisler, M., Bouknight, R. R., Hayward, R. A., Smith, D. M., & Kerr, E. A. (2002). The relative importance of physician communication, participatory decision making, and patient understanding in diabetes self-management. *Journal of General Internal Medicine, 17*(4), 243-252. doi: 10.1046/j.1525-1497.2002.10905.x

Homayoon, B., Shahidi, N. C., & Cheung, W. Y. (2013). Impact of Asian ethnicity on colorectal cancer screening: A population-based analysis. *American Journal of Clinical Oncology, 36*(2), 167-173.

Honda, K. (2004). Factors associated with colorectal cancer screening among the U.S. urban Japanese population. *American Journal of Public Health, 94*(5), 815-822.

Honda, K. & Gorin, S. (2005). Modeling pathways to affective barriers on colorectal cancer screening among Japanese Americans. *Journal of Behavioral Medicine, 28*(2), 115-124.

Honda, K. & Kagawa-Singer, M. (2006). Cognitive mediators linking social support networks to colorectal cancer screening adherence. *Journal of Behavioral Medicine, 29*(5), 449-460.

Hsiao, A. F., Wong, M. D., Goldstein, M. S., Yu, H., Andersen, R. M., Brown, R. E., Becerra, L. M., & Wenger, N. S. (2006). Variation in complementary and alternative medicine (CAM) use across racial/ethnic groups and the development of ethnic-specific measures of CAM use. *The Journal of Alternative and Complementary Medicine, 12(*3), 281-290.

Islam, N. S., Patel, S., Wyatt, L. C., Sim, S., Mukherjee-Ratnam, R., Chun, K., Desai, B., Tandon, S. D., Trinh-Shevrin, C., Pollack, H., & Kwon, S. C. (2016). Sources of health

information among select Asian American immigrant groups in New York City. *Health Community, 31*(2), 207-216.

Jerant, A. F., Fenton, J. J., & Franks, P. (2008). Determinants of racial/ethnic colorectal cancer screening disparities. *Archives of Internal Medicine, 168*(12). 1317-1324.

Jin, H., Pinheiro, P. S., Xu, J. & Amei, A. (2016). Cancer incidence among Asian American populations in the United States, 2009-2011. *International Journal of Cancer, 138*(9), 2136-2145.

Jinjuvadia, R., Lohia, P., Ehrinpreis, M. (2012). Impact of health insurance, education, and income status on colorectal cancer screening in minority populations: 2001-2010. *Gastroenterology, 142*(5), S-214-S-214.

Jo, A., Maxwell, A., Rick, A., Cha, J., & Bastani, R. (2009). Why are Korean American physicians reluctant to recommend colorectal cancer screening to Korean American patients? Exploratory interview findings. *Journal of Immigrant and Minority Health, 11*(4), 302-309.

Jo, A., Maxwell, A., Wong, & W., Bastani, R. (2008). Colorectal cancer screening among underserved Korean Americans in Los Angeles County. Journal of Immigrant and *Minority Health, 10*(2), 119-126.

Juon, H., Han, W., Shin, H., Kim, K. B., & Kim, M. T. (2003). Predictors of older Korean Americans' participation in colorectal cancer screening. *Journal of Cancer Education, 18*(1), 37-42.

Kagawa-Singer, M., Dadia, A. V., Yu, M. C., & Surbone, A. (2010). Cancer, culture, and health disparities: Time to chart a new course? *CA: A Cancer Journal for Clinicians, 60*(1), 12-39.

Kao, D. (2010). Factors associated with ethnic differences in health insurance coverage and type among Asian Americans. *Journal of Community Health, 35*(2), 142-155.

Kim, K., Chapman, C., & Vallina, H. (2012). Colorectal cancer screening among Chinese American immigrants. *Journal of Immigrant and Minority Health, 14*(5), 898-901.

Kim, K., Yu, E. S. H., Chen, E. H., Kim, J., & Brintnall, R. A. (1998). Colorectal cancer screening: Knowledge and practices among Korean Americans. *Cancer Practice, 6*(3), 167-175.

Klabunde, C. N., Vernon, S. W., Nadel, M. R., Breen, N., & Brown, M. L. (2005). Barriers to colorectal cancer screening: A comparison of reports from primary care physicians and average-risk adults. *Medical Care, 43*(9), 939-944.

Laiyemo, A. O., Adebogun, A. O., Doubeni, C. A., Ricks-Santi, L., McDonald-Pinkett, S., Young, P. E., Cash, B. D., & Klabunde, C. N. (2014). Influence of provider discussion and specific recommendation on colorectal cancer screening uptake among U.S. adults. *Preventive Medicine, 67*, 1-5.

Le, T., Carney, P., Lee-Lin, F., Mori, M., Chen, Z., Leung, H., Lau, C., Lieberman, D. (2014). Differences in knowledge, attitudes, beliefs, and perceived risks regarding colorectal cancer screening among Chinese, Korean, and Vietnamese subgroups. *Journal of Community Health, 39*(2), 248-265.

Lee, H. Y. & Im, H. (2013). Colorectal cancer screening among Korean American immigrants: unraveling the influence of culture. *Journal of Health Care for the Poor and Underserved, 24*(2), 579-598.

Lee, H. Y., Lundquist, M., Ju, E., Luo, X., & Townsend, A. (2011). Colorectal cancer screening disparities in Asian Americans and Pacific Islanders: Which groups are most

vulnerable? *Ethnicity & Health*, *16*(6), 501-518. doi: 10.1080/13557858.2011.575219

Lee, S., Chen, L., Jung, M., Baezconde-Garbanati, L., & Juon, H. (2014). Acculturation and cancer screening among Asian Americans: Role of health insurance and having a regular physician. *Journal of Community Health, 39*(2), 201-212.

Liss, D. T. & Baker, D. W. (2014). Understanding current racial/ethnic disparities in colorectal cancer screening in the United States: The contribution of socioeconomic status and access to care. *American Journal of Preventive Medicine*, *46*(3), 228-236. doi: 10.1016/j.amepre.2013.10.023

Ma, G. X., Shive, S. E., Wang, M. Q., & Tan, Y. (2009). Cancer screening behaviors and barriers in Asian Americans. *American Journal of Health Behavior, 33*(6), 650-660.

McCracken, M., Olsen, M., Chen Jr., M. S., Jemal, A., Thun, M., Cokkinides, V., Deapen, D., & Ward, E. (2007). Cancer incidence, mortality, and associated risk factors among Asian Americans of Chinese, Filipino, Vietnamese, Korean, and Japanese ethnicities. *A Cancer Journal for Clinicians*, *57*(4), 190-205. doi: 10.3322/canjclin.57.4.190

Maxwell, A. E., Bastani, R., Crespi, C. M., Danao, L. L., & Cayetano, R. T. (2011). Behavioral mediators of colorectal cancer screening in a randomized controlled intervention trial. *Preventive Medicine, 52*(2), 167-173.

Maxwell, A. E., Bastani, R., & Warda, U. S. (2000). Demographic predictors of cancer screening among Filipino and Korean immigrants in the United States. *American Journal of Preventive Medicine, 18*(1), 62-68.

Maxwell, A. E. & Crespi, C. M. (2008). Trends in colorectal cancer screening utilization among ethnic groups in California: Are we closing the gap? *Cancer Epidemiology Biomarkers Prevention*, *18*(3), 752-759.

Maxwell, A. E., Crespi, C.M., & Antonio, C. M., & Lu, P. (2010). Explaining disparities in colorectal cancer screening among five Asian ethnic groups: A population based study in California. *BMC Cancer, 10*, 214-214.

Maxwell, A. E., Danao, L. L., Crespi, C. M., Antonio, C., Garcia, G. M., & Bastani, R. (2008). Disparities in the receipt of fecal occult blood test versus endoscopy among Filipino American immigrants. *Cancer Epidemiology, Biomarkers, & Prevention, 17*(8), 1963-1967.

Miller, B. A., Chu, K. C., Hankey, B. F., & Ries, L. A. G. (2008). Cancer incidence and mortality patterns among specific Asian and Pacific-Islander population in the U.S. *Cancer Causes Control, 19*, 227-256. doi: 10.1007/s10552-007-9088-3

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Annals of Internal Medicine, 151*(4), 264-269.

Oh, K. M. & Jacobsen, K. H. (2014). Colorectal cancer screening among Korean Americans: A systematic review. *Journal of Community Health, 39*, 193-200. doi: 10.1007/s10900-013-9758-x

Oh, K. M., Kreps, G. L., & Jun, J. (2013). Colorectal cancer screening knowledge, beliefs, and practices of Korean Americans. *American Journal of Health Behavior, 37*(3), 381-394.

Oh, K. M., Zhou, Q., Kreps, G. L., & Kim, W. (2014). The influence of immigration on health seeking behavior among Korean Americans and native Koreans. *Health Education and Behavior, 41*(2), 173-185.

Oh, K. M., Zhou, Q., Kreps, G. L., & Ryu, S. K. (2012). Breast cancer screening practices among Asian Americans and Pacific Islanders. *Journal of American Health Behavior*,

36(5), 711-722. doi: http://dx.doi.org/10.5993/AJHB.36.5.13

Oldach, B. R., & Katz, M. L. (2014). Health literacy and cancer screening: A systematic review. *Patient Education and Counseling, 94*(2), 149-157.

Pew Research Center. (2015). The Rise of Asian Americans. Retrieved from http://www.pewsocialtrends.org/asianamericans-graphics/

Richman, I., Asch, S. M., Bhattacharya, J., & Owens, D. K. (2016). Colorectal cancer screening in the era of the affordable care act. *Journal of General Internal Medicine, 31*(3), 315-320.

Ryu, S. Y., Crespi, C. M., & Maxwell, A. E. (2014). Colorectal cancer among Koreans living in South Korea versus California: Incidence, mortality, and screening rates. *Ethnicity & Health, 19*(4), 406-423.

Sentell, T., Braun, K. L., Davis, J. & Davis, T. (2013). Colorectal cancer screening: Low health literacy and limited English proficiency among Asians and Whites in California. *Journal of Health Communications, 18*, 242-255. doi: 10.1080/10810730.2013.825669

Stanley, S. L., King, J. B., Thomas, C. C., & Richardson, L. C. (2013). Factors associated with never being screened for colorectal cancer. *Journal of Community Health*, *38*, 31-39. doi: 10.1007/s10900-012-9600-x

Strong, C., Ji, C. S., Liang, W., Ma, G., Brown, R., Wang, J. H. (2014). Heterogeneous demographic and cultural profiles of Chinese American patients nonadherent to colorectal cancer screening: A latent class analysis. *Cancer Nursing, 37*(2), 106-113.

Sun, W. Y., Basch, C. E., Wolf, R. L., & Li, X. J. (2004). Factors associated with colorectal cancer screening among Chinese Americans. *Preventive Medicine, 39*(2), 323-329.

Tang, T. S., Solomon, L. J., McCracken, L. M. (2001). Barriers to fecal occult blood testing and

sigmoidoscopy among older Chinese American women. *Cancer Practice, 9*(6), 277-282.

Teng, E. J., Friedman, L. C., & Green, C. E. (2006). Determinants of colorectal cancer behavior among Chinese Americans. *Psycho-Oncology, 15*(5), 374-381.

Todd, L. & Hoffman-Goetz, L. (2011). Predicting health literacy among English-as-a-second-language older Chinese immigrant women to Canada: Comprehension of colon cancer prevention information. *Journal of Cancer Education, 26*(2), 326-332.

U.S. Census Burearu. (2014). 2010-2014 American community survey 5-year estimates. Retrieved from http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_14_5YR_B02006&prodType=table

United States Preventive Services Task Force (USPSTF). (2015). Colorectal Cancer: Screening. Retrieved from http://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/colorectal-cancer-screening?ds=1&s=colorectal%20cancer

Wang, J. H., Liang, W., Chen, M., Cullen, J., Feng, S., Yi, B., Schwartz, M. D., & Mandelblatt, J. S. (2006). The influence of culture and cancer worry on colon cancer screening among older Chinese American women. *Ethnicity & Disease, 16*(2), 404-411.

Wong, S. T., Gildengorin, G., Nguyen, T., & Mock, J. (2005). Disparities in colorectal cancer screening rates among Asian Americans and non-Latino Whites. *Cancer*, *104*(12), 2940-2947. doi: 10.1002/cncr.21521

Yang, D. X., Gross, C. P., Soulos, P. R., & Yu, J. B. (2014). Estimating the magnitude of colorectal cancers prevented during the era of screening: 1976-2009. *Cancer*, *120*, 2893-2901.

Yarnall, K. S. H., Pollak, K. I., Ostbye, T., Krause, K. M., Michener, L. J. (2003). Primary care: is there enough time for prevention? *The American Journal of Public Health, 93*(4), 635-637.

Yu, E. H., Kim, K., Chen, E., Brintnall, R. A., & Liu, W. Colorectal cancer of screening among Chinese Americans: A community-based study of knowledge and practice. *Journal of Psychosocial Oncology, 19*(3-4). 97-112.

Chapter 3: Colorectal Cancer Screening among Asian Americans in Hawai‘i: Do Ethnicity and Gender Matter?

Introduction

Unique from any other state, Hawai‘i's ethnically diverse population are comprised of mostly self-reported Asian Americans (AA) (i.e., approximate estimate of AA alone 534,189 and non-Hispanic White alone 360,711 (American Community Survey, 2014). Filipinos 14.7%, Japanese 12.2%, and Chinese 4.3% are the largest Asian sub-groups in Hawai‘i respectively (American Community Survey, 2014). Colorectal cancer (CRC) has had significant impacts among these Asian subgroups in Hawai‘i and is one of the top three most frequently diagnosed cancer and leading cause of death among Japanese, Filipino, and Chinese men and women (Hawai‘i: Cancer Facts & Figures, 2010).

CRC is preventable and one approach to prevention is adhering to recommended screening practices (CDC, 2013c). Currently, U.S. Preventive Service Task Force (USPSTF, 2016) recommends average-risk people, irrespective of gender, to adhere to routine CRC screening starting at age 50 to 75. The three most common screening modalities due to their respective effectiveness in detecting adenomatous polyps and early-stage CRC include: 1) fecal occult blood test (FOBT), a non-invasive modality recommended on a yearly basis and used to detect blood in the stool, 2) sigmoidoscopy recommended every 5 years (or every 3 years when paired with the annual FOBT) and used to detect polyps inside the rectum and the lower end of the colon, and 3) colonoscopy recommended every 10 years and used to detect polyps inside the rectum and the entire colon (CDC, 2013c; USPSTF, 2016).

Maintaining routine colorectal cancer screening practice (CCSP) is important because physical symptoms are typically not experienced at earlier stages of cancer and screenings can detect precancerous polyps when treatment is most effective (American Cancer Society [ACS],

2015; CDC, 2013c). In turn, this health behavior plays a pivotal role in reducing CRC incidences and death rates (Ritvo et al., 2013). However, among all the ethnic/racial groups in the nation, AA continue to receive the lowest rate in CRC screenings (Lee, Lu, Jung, Baezconde-Garbanati, & Juon, 2014; McCracken et al., 2007) with AA generally screening at a lower rate (47.8%) compared to non-Hispanic Whites (56%) (Jerant, Arellanes, & Franks, 2008). In addition, ethnic disparities in CCSP have been revealed within the AA population (Chien, Morimoto, Tom, & Li, 2005; Lee et al., 2014; Lee, Ju, Vang, & Lundquist, 2010; McCracken et al., 2007; Wong, Gildengorin, Nguyen, & Mock, 2005).

A unique feature of CRC screening is that both males and females receive the same options in screening modalities and face comparable risks (Miller, Chu, Hankey, & Ries, 2008). Nevertheless, the examination of gender's effect on CRC screening has yielded mixed results. For instance, one study indicated higher screening rate for men compared to women particularly for endoscopic procedures (Friedemann-Sanchez, Griffin, & Partin, 2007). Whereas Callcut, Kaufman, Stone-Newsome, Remington, and Mahvi's (2006) study found no gender disparities in types of CRC screening reported. In addition, qualitative studies have indicated clear gender differences regarding screening knowledge and barriers and facilitators to screening (Burke, Beeker, Kraft, & Pinksy, 2000; Friedemann-Sanchez et al., 2007; Miller et al., 2008; Ritvo et al., 2013). For example, Friedemann-Sanchez et al (2007) found that women perceived the required preparation (i.e., ingestion of preparatory laxative) for either endoscopic procedures (sigmoidoscopy or colonoscopy) as a significant barrier to completing screening. Additionally, different reasons for fear to undergo screening were noted by gender, with more fear being due to the physical invasiveness of endoscopic procedures among men (Friedemann-Sanchez, 2007). The exploration of the gender variable already is underway, however, gender influences on

screening practices is still under-researched especially among AA and further investigation is warranted to shed light on the preferred screening practice(s) among men and women. In turn, this may indicate a need for gender-specific approaches to reduce screening disparities.

When examining CCSP among ethnic minorities including AA, certain sociodemographic and healthcare-related variables have been found to predict screening differently for specific ethnic groups. These have included age, marital status, gender, education attainment, and access to healthcare (Jerant, Arellanes, & Franks, 2008; Kim, Chandrasekar, & Lam, 2014; Tang, Solomon, & McCracken, 2001; Wong et al., 2013; Wong, Gildengorin, Nguyen, & Mock, 2005). The heterogeneity of the AA population adds to the complexity when examining screening behavior among specific AA subgroups. In as such, the reasons for the aforementioned screening disparity can be attributed to a variety of sociodemographic and healthcare access factors (Wong et al., 2005). Examining the sociodemographic and healthcare-related factors can help to reveal specific subgroups within each AA ethnic group that warrants additional support and attention when attempting to optimize CCSP. In turn, understanding the characterization of individuals who are likely to screen as opposed to those who are not can support strategies for tailored intervention approaches.

This study aims 1) to examine CCSP among the disaggregated three largest AA population in Hawai‘i: Japanese, Filipino, and Chinese, 2) to examine gender variances in CCSP, and 3) to examine sociodemographic and healthcare factors in relation to CRC screening uptake. Exploring the ethnic, gender, and other sociodemographic and healthcare factors associated with CRC screening may reveal areas in need of focus when developing interventions to increase screening uptake.

Methodology

Sampling

Data from the 2012 Hawai‘i Behavioral Risk Factor Surveillance System (BRFSS) was used for the analysis. Conducted by the Centers for Disease Control and Prevention (CDC), BRFSS is the world's largest cross-sectional telephone health survey system and provides a national estimate of the behavioral health risks associated with premature morbidity and mortality among U.S. adults (CDC, 2013a). This study focused on respondents who self-reported themselves as Japanese (n = 761), Filipino (n = 335), and Chinese (n = 193). Respondents who reported being non-Hispanic White (n = 1,659) served as the reference category. The respondents' age ranged from 50 to 75 years with an average age of 61.9 years (SD = 6.95).

Measures

CCSP served as the main outcome variable and were measured by: 1) Ever had blood stool test (BST) using home kit (yes or no) and 2) Ever had sigmoidoscopy/colonoscopy (SC) (yes or no) (CDC, 2013b). Although sigmoidoscopy and colonoscopy are two separate screenings, BRFSS combined these two screenings in one question. As such, respondents who had ever received either a sigmoidoscopy or colonoscopy were to respond "yes." If respondents were 49 years of age or younger, they skipped out of the CRC related questions on the BRFSS. This age cut-off falls in line with the recommended screening age for CRC (USPSTF, 2016).

The primary independent variables were the respondents' ethnicity and gender. The other independent variables included sociodemographic and healthcare factors including: 1) age (50-75), 2) marital status [married/couple (married, a member of an unmarried couple) vs. single (divorced, widowed, separated)] 3) education attainment, measured by a question, "what is the highest grade or year of school completed?" [below high school (HS) graduate (grades 1-8, grades 9-11), HS graduate (grade 12 or GED), college and higher (college 1 – 3 years and

college 4 years or more)], 4) employment status [employed (employed for wages and self-employed) vs. unemployed (out of work for more than 1 year, out of work for less than 1 year, a homemaker, a student, and retired), and 5] access to healthcare, measured by a question, "do you have any kind of health care coverage including health insurance, prepaid plans such as HMOs or government plans such as Medicare or IHS?" (yes or no) (CDC, 2013b).

Data Analysis

Using SPSS version 22.0, descriptive statistics were computed for gender within each ethnic group indicating their respective frequencies and percentages by CRC screening practices (i.e., having had BST vs. not having had BST; having had SC vs. not having had SC). Chi-square analyses were used to examine any significant ethnic and gender differences in CRC screening practices. Multiple logistic regression analyses were then used to examine the associations between CRC screening practices and ethnicity and gender, controlling for the sociodemographic and healthcare variables. All reported odds ratios (ORs) were considered statistically significant at the $p \leq 0.05$ level.

Results

Tables 1.5 shows the chi-square results of BST rates by ethnicity and gender. For ever having done a BST, distribution of respondents' ethnicity and gender were explored via the frequencies and percentages and compared to their respective ethnic gender counterparts. Across all ethnicities, more males did not have a BST compared to males that have. In addition, more females showed to have had BST than not across all ethnicities except for Filipino. A higher percentage of Filipino men and women did not have a BST, 65.2% and 65.2% respectively, compared to those who did. Chi-square analyses indicated significant gender differences for BST among the total sample and Japanese. Overall, women are more likely to ever had a BST

compared to men χ^2 (1, n = 2829) = 4.950, $p \leq .05$. More specifically, Japanese women are more likely to ever had a BST compared to Japanese men χ^2 (1, n = 728) = 4.556, $p \leq .05$.

Table 1.5. Ever had BST: Distribution of Ethnicity and Gender Variables

Ethnic		**No BST**	**Yes BST**	**Chi-Square**
Whites	Male	380 (50.6%)	371 (49.4%)	
	Female	404 (47.5%)	447 (52.5%)	1.560
Japanese	Male	182 (53.7%)	157 (46.3%)	
	Female	178 (45.8%)	211 (54.2%)	4.556*
Filipino	Male	90 (65.2%)	48 (34.8%)	
	Female	116 (65.2%)	62 (34.8%)	.000
Chinese	Male	45 (51.7%)	42 (48.3%)	
	Female	41 (42.7%)	55 (57.3%)	1.489
Total	Male	697 (53%)	618 (47%)	
	Female	739 (48.8%)	775 (51.2%)	4.950*

Male served as reference group
* $p \leq .05$

Table 1.6 shows the chi-square results for SC rates by ethnicity and gender. For ever having done SC, distribution of respondents' ethnicity and gender were explored via the frequencies and percentages and compared to their respective ethnicity and gender counterparts. Across all ethnicities, more males and females have had SC compared to those who have not except for Filipino females. More Filipino females have not had SC (52%) compared to Filipino females that have had SC. None of the differences were statistically significant.

Table 1.6. Ever had SC: Distribution of Ethnic and Gender Variables

Ethnic		No SC	Yes SC	Chi-Square
Whites	Male	232 (30.8%)	522 (69.2%)	
	Female	287 (33.4%)	571 (66.6%)	1.321
Japanese	Male	98 (28.4%)	247 (71.6%)	
	Female	92 (23.4%)	302 (76.6%)	2.461
Filipino	Male	64 (46.4%)	74 (53.6%)	
	Female	92 (52.0%)	85 (48.0%)	.973
Chinese	Male	35 (40.2%)	52 (59.8%)	
	Female	36 (37.5%)	60 (62.5%)	.143
Total	Male	429 (32.4%)	895 (67.6%)	
	Female	507 (33.2%)	1018 (66.8%)	.229

Male served as reference group

Multiple Logistic Regression Results

Table 1.7 and table 1.8 shows that after controlling for all other covariates, Filipino were still less likely to have BST and SC (OR = .590, $p \leq .001$; OR = .589, $p \leq .001$) than non-Hispanic Whites; Japanese were more likely to have SC (OR = 1.326, $p \leq .01$); and Chinese were less likely to have SC (OR = .711, $p \leq .05$). Factors that were associated with decreased likelihood to have BST included male gender (OR= .815, $p \leq .01$), single status (OR = .851, $p \leq .05$), below HS graduate (OR = .381, $p \leq .001$) and HS graduate education level (OR = .787, $p \leq .05$), and not having healthcare insurance (OR = .526, $p \leq .001$). Age (OR = 1.044, $p \leq .001$) was the only factor that increased the likelihood to have BST. For SC, there were no statistically significant

gender variances. Factors that were associated with less likelihood to have SC were similar to BST and included single status (OR = .598, $p \leq .001$), below HS graduate (OR = .296, $p \leq .001$) and HS graduate education level (OR = .571, $p \leq .001$), and not having healthcare (OR = .235, $p \leq .001$). Conversely, age (OR = 1.067, $p \leq .001$) and unemployment (OR = 1.395, $p \leq .01$) significantly increased likelihood for SC.

Table 1.7. Sociodemographic and Healthcare Factors Influencing Having BST

Sociodemographic & Healthcare Factors		B	S.E.	OR (95% CI)
Ethnicity	Non-Hispanic White	Reference		
	Japanese	-.078	.091	.925 (.773 – 1.106)
	Filipino	-.528	.134	.590 (.454 - .767) ***
	Chinese	.080	.160	1.084 (.792 – 1.482)
Age	50 – 75	.043	.006	1.044 (1.031 – 1.057) ***
Gender	Female	Reference		
	Male	-.205	.078	.815 (.699 - .949) **
Marital Status	Married/Couple	Reference		
	Single	-.161	.079	.851 (.729 - .994) *
Education Level	College and Higher	Reference		
	Below HS Graduate	-.925	.273	.381 (.223 - .651) ***
	HS Graduate	-.239	.099	787 (.648 - .956) *
Employment Status	Employed	Reference		
	Unemployed	.031	.087	1.031 (.870 – 1.223)
Access to Healthcare	Yes	Reference		
	No	-.642	.168	.526 (.378 - .732) ***

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 1.8. Sociodemographic and Healthcare Factors Influencing Having SC

Sociodemographic & Healthcare Factors		B	S.E.	OR (95% CI)
Ethnicity	Non-Hispanic White	Reference		
	Japanese	.282	.106	1.326 (1.076 – 1.633) **
	Filipino	-.530	.137	.589 (.450 - .769) **
	Chinese	-.341	.171	.711 (.508 - .995) *
Age	50 – 75	.064	.007	1.067 (1.052 – 1.082) ***
Gender	Female	Reference		
	Male	.025	.087	1.026 (.865 – 1.216)
Marital Status	Married/Couple	Reference		
	Single	-.515	.088	.598 (.503 - .710) ***
Education Level	College and Higher	Reference		
	Below HS Graduate	-1.218	.262	.296 (.177 - .494) ***
	HS Graduate	-.560	.106	.571 (.464 - .704) ***
Employment Status	Employed	Reference		
	Unemployed	.333	.097	1.395 (1.152 – 1.688) **
Access to Healthcare	Yes	Reference		
	No	-1.449	.175	.235 (.167 - .331) ***

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Each ethnic group's unique characteristics associated with CCSP were further revealed in the following sections.

Japanese

Among Japanese, age increased the likelihood of having a BST (OR = 1.057, $p \leq .001$), whereas HS graduate education level and not having healthcare decreased the likelihood of having a BST (OR = .656, $p \leq .05$; OR = .282, $p \leq .01$ respectively). Age also increased the likelihood of having a SC (OR = 1.080, $p \leq .001$), whereas single, below HS graduate level, and not having healthcare decreased the likelihood of having a SC (OR = .600, $p \leq .01$; OR = .061, $p \leq .05$; OR = .177, $p \leq .001$, respectively).

Filipino

Among Filipino, having below HS graduate level decreased the likelihood of having a BST (OR = .257, $p \leq .01$). For SC, below HS graduate level and HS graduate education levels decreased the likelihood of having these screenings (OR = .305, $p \leq .01$; OR = .526, $p \leq .05$ respectively), whereas being unemployed increased the likelihood of having a SC (OR = 1.912, $p \leq .05$).

Chinese

Among Chinese, being single increased the likelihood of having a BST (OR = 2.123, $p \leq .05$) and age increased the likelihood of having a SC (OR = 1.136, $p \leq .001$).

Table 1.9. Sociodemographic and Healthcare Factors Influencing Having BST and SC by AA Subgroups

Sociodemographic and Healthcare Factors		BST		SC	
		OR	*p* value	OR	*p* value
Japanese	Age	1.057	.000	1.080	.000
	Male	.780	.111	.890	.526
	Single	.880	.421	.600	.006
	Below HS Graduate	.000	.999	.061	.019
	HS Graduate	.656	.040	.685	.107

	Unemployed	1.280	.178	1.396	.129
	No Healthcare	.282	.004	.177	.000
Filipino	Age	1.021	.310	1.030	.133
	Male	1.006	.982	1.206	.437
	Single	1.186	.512	.913	.724
	Below HS Graduate	.257	.009	.305	.006
	HS Graduate	.815	.423	.526	.011
	Unemployed	1.011	.969	1.912	.021
	No Healthcare	1.154	.751	.758	.534
Chinese	Age	1.050	.085	1.136	.000
	Male	.616	.133	.729	.359
	Single	2.123	.027	.511	.071
	Below HS Graduate	.000	.999	.169	.187
	HS Graduate	.818	.660	.463	.112
	Unemployed	.776	.505	1.004	.993
	No Healthcare	.530	.383	.302	.166

Discussion

This study disaggregated the AA population using the three largest AA subgroups in Hawai‘i, Filipino, Japanese, and Chinese, and revealed ethnic variances in CCSP and by screening modality. Filipino had the lowest screening rate compared to the other groups and the multiple logistic regression analyses suggested that, after controlling for the other covariates, Filipinos are less likely to have a BST and SC, Japanese are more likely to have SC, and Chinese

were less likely to have SC when compared to non-Hispanic Whites. These findings are supported by other studies that identified Filipino are less likely to undergo screenings and Japanese as being more comparable to non-Hispanic Whites in screening practices (Lee et al., 2014; Wong et al., 2005). Given the fact that the data was collected in Hawai‘i, a state that is uniquely comprised of mostly Asian ethnicities, it is important to note cultural factors' influence among the Asian subgroups on screening behavior. For instance, study findings have shown that higher acculturation level is associated with cancer screening among Asians (Jun & Oh, 2013). This may provide some explanation to the low screening participation among Filipinos as this group is the most recent immigrant group to migrate to Hawai‘i (Hawai‘i: Cancer Facts & Figures, 2010) and the higher screening rates among Japanese. Options in CRC screening modalities exists and these options should be made available for those who are eligible for screening to facilitate informed decision-making and to optimize screening coverage. Further exploration is needed to understand the factors that influence specific screening modality uptake and whether and to what degree the nature of the screening modalities (invasive vs. non-invasive) affect Asian subgroups' decision making process in screening uptake.

Previous studies have suggested a need for gender-specific approaches to promote CCSP (Friedemann-Sanchez et al., 2007; USPSTF, 2016). As such, this study also explored gender variances in CCSP, an under-researched focus especially among AA subgroups. Chi-square analyses indicated that overall women are more likely to ever had a BST compared to men. Multiple logistic regression analyses supported this finding as men were found to have decreased odds of having had a BST than women. More specifically, Japanese women are more likely to ever had a BST compared to Japanese men. This suggests different explanations. BST may be the preferred screening modality for women in general and specifically for Japanese women.

This coincides with findings that indicate women's inclination for BST as their preferred screening modality than endoscopic procedures due to gender specific barriers that women identify with endoscopic procedures (Friedemann-Sanchez et al., 2007). This may also indicate that women are being recommended BST more than endoscopic procedures by their physicians, which in turn, may lead to higher screening rates. Nevertheless, this study showcases gender's role in BST screening and specifically among Japanese. The exploration of gender in CCSP among AA warrants further investigation to understand the decision-making process of how and why certain screening modalities are selected.

When examining screening practices among AA, there is a need to disaggregate the AA population to reveal the unique characteristic profiles of those who are more likely to screen and those who are not. This study revealed different predictors of FOBT and SC for each subgroup. A previous study has shown that having access to healthcare supports health behavior including screening practice (Jun & Oh, 2013). Interestingly in this study, not having healthcare insurance was significantly influential in lowering the odds of uptake of both BST or SC for only Japanese. This suggests different barriers that may be experienced with access to healthcare for specific subgroups. In addition, "having healthcare or not" as a proxy for access to healthcare may not play an influential role in screening behavior among Filipino and Chinese. It is recommended to further examine the role of access to healthcare and other healthcare factors in facilitating screening practices among these specific Asian subgroups. This study also revealed different socioeconomic factors' effect on screening. For instance, having lower education level decreased the odds of screening for both Japanese and Filipino and being unemployed decreased the odds of screening for only Filipino. The latter finding was unexpected; however, studies have shown that unemployment increased CRC screening for Koreans as well (Maxwell, Crespi, Antonio, &

Lu, 2010). The inability to take time off work was one reason to explain unemployed Koreans higher screening rate (Jo, Maxwell, Wong, & Bastani, 2007). Further examination is needed to understand the effect of employment status on CRC screening among AA subgroups and how it can facilitate or hinder CRC screening completion. As such, understanding the sociodemographic profiles of Asian subgroups is an important first step for targeted intervention efforts.

Limitations and Strengths

There are some limitations in this study. Data from Hawai‘i BRFSS was used in this study, which does not allow us to infer causation and may limit the generalizability to other geographic locations. However, because majority of the AA population live in three states with Hawai‘i being one of them (Hoeffel, Rastogi, Kim, & Shahid, 2012), and due to the standardized questions and the consistent procedure conducted by all the states, this may allow for cross-state comparisons to be made in future studies. Future studies may also consider including additional important covariates shown to have association with health/screening behavior among Asian groups including cultural factors and additional healthcare-related factors.

Conclusion

This study revealed the likelihood of BST and SC uptake for Japanese, Chinese, and Filipino when compared to non-Hispanic Whites in Hawai‘i, gender variances by screening modalities, and unique sociodemographic and healthcare factors within each ethnic group that predicted screening practices. There is a need to develop tailored interventions to target this heterogeneous population with consideration of ethnic and gender specific approaches to understand how and why screening modalities are understood and selected for uptake. In as such, the sociodemographic predictors to CCSP needs to be understood to aid in targeted approach for

culturally responsive intervention efforts and when promoting the different screening modalities to support optimal screening uptake.

References

American Cancer Society (ACS). (2015). Cancer Facts & Figures 2015. http://www.cancer.org/acs/groups/content/@editorial/documents/document/acspc-044552.pdf. Accessed 22 November 2015.

American Community Survey. (2014). 2014 American Community Survey 1- Year Estimates. http://files.hawaii.gov/dbedt/census/acs/ACS2014/ACS2014_1_Year/geographic/ACS_14_1YR_DP_state_all.pdf. Accessed 13 August 2016.

American Network for Cancer Awareness, Research, and Training (AANCART). (2012). The National Center for Reducing Asian American Cancer Health Disparities: About Us. http://www.aancart.org/about-us. Accessed 22 November 2015.

Burke, W., Beeker, C., Kraft, J., & Pinksy, L. (2000). Engaging women's interest in colorectal cancer screening: A public health strategy. *Journal of Women's Health & Gender-Based Medicine, 9*(4), 363-371.

Callcut, R. A., Kaufman, S., Stone-Newsom, R., Remington, P., & Mahvi, D. (2006). Gender disparities in colorectal cancer screening: True or false? *Journal of Gastrointestinal Surgery, 10*(10), 1409-1417. doi:10.1016/j.gassur.2006.06.006

Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2013a].

Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Questionnaire. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2013b].

Centers for Disease Control and Prevention (CDC). (2013c). Colorectal Cancer Tests Save

Lives. http://www.cdc.gov/vitalsigns/colorectalcancerscreening/. Accessed 22 October 2015

Chien, C., Morimoto, L. M., Tom, J., Li, C. I. (2005). Differences in colorectal carcinoma stage and survival by race and ethnicity. *American Cancer Society, 104*(3), 629-639. doi:10.1002/cncr.21204

Friedemann-Sanchez, G., Griffin, J. M., & Partin, M. R. (2007). Gender differences in colorectal cancer screening barriers and information needs. *Health Implications, 10*(2), 148-160. doi:10.1111/j.1369-7625.2006.00430.x

Hawaii: Cancer Facts & Figures. (2010). http://www.uhcancercenter.org/pdf/hcff-pub 2010.pdf. Accessed 22 November 2015.

Hoeffel, E. M., Rastogi, S., Kim, M. O., & Shahid, H. (2012). The Asian population: 2010. Washington, DC: U.S Department of Commerce, U.S. Census Bureau, 2010.

IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.

Jerant, A. F., Arellanes, R. E., Franks, P. (2008). Factors associated with Hispanic/non-Hispanic White colorectal cancer screening disparities. *Journal of General Internal Medicine, 23*(8), 1241-1245. doi: 10.1007/s11606-008-0666-1

Jo, A. M., Maxwell, A. E., Wong, W. K., & Bastani, R. (2007). Colorectal cancer screening among underserved Korean Americans in Los Angeles County. *Journal of Immigrant and Minority Health, 10*(2), 119-126.

Jun, J. & Oh, K. M. (2013). Asian and Hispanic Americans' cancer fatalism and colon cancer screening. *American Journal Health Behavior, 37*(2), 145-154. doi:10.5993/AJHB.37.2.1

Kim, K. E., Chandrasekar, E., & Lam, H. Y. (2014). Socio-demographic factors and cancer screening among foreign-born Chinese, Cambodian, and Vietnamese. *Race and Social Problems, 6*(1), 4-14.

Lee, S., Lu, C., Jung, M. Y., Baezconde-Garbanati, L., & Juon, H. (2014). Acculturation and cancer screening among Asian Americans: Role of health insurance and having a regular physician. *Journal of Community Health, 39*(2), 201-212. doi:10.1007/s10900-013-9763-0

Lee, H. Y., Ju, E., Vang, P. D., & Lundquist, M. (2010). Breast and cervical cancer screening among Asian American women and Latinas: Does race/ethnicity matter? *Journal of Women's Health, 19*(10), 1877-1884. doi:10.1089/jwh.2009.1783

Lee, H. Y., Lundquist, M., Ju, E., Luo, X., & Townsend, A. (2011). Colorectal cancer screening disparities in Asian Americans and Pacific Islanders: Which groups are most vulnerable? *Ethnicity & Health, 16*(6), 501-518. doi:10.1080/13557858.2011.575219

Maxwell, A. E., Crespi, C. M., Antonio, C. M., & Lu, P. (2010). Explaining disparities in colorectal cancer screening among five Asian ethnic groups: A population-based study in California. *BioMed Central Cancer, 10*, 214 – 222.

McCracken, M., Olsen, M., Chen Jr., M. S., Jemal, A., Thun, M., Cokkinides, V., Deapen, D., & Ward, E. (2007). Cancer incidence, mortality, and associated risk factors among Asian Americans of Chinese, Filipino, Vietnamese, Korean, and Japanese ethnicities. *A Cancer Journal for Clinicians, 57*(4), 190-205. doi:10.3322/canjclin.57.4.190

Miller, B. A., Chu, K. C., Hankey, B. F., & Ries, L. A. G. (2008). Cancer incidence and mortality patterns among specific Asian and Pacific-Islander population in the U.S. *Cancer Causes Control, 19*, 227-256. doi:10.1007/s10552-007-9088-3

Oh, K. M., Zhou, Q., Kreps, G. L., & Ryu, S. K. (2012). Breast cancer screening practices among Asian Americans and Pacific Islanders. *Journal of American Health Behavior, 36*(5), 711-722. doi:http://dx.doi.org/10.5993/AJHB.36.5.13

Ritvo, P., Myers, R, E., Paszat, L., Serenity, M., Perez, D. F., & Rabeneck, L. (2013). Gender differences in attitudes impeding colorectal cancer screening. *BioMed Central Public Health, 13*(1), 1-14. doi:10.1186/1471-2458-13-500

Slattery, M. L., Kinney, A. Y., & Levin, T. R. (2004). Factors associated with colorectal cancer screening in a population-based study: The impact of gender, healthcare source, and time. *Preventive Medicine, 38*(3), 276-283. doi:10.1016/j.ypmed.2003.11.009

Stanley, S. L., King, J. B., Thomas, C. C., & Richardson, L. C. (2013). Factors associated with never being screened for colorectal cancer. *Journal of Community Health, 38*, 31-39. doi:10.1007/s10900-012-9600-x

Tang, T. S., Solomon, L. J., & McCracken, L. M. (2001). Barriers to fecal occult blood testing and sigmoidoscopy among older Chinese-American women. *Cancer Practice, 9*(6), 277-282.

U.S. Preventive Services Task Force. (2016) Screening for colorectal cancer: US preventive services task force recommendation statement. *Journal of the American Medical Association, 315*(23), 2564-2575. doi: 10.1001/jama.2016.5989

Wong, R. K., Wong, M. L., Chan, Y. H., Feng, Z., Wai, C. T., & Yeoh, K. G. (2013). Gender differences in predictors of colorectal cancer screening uptake: A national cross sectional study based on the health belief model. *BioMed Central, 13*, 677.

Wong, S. T., Gildengorin, G., Nguyen, T., & Mock, J. (2005). Disparities in colorectal cancer screening rates among Asian Americans and non-Latino Whites. *Cancer, 104*(12),

2940 - 2947. doi:10.1002/cncr.21521

Chapter 4: Factors Associated with Physician Recommendation for Colorectal Cancer Screening among Asian Americans

Introduction

Colorectal cancer (CRC) has been a significant contributor of cancer mortality for Asian American (AA) men and women, accounting for the second leading cause of cancer mortality for men and the third among women (Jun & Oh, 2013; McCracken et al., 2007). CRC contributes significantly to cancer mortality despite the fact that current recommendations in screening adherence have proven to decrease the burden of CRC by finding and removing precancerous polyps before it develops into cancer (United States Preventive Services Task Force [USPSTF], 2015).

AA are less likely to screen for CRC compared to non-Hispanic White (Lee, Lundquist, Ju, Luo, & Townsend, 2011; Wong, Gildengorin, Nguyen, & Mock, 2005). This notion is coincided by their low screening rate when compared to non-Hispanic White (Lee et al., 2011; Liss & Baker, 2014; Oh, Zhou, Kreps, & Ryu, 2012; Wong et al., 2005). When the AA population is disaggregated, further disparities in screening practices are exposed (Homayoon, Shahidi, & Cheung, 2013; Maxwell & Crespi, 2008). For instance, Maxwell and Crespi (2008) have found that Japanese had comparable screening rates to non-Hispanic White and the highest screening rate when compared to other AA subgroups. On the other hand, Koreans had the lowest screening rates particularly for fecal occult blood test (FOBT) and either endoscopic procedures (flexible sigmoidoscopy [FSIG] or colonoscopy); and were the only subgroup to experience a significant decline in CRC screening (Maxwell & Crespi, 2008).

Primary care physicians (PCP) can play a critical role throughout a patient's decision making process on whether to undergo screening or not (Brawarsky, Brooks, Mucci, & Wood,

2004; Gennarelli et al., 2004). In as such, studies have emphasized the importance of their role in increasing CRC screening rates (Ferrer, Ramirez, Beckman, Danao, & Ashing-giwa, 2010; Jo, Maxwell, Wong, & Bastani, 2008; Teng, Friedman, & Green, 2006). For instance, one consistent reason that patients, regardless of race/ethnicity, report not having a cancer screening test is due to not being aware of the need for CRC screening and not receiving a recommendation by their PCP (Seeff et al., 2004). In turn, a study examining the association between patient-provider communication and compliance with CRC screening among a nationally representative sample of U.S. adults found that CRC screening discussion with a provider, including a recommendation for a specific screening modality (i.e., FOBT, FSIG, or colonoscopy), improved compliance with CRC screening guidelines (Laiyemo et al., 2014). According to the U.S. Preventive Services Task Force (USPSTF, 2015), the following three screening modalities, FOBT (annually), FSIG (5x/year), and colonoscopy (once every 10 years) are recommended for CRC screening adherence. It is important to note that the three screening modalities differ in regards to their nature (i.e., non-invasive procedure or invasive procedure), screening preparation required on behalf of the patient, and general benefits and costs of undergoing the screening (National Cancer Institute [NCI], 2016). Despite the options in screening modalities, receiving a recommendation by a PCP has been identified as a powerful predictor to CRC screening compliance (Aragones, Trinh-Shevrin, & Gany, 2009; Chacko, Macaron, & Burke, 2015; Honda, 2004; Klabunde et al., 2005). However, studies indicate suboptimal compliance to CRC screening guidelines by PCP as a barrier to CRC screening. (Bodle et al., 2012; Jo, Maxwell, Rick, Cha, & Bastani, 2009). Even PCP have cited lack of physician recommendation as a barrier to CRC screening (Klabunde et al., 2005). Furthermore, Holden, Jonas, Porterfield, Reuland, and Harris (2010) have suggested that when provider-patient discussion is held, it often

includes a recommendation for only colonoscopy, which further limits patients' awareness and knowledge of other effective screening modalities.

Various patient level predictors for CRC screening including sociodemographic, cultural, and access to healthcare factors have been shown to predict physician's screening recommendations (Bodle et al., 2012; Coughlin & Thompson, 2005; Jo et al., 2009). For instance, Coughlin and Thompson's (2005) study found the following factors are associated with physician's screening recommendations: age, non-White race/ethnicity, education, time since immigration, access to healthcare, income, and having seen a specialist physician. Another study revealed that respondents who were not current with CRC screening and who had visited a doctor in the past year or who had no health insurance, were more likely to report lack of physician recommendation as the main reason why they were not current with screening (Klabunde et al., 2005). Lower education attainment and nativity (i.e., born in the U.S.) were also shown to have impacts on lack of physician recommendation (Klabunde et al., 2005).

It is important to note that AA subgroups' demographic, socioeconomic, cultural characteristic, and access to healthcare vary substantially (Goel et al., 2003; McCracken et al., 2007; Stanley, King, Thomas, & Richardson, 2013). Tang, Solomon, Yeh, and Worden (1999) stated that the concept of acculturation is relevant for AA because the perception of culture consists of both the American culture and the culture of the host country. As such, studies have measured the multifaceted concept of culture to include respondents' ethnicity, nativity, number of years lived in the U.S., and English proficiency (Manne, Steinberg, Delnevo, Ulpe, & Sorice, 2015). Foreign born individuals, in particular, have increased likelihood of experiencing barriers with measures of access to healthcare such as lack of health insurance (Goel et al., 2003). Although having healthcare insurance has been identified as an important predictor to screening

practice, a systematic review found that having healthcare insurance may not be enough to improve screening behavior and that engagement with physicians and other health care system is needed to facilitate screening (Holden et al., 2010). Studies have supported this notion with findings that suggested general lack of awareness of Western preventative healthcare among Asians may be the main driver of suboptimal CRC screening rather than access to healthcare (Homayoon et al., 2013; Teng, Friedman, & Green, 2006). Moreover, irrespective of insurance status, physician recommendation for CRC screening can increase the likelihood of screening completion (Doubeni et al., 2010; Homayoon et al., 2013; Teng, Friedman, & Green, 2006). Further investigation of physician's screening recommendations for CRC screening among AA subgroups and the facilitators and barriers associated with it is needed.

Research Aim

This study aims to 1) examine the proportion of respondents who had not received a physician's recommendation for CRC screening among Chinese, Filipino, Japanese, Korean, and Vietnamese, 2) examine ethnic variances in physician's recommendation, and 3) examine factors associated with physician's recommendation. Examining the factors associated with physician's recommendation for CRC screening may shed light on the most disadvantaged AA ethnic subgroups and highlight areas for targeted interventions.

Methodology

Study Design

The data used in this analysis was from the 2009 California Health Interview Survey (CHIS) public-use adult data file with interviews conducted between September 2009 and April 2010. CHIS (2012) is conducted by the UCLA Center for Health Policy Research in collaboration with the California Department of Public Health and the Department of Health

Care Services. CHIS is the largest random-dial telephone state health survey in the nation, providing a representative picture of the heath and health care needs of the diverse population in California (2012). Many historically under-surveyed groups were targeted with interviews being offered in different languages including Chinese (Mandarin and Cantonese dialects), Vietnamese, and Korean to capture California's diverse population (CHIS, 2012a).

Sample

Men and women age 50 and older from the following Asian American subgroups were included in the analysis: Chinese, Filipino, Japanese, Korean, and Vietnamese. The final, unweighted sample sizes were self-reported as 529 Chinese, 249 Filipino, 275 Japanese, 519 Korean, and 718 Vietnamese.

Measures

Dependent variable was physician's recommendation of CRC screening measured by "past 5 years doctor recommended colon tests: yes or no."

The primary independent variables were the respondents' *ethnicity* measured by UCLA definition of Asian subtypes (Chinese, Filipino, Japanese, Korean, and Vietnamese as the reference group). Other covariates included in the analyses included: 1) *age*, 2) *gender*, 3) *marital status* measured as married/living with partner vs. single (widowed, separated, divorced, and never married), 4) *education attainment* measured as low (grades 1-12, high school graduate, no formal education), medium (some college, vocational school, AA, BA), and high (some graduate school, MA, PhD), 5) *employment* measured as employed vs. unemployed, 6) *access to healthcare* (have insurance vs. no insurance), 7) *nativity* measured as born in U.S. vs born outside of U.S., 8) *limited English proficiency* (LEP) measured as low LEP (English speaking only/very well/well) and high LEP (not well/not at all).

Data Analysis

Using SPSS version 24.0, descriptive statistics were stratified by each AA ethnic subgroup (Chinese, Filipino, Japanese, Korean, and Vietnamese) indicating their respective frequencies and percentages by physician's recommendation of colorectal screening (i.e., yes vs. no). Simple logistic regressions were used to examine any significant ethnic differences in doctor's recommendations. Finally, multiple logistic regression analyses were used to examine the associations between doctor's recommendation and ethnicity, controlling for socio-demographic, cultural, and healthcare related variables. All reported odds ratios (ORs) were considered statistically significant at the $p \leq 0.05$ level.

Results

Table 1.10 shows the similarities as well as notable differences regarding the characteristics between the AA ethnic subgroups. For instance, majority of individuals across the subgroups have health insurance. Also, across all the subgroups, majority of the individuals were born outside of the U.S., except for Japanese (79.6% born in U.S.). In terms of LEP, majority of Korean and Vietnamese reported high LEP (72.8% and 70.9% respectively), while approximately half of Chinese reported low LEP and higher percentages of Filipino and Japanese reported low LEP.

Table 1.10. Participants' Characteristics

		Chinese n (%) (N = 529)	Filipino n (%) (N = 249)	Japanese n (%) (N = 275)	Korean n (%) (N = 519)	Vietnamese n (%) (N = 718)	Chi-Square
Sex	Male	237 (44.8%)	78 (31.3%)	114 (41.5%)	191 (36.8%)	378 (52.6%)	49.74***
	Female	292 (55.2%)	171 (68.7%)	161 (58.5%)	328 (63.2%)	340 (47.4%)	
Marital Status	Married	370 (69.9%)	162 (65.1%)	148 (53.8%)	369 (71.1%)	528 (73.5%)	39.53***

	Single	159 (30.1%)	87 (34.9%)	127 (46.2%)	150 (28.9%)	190 (26.5%)	
Education	Low	137 (25.9%)	39 (15.7%)	63 (22.9%)	188 (36.2%)	410 (57.1%)	295.80***
	Medium	247 (46.7%)	180 (72.3%)	155 (56.4%)	247 (47.6%)	268 (37.3%)	
	High	145 (27.4%)	30 (12.0%)	57 (20.7%)	84 (16.2%)	40 (5.6%)	
Employment Status	Employed	272 (51.4%)	133 (53.4%)	100 (36.4%)	168 (32.4%)	278 (38.7%)	59.07***
	Unemployed	257 (48.6%)	116 (46.6%)	175 (63.6%)	351 (67.6%)	440 (61.3%)	
Access to Healthcare	Have insurance	479 (90.5%)	241 (96.8%)	264 (96.0%)	424 (81.7%)	645 (89.8%)	61.50***
	No insurance	50 (9.5%)	8 (3.2%)	11 (4.0%)	95 (18.3%)	73 (10.2%)	
Nativity	Born in U.S.	100 (18.9%)	22 (8.8%)	219 (79.6%)	13 (2.5%)	1 (0.1%)	1072.95***
	Born outside U.S.	429 (81.1%)	227 (91.2%)	56 (20.4%)	506 (97.5%)	717 (99.9%)	
Limited English Proficiency (LEP)	Low LEP	214 (51.6%)	173 (89.6%)	61 (84.7%)	134 (27.2%)	205 (29.1%)	342.31***
	High LEP	201 (48.4%)	20 (10.4%)	11 (15.3%)	359 (72.8%)	500 (70.9%)	

*** $p \leq .001$

Table 1.11 provides a snapshot of whether each of the AA subgroups have ever undergone CRC screening. Approximately half of Chinese, Filipino, and Vietnamese had a FOBT. More than half of Japanese (60.4%) had FOBT while only about a third of Koreans (32%) had FOBT. Across all the subgroups, majority of the individuals never had FSIG. About half of Chinese, Filipino, Korean, and Vietnamese had a colonoscopy, while more than half of Japanese (60.4%) had a colonoscopy.

Table 1.11. Frequency and Percentages for Ever Having FOBT, FSIG and Colonoscopy by

AA Subgroups

	Ever had FOBT		Ever had FSIG		Ever had colonoscopy	
	Yes	No	Yes	No	Yes	No
Chinese (N = 529)	270 (51.1%)	259 (49.0%)	156 (29.5%)	373 (70.5%)	272 (51.4%)	257 (48.6%)
Filipino (N = 249)	131 (52.6%)	118 (47.4%)	76 (30.5%)	173 (69.5%)	122 (49.0%)	127 (51.0%)
Japanese (N = 275)	166 (60.4%)	109 (39.6%)	106 (38.5%)	169 (61.5%)	166 (60.4%)	109 (39.6%)
Korean (N = 519)	166 (32.0%)	353 (68.0%)	67 (12.9%)	452 (87.1%)	290 (55.9%)	229 (44.1%)
Vietnamese (N = 718)	394 (54.9%)	324 (45.1%)	145 (20.2%)	573 (79.8%)	347 (48.3%)	371 (51.7%)
Chi-Square	86.38***		87.10***		15.621**	

*** $p \leq .001$, ** $p \leq .01$

Approximately half of Chinese, Filipino, and Vietnamese (54.6%, 53.8%, and 54%, respectively) reported not having a physician recommendation for CRC screening in the past 5 years. Close to 70% of the Korean sample reported not having a physician recommendation. Only for Japanese sample, a higher proportion of respondents (close to 60%) reported having had a physician recommendation. (Refer to Table 1.12).

Table 1.12. Frequency and Percentages for Having a Physician Recommendation for CRC Screening in the Past 5 years

	YES	NO
Chinese (N = 529)	240 (45.4%)	289 (54.6%)
Filipino (N = 249)	115 (46.2%)	134 (53.8%)
Japanese (N = 275)	162 (59.1%)	112 (40.9%)

Korean (N = 519)	158 (30.4%)	361 (69.6%)
Vietnamese (N = 718)	330 (46.0%)	387 (54.0%)
Chi-Square	66.25***	

*** $p \leq .001$

Across all the AA ethnic subgroups, one of the top three reasons for not having FSIG or colonoscopy was because "doctor didn't tell them." In turn, this was the main reason given by Filipino. "No reason/never thought of it" was the number one reason given by Chinese, Japanese, and Korean and "haven't had any problems" was the main reason given by Vietnamese. (Refer to Table 1.13).

Table 1.13. Frequency and Percentages for the Main Reason for Not Having FSIG or Colonoscopy in Past 10 years

	Chinese (N = 529)	Filipino (N = 249)	Japanese (N = 275)	Korean (N = 519)	Vietnamese (N = 718)
No reason/Never thought of it	40 (28.6%)	16 (24.6%)	19 (33.9%)	60 (32.8%)	37 (19.3%)
Didn't know if needed	9 (6.4%)	5 (7.7%)	2 (3.6%)	18 (9.8%)	8 (4.2%)
Doctor didn't tell me	26 (18.6%)	19 (29.2)	15 (26.8%)	25 (13.7%)	37 (19.3%)
Haven't had any problems	39 (27.9%)	11 (16.9%)	4 (7.1%)	57 (31.1%)	63 (32.8%)
Put it off/Laziness	6 (4.3%)	5 (7.7%)	10 (17.9%)	5 (2.7%)	8 (4.2%)
Too expensive/ No insurance/ Cost	10 (7.1%)	5 (7.7%)	5 (8.9%)	14 (7.7%)	27 (14.1%)
Too painful/Unpleasant/Embarrassing	7 (5.0%)	2 (3.1%)	0 (0.0%)	3 (1.6%)	8 (4.2%)

Had another type of CRC exam	1 (0.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Don't have a doctor	2 (1.4%)	2 (3.1%)	1 (1.8%)	1 (0.5%)	4 (2.1%)
Other	29 (17.2%)	19 (22.6%)	13 (18.8%)	17 (8.5%)	44 (18.6%)

Simple logistic regression showed that when compared to Vietnamese (reference group), Japanese have decreased odds of receiving a physician recommendation for CRC screening (OR = .590, p = .000) and Koreans have increased odds (OR = 1.948, p = .000) (Data not shown). After controlling for all the other covariates, Chinese, Filipino, and Koreans had increased odds of having physician recommendation (OR = 1.478, p = .004; OR = 1.457, p = .040; OR = 1.991, p = .000, respectively) and Japanese was no longer statistically significant when compared to Vietnamese. Having insurance and having high LEP decreased the odds of receiving a physician recommendation for CRC (OR = .486, p = .000; OR = .675, p = .001). (Refer to Table 1.14).

Table 1.14. Multiple Logistic Regression for Receiving a Physician Recommendation for CRC Screening

Variables		B	S.E.	OR (95% CI)
Ethnicities	Chinese	.391	.136	1.478 (1.132 – 1.930)**
	Filipino	.377	.183	1.457 (1.018 – 2.086)*
	Japanese	-.033	.309	.968 (.528 – 1.774)
	Korean	.688	.133	1.991 (1.532 – 2.586)***
	Vietnamese	reference		
Age		.000	.006	1.000 (.988 – 1.013)

Gender	Male	-.002	.105	.998 (.813 – 1.226)
	Female	reference		
Marital Status	Married	.114	.113	1.121 (.893 – 1.398)
	Single	reference		
Education	Low	.266	.175	1.305 (.927 – 1.838)
	Medium	.261	.154	1.299 (.961 – 1.755)
	High	reference		
Employment Status	Employed	.050	.121	1.051 (.828 – 1.333)
	Unemployed	reference		
Access to Healthcare	Yes	-.722	.174	.486 (.345 - .684)***
	No	reference		
Nativity	Born in U.S.	-.110	.318	.896 (.481 – 1.669)
	Born outside U.S.	reference		
LEP	High	-.394	.123	.675 (.530 - .858)***
	Low	reference		

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Unique factors were shown to be associated with physician recommendation for each AA ethnic subgroups. For Chinese, having high LEP decreased the odds (OR = .352, $p = .000$), Filipino, being employed decreased the odds (OR = .430, $p = .032$), and for Koreans, having insurance decreased the odds (OR = .389, $p = .004$). There were no statistically significant factors for Japanese and Vietnamese. (Refer to Table 1.15).

Table 1.15. Multiple Logistic Regression for Receiving a Physician Recommendation for CRC Screening by AA Subgroups

Variables			B	S.E.	OR (95% CI)
Chinese (N = 415)	Age		.005	.014	1.005 (.978 – 1.034)
	Gender (male)		-.236	.226	.789 (.507 – 1.230)
	Marital Status (married)		.356	.248	1.428 (.878 – 2.322)
	Education	(low)	.457	.333	1.580 (.823 – 3.034)
		(medium)	.218	.278	1.243 (.721 – 2.144)
	Employment Status (employed)		-.031	.273	.969 (.567 – 1.655)
	Access to Healthcare (yes)		-.300	.362	.741 (.364 – 1.507)
	Nativity (born in U.S.)		.115	.453	1.122 (.462 – 2.724)
	LEP (high)		-1.045	.249	.352 (.216 - .573)***
Filipino (N = 193)	Age		.005	.020	1.005 (.966 – 1.046)
	Gender (male)		.306	.359	1.358 (.672 – 2.743)
	Marital Status (married)		.365	.353	1.441 (.721 – 2.879)
	Education	(low)	.786	.645	2.194 (.620 – 7.765)
		(medium)	-.134	.472	.875 (.347 – 2.204)
	Employment Status (employed)		-.843	.394	.430 (.199 - .931)*
	Access to Healthcare (yes)		-21.29	15002.82	.000 (.000 - .)
	Nativity (born in U.S.)		-20.75	40192.97	.000 (.000 - .)
	LEP (high)		-.185	.563	.831 (.276 – 2.506)
Japanese (N = 71)	Age		.029	.032	1.030 (.967 – 1.097)
	Gender (male)		-.024	.604	.976 (.299 – 3.189)

	Marital Status (married)		-.259	.581	.772 (.247 – 2.409)
	Education	(low)	-.889	.863	.411 (.076 – 2.233)
		(medium)	-.333	.676	.717 (.191 – 2.696)
	Employment Status (employed)		-.104	.686	.901 (.235 – 3.456)
	Access to Healthcare (yes)		-21.83	27269.97	.000 (.000 - .)
	Nativity (born in U.S.)		.093	.631	1.098 (.319 – 3.778)
	LEP (high)		-1.128	.806	.324 (.067 – 1.572)
Korean (N = 493)	Age		-.009	.014	.991 (.963 – 1.019)
	Gender (male)		.271	.238	1.312 (.822 – 2.092)
	Marital Status (married)		-.077	.249	.926 (.568 – 1.508)
	Education	(low)	.515	.331	1.673 (.874 – 3.202)
		(medium)	.146	.291	1.157 (.655 – 2.044)
	Employment Status (employed)		-.101	.258	.904 (.545 – 1.500)
	Access to Healthcare (yes)		-.945	.332	.389 (.203 - .745)**
	Nativity (born in U.S.)		-21.800	40192.97	.000 (.000 - .)
	LEP (high)		-.201	.244	.818 (.506 – 1.320)
Vietnamese (N = 704)	Age		-.010	.010	.990 (.971 – 1.010)
	Gender (male)		-.017	.165	.983 (.711 – 1.359)
	Marital Status (married)		.183	.183	1.201 (.840 – 1.718)
	Education	(low)	-.181	.380	.834 (.396 – 1.758)
		(medium)	.023	.366	1.023 (.499 – 2.098)
	Employment Status (employed)		.349	.190	1.417 (.976 – 2.058)

	Access to Healthcare (yes)	-.450	.271	.638 (.375 – 1.085)
	Nativity (born in U.S.)	NA		
	LEP (high)	-.186	.202	.830 (.559 – 1.233)

*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Discussion

CRC is a significant contributor to cancer mortality among both the AA population, as well as the disaggregated AA population (McCracken et al., 2007). Despite the options in recommended screening modalities, AA appear to underutilize screenings (Lee et al., 2011). This was confirmed by this study's findings: approximately half or less of the respondents within the Chinese, Filipino, Korean, and Vietnamese samples ever had a FOBT; majority across all the subgroups never had FSIG; and only about half of the Chinese, Filipino, Korean, and Vietnamese respondents reported ever having a colonoscopy. This study showed that FSIG is the most underutilized screening modality. This may suggest that FSIG is the screening modality least recommended by physicians. For respondents who had never had either of the endoscopic procedures (FSIG or colonoscopy) among all the AA subgroups, "doctor didn't tell me" was a top reason for not having either procedures. "No reason, never thought of it" and "haven't had any problems" were other top reasons, both which can be influenced by proper physician communication and education by physician.

PCP play an important role in CRC screening uptake. This study found differences in the proportions of AA who had not received a physician recommendation for CRC screening. Excluding Japanese, a higher proportion of individuals within the Chinese, Filipino, Korean, and Vietnamese samples reported not receiving a physician recommendation for CRC screening. Ethnic disparities in receiving physician recommendation for CRC screening were further

uncovered in this study. After controlling for all other covariates, Chinese, Filipino, and Koreans continued to have increased likelihood to receive physician recommendation for CRC screening than Vietnamese. Interestingly, this study found that having healthcare insurance decreased the odds of having physician recommendation. This contradicts previous studies that have mentioned the positive role of having healthcare insurance with physician recommendation for cancer screening among minority groups including African Americans and Hispanics (Ahmed et al., 2013; O'Malley et al., 2001). This suggests plausible differences in the role of having healthcare insurance when predicting the impacts of physician recommendation on CRC screening between and within racial/ethnic groups. Further examination is warranted when examining the role of having healthcare insurance and physician recommendation among AA subgroups. Similar to findings from a previous study examining LEP's role in physician recommendation for cancer screening among Hispanic women (De Alba & Sweningson, 2006), this study found having high LEP decreased the likelihood of receiving a CRC screening recommendation. This may be due to the additional challenges perceived by physicians when communicating with patients who have high LEP including time constraints and compounded barriers to patients' health literacy (De Alba & Sweningson, 2006; Tocher & Larson, 1999). For instance, individuals with high LEP are confronted with additional barriers to accessing and comprehending health information (Tu et al., 2008). Even when patients gain access to health information, language barriers may interfere with the physicians' ability to describe the screening procedure, and instead, some physicians may choose to postpone or omit a recommendation for a screening (De Alba & Sweningson, 2006). Having high LEP is common among AA groups (Sentell et al., 2013); however, its role in receiving physician recommendation for CRC screening is less understood, specifically among AA ethnic groups. Further investigation is warranted to understand its impacts on physician

recommendation.

This study revealed different factors to be influential in physician recommendation for CRC screening for each of the AA subgroups. Recognizing how and why certain factors support and inhibit physician recommendation is an important preliminary step when aiming to improve physician's significant role in promoting screening uptake. Further research is needed to understand the characteristics of specific AA subgroups who are most disadvantaged to receiving CRC screening recommendation by physicians. In turn, these preliminary steps may inform clinical training for physicians and other appropriate healthcare workers to promote the initiation and the quality of CRC screening discussions with their patients to support screening behavior.

Limitations

This study used the 2009 CHIS dataset based in California. This dataset was self-reported and cross-sectional in design which may have been to subjected to recall bias. In addition, findings in this study may only be relevant to AA subgroups in California and not to AA ethnic groups in other U.S. states. Furthermore, the 2009 CHIS data did not include specific physician level measurements. Thus, questions regarding physicians' characteristics, perspectives on CRC screening recommendations, and reasons why they are likely or unlikely to recommend screening cannot be addressed in this study. Future studies should investigate larger sample sizes of AA subgroups to assure adequate power in data analyses and to achieve enhanced understanding of important factors that influence physician's recommendation.

References

Ahmed, N. U., Pelletier, V., Winter, K., & Albatineh, A. N. (2013). Factors explaining racial/ ethnic disparities in rates of physician recommendation for colorectal cancer screening. *American Journal of Public Health, 103*(7), e91-e99.

Aragones, A., Trinh-Shevrin, C., & Gany, F. (2009). Cancer screening practices among physicians serving Chinese immigrants. *Journal of Health Care for the Poor and Underserved, 20*(1), 64-73.

Bodle, E. E., Islam, N., Kwon, S. C., Zojwalla, N., Ahsan, H., & Senie, R. T. (2012). Cancer screening practices of Asian American physicians in New York City. *Journal of Immigrant Minority Health, 10*(3), 239-246. doi: 10.1007/s10903-007-9077-3

Brawarsky, P., Brooks, D. R., Mucci, L.A., & Wood, P. A. (2004). Effect of physician Recommendation and patient adherence on rates of colorectal cancer testing. *Cancer Detection and Prevention, 28*(4), 260-268.

California Health Interview Survey [CHIS]. (2011). About the California Health Interview Survey. Survey design and methods: CHIS data quality. Retrieved from http://www.chis.ucla.edu/dataquality.html

California Health Interview Survey [CHIS]. (2012). California Health Interview Survey: Overview. Retrieved from http://healthpolicy.ucla.edu/chis/about/Pages/about.aspx

California Health Interview Survey [CHIS]. (2012a). CHIS 2009 Adult Survey. UCLA Center for Health Policy Research. Los Angeles, CA: November 2012.

Chacko, L., Macaron, C., & Burke, C. A. (2015). Colorectal cancer screening and prevention in women. Digestive Diseases and Sciences, 60(3), 698-710. doi: 10.1007/s10620-014-3452-4

Coughlin, S. S. & Thompson, T. (2005). Physician recommendation for colorectal cancer screening by race, ethnicity, and health insurance status among men and women in the United States, 2000. *Health Promotion Practice, 6*(4), 369-378. doi: 10.1177/1524839905278742

De Alba, I. & Sweningson, J. M. (2006). English proficiency and physician's recommendation of pap smears among Hispanics. *Cancer Detection and Prevention, 30*(3), 292-296.

Ferrer, R. R., Ramirez, M., Beckman, L. J., Danao, L. L., Ashing-giwa, K. T. (2011). The impact of cultural characteristics on colorectal cancer screening adherence among Filipinos in the United States: A Pilot Study. *Psycho-Oncology, 20*(8), 862-870.

Gennarelli, M., Jandorf, L., Cromwell, C., Valdimarsdottir, H., Redd, W., & Itzkowitz, S. (2004). Barriers to colorectal cancer screening: Inadequate knowledge by physicians. *The Mount Sinai Journal of Medicine, 72*(1), 36-44.

Goel, M., Wee, C., McCarthy, E., Davis, R., Ngo-Metzger, Q., & Phillips, R. (2003). Racial and ethnic disparities in cancer screening the importance of foreign birth as a barrier to care. *Journal of General Internal Medicine*, *18*(12), 1028-1035.

Holden, D. J., Jonas, D. E., Porterfield, D. S., Reuland, D., & Harris, R. (2010). Systematic review: Enhancing the use and quality of colorectal cancer screening. Annals of Internal Medicine, 152(10), 668-676. doi: 10.7326/0003-4819-152-10-201005180-00239

Homayoon, B., Shahidi, N. C., & Cheung, W. Y. (2013). Impact of Asian ethnicity on colorectal cancer screening: A population-based analysis. American Journal of Clinical Oncology, 36(2), 167-173. doi: 10.1097/COC.0b013e3182439068

Honda, K. (2004). Factors associated with colorectal cancer screening among the U.S. urban Japanese population. *American Journal of Public Health*, *94*(5), 815-822.

Jo, A. M., Maxwell, A. E., Rick, A. J., Cha, J. & Bastani, R. (2009). Why are Korean American physicians reluctant to recommend colorectal cancer screening to Korean American patients? Exploratory interview findings. *Journal of Immigrant Minority Health, 11*(4), 302-309. doi: 10.1007/s10903-008-9165-z

Jun, J. & Oh, K. M. (2013). Asian and Hispanic Americans' cancer fatalism and colon cancer screening. *American Journal Health Behavior*, *37*(2), 145-154. doi: 10.5993/AJHB.37.2.1

Klabunde, C. N., Vernon, S. W., Nadel, M. R., Breen, N., Seeff, L. C., & Brown, M. L. (2005). Barriers to colorectal cancer screening: A comparison of reports from primary care physicians and average-risk adults. *Medical Care, 43*(9), 939-944.

Laiyemo, A. O., Adebogun, A. O., Doubeni, C. A., Ricks-Santi, L., McDonald-Pinkett, S., Young, P. E., Cash, B. D., & Klabunde, C. N. (2014). Influence of provider discussion and specific Recommendation on colorectal cancer screening uptake among U.S. adults. *Preventive Medicine, 67*, 1-5.

Lee, H. Y., Lundquist, M., Ju, E., Luo, X., & Townsend, A. (2011). Colorectal cancer screening disparities in Asian Americans and Pacific Islanders: Which groups are most vulnerable? *Ethnicity & Health*, *16*(6), 501-518. doi: 10.1080/13557858.2011.575219

Liss, D. T. & Baker, D. W. (2014). Understanding current racial/ethnic disparities in colorectal cancer screening in the United States: The contribution of socioeconomic status and access to care. *American Journal of Preventive Medicine*, *46*(3), 228-236. doi: 10.1016/j.amepre.2013.10.023

Manne, S., Steinberg, M. B., Delnevo, C., Ulpe, R., & Sorice, K. (2015). Colorectal cancer screening among foreign-born South Asians in the Metropolitan New York/New Jersey

region. *Journal of Community Health, 40*(6), 1075-1083.

Maxwell, A. E. & Crespi, C. M. (2008). Trends in colorectal cancer screening utilization among ethnic groups in California: Are we closing the gap? *Cancer Epidemiology Biomarkers Prevention*, *18*(3), 752-759.

McCracken, M., Olsen, M., Chen Jr., M. S., Jemal, A., Thun, M., Cokkinides, V., Deapen, D., & Ward, E. (2007). Cancer incidence, mortality, and associated risk factors among Asian Americans of Chinese, Filipino, Vietnamese, Korean, and Japanese ethnicities. *A Cancer Journal for Clinicians*, *57*(4), 190-205. doi: 10.3322/canjclin.57.4.190

National Cancer Institute [NCI]. (2016). Colorectal cancer: Tests to detect colorectal cancer and polyps. Retrieved from https://www.cancer.gov/types/colorectal/screening-fact-sheet

Oh, K. M., Zhou, Q., Kreps, G. L., & Ryun, S. K. (2012). Breast cancer screening practices among Asian Americans and Pacific Islanders. Journal of American Health Behavior, 36(5), 711-722. doi: http://dx.doi.org/10.5993/AJHB.36.5.13

O'Malley, M. S., Earp, J. A., Hawley, S. T., Schell, M. J., Mathews, H. F., & Mitchell, J. (2001). The association of race/ethnicity, socioeconomic status, and physician recommendation for mammography: who gets the message about breast cancer screening? *American Journal of Public Health, 91*(1), 49-54.

Seeff, L. C., Nadel, M. R., Klabunde, C. N., Thompson, T., Shapiro, J. A., Vernon, S. W., & Coates, R. J. (2004). Patterns and predictors of colorectal cancer test use in the adult U.S. population. *Cancer, 100*, 2093-2103. doi: 10.1002/cncr.20276

Sentell, T., Braun, K. L., Davis, J., & Davis, T. (2013). Colorectal cancer screening: Low health literacy and limited English proficiency among Asians and Whites in California. *Journal of Health Communication, 18*, 242-255.

Stanley, S. L., King, J. B., Thomas, C. C., & Richardson, L. C. (2013). Factors associated with never being screened for colorectal cancer. *Journal of Community Health*, *38*, 31-39. doi: 10.1007/s10900-012-9600-x

Tang, T. S., Solomon, L. J., Yeh, J. C., & Worden, J. K. (1999). The role of cultural variables in breast self-examination and cervical cancer screening behavior in young Asian women living in the United States. *Journal of Behavioral Medicine, 22*(5), 419-436.

Teng, E. J., Friedman, L. C., & Green, C. E. (2006). Determinants of colorectal cancer screening behavior among Chinese Americans. *Psycho-Oncology, 15*, 374-381. doi: 10.1002/pon.958

Tocher, T. M. & Larson, E. B. (1999). Do physicians spend more time with non-English speaking patients? *Journal of General Internal Medicine, 14*, 303-309.

Tu, S. P., Yip, M. P., Chun, A., Choe, J., Bastani, R., &Taylor, V. (2008). Development of intervention materials for individuals with limited English proficiency: Lessons learned from "colorectal cancer screening in Chinese Americans." *Medical Care, 46*, S51-S61.

U.S. Preventive Services Task Force (USPSTF). (2015). Colorectal Cancer: Screening. Retrieved from http://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/colorectal-cancer-screening?ds=1&s=colorectal%20cancer

Wong S. T., Gildengorin, G., Nguyen, T., & Mock, J. (2005). Disparities in colorectal cancer screening rates among Asian Americans and non-Latino Whites. *Cancer*, *104*(12), 2940-2947. doi: 10.1002/cncr.215

Chapter 5: Conclusion

This dissertation aims to advance the knowledge regarding colorectal cancer screening practice (CCSP) among the disaggregated Asian American (AA) population. In turn, the vision is to incorporate findings from this dissertation with existing literature to inform intervention efforts in CCSP promotion among AA subgroups.

Findings from this dissertation support the notion that CRC screening is a complex behavior as evidenced by the findings in Study 1, 2, and 3. This is suggested by AA subgroups' CRC screening disparities, as well as the unique factors experienced by distinct AA subgroups that may exacerbate the screening disparities. The disaggregation of the AA population was a key focus in this dissertation for important reasons. First, research studies have reported that the examination of health behavior and outcomes among the aggregated AA population "masked" health disparities experienced by distinct AA subgroups (Chen, 2005; Holland & Palaniappan, 2012). Thus, the disaggregation of the AA population was a fundamental step for this dissertation to showcase the different determinants to undergoing CRC screening between subgroups as well as to reveal unique determinants to CRC screening within the subgroups. In as such, the aims of this dissertation were threefold and articulated in three distinct studies. Study 1, *Unraveling the Determinants to Colorectal Cancer Screening among Asian Americans: A Systematic Literature Review* systematically reviewed and synthesized literature on facilitators and barriers to CRC screening across four AA subgroups (i.e., Chinese, Filipino, Korean, and Japanese). Study 2, *Colorectal Cancer Screening Practices among Asian Americans in Hawai'i : Does Ethnicity and Gender Matter?* specifically examined the three largest AA subgroups in Hawai'i (i.e., Filipino, Japanese, and Chinese). Finally, Study 3, *Factors Associated with Physician Recommendation for Colorectal Cancer Screening among Asian Americans* focused

on the following subgroups, Chinese, Filipino, Japanese, Korean, and Vietnamese in California.

Determinants of health encompasses the interrelations of various factors ranging from an individual level to environmental level and is understood to influence both individual's and community's health status (Office of Disease Prevention and Health Promotion [ODPHP], 2014; World Health Organization [WHO], 2017). Findings from this dissertation supported the notion that the context of people's lives matter when examining AA subgroups' CCSP. For instance, findings from Study 1 identified culture as a potentially important factor for both Chinese and Japanese, but with different emphasis due to the different conceptualizations used for culture. For Chinese, questions arose as to how culture, and more specifically, acculturation is measured when aiming to understand its impacts on CCSP; whereas for Japanese, the acknowledgment of Japanese as a sociocentric ethnic group was discussed and the influential roles of subjective norm and social support from family and friends were suggested to be more important factors to consider when optimizing CRC screening adherence efforts. Additionally, for Chinese, important psychological constructs were noted to be important, and if addressed through appropriate psychoeducation and community-level outreach, they may promote increased CRC screening behavior.

Healthcare-related factors appeared to be important for Filipino, Korean, and Japanese but for different reasons. Among Koreans, access to healthcare and the role of having healthcare insurance warrants further investigation in determining its impacts on CRC screening behavior, whereas for Filipino and Japanese, patient-provider relations (e.g., quality of patient-provider communication) may be important areas to further investigate and potentially strengthen for improved outcomes in CCSP.

Study 2 brought to light the complicated role gender may have on AA when deciding to

undergo CRC screening. A notable finding from this study indicated that gender-specific approaches may be beneficial when aiming to promote CCSP among Japanese. However, with due consideration for individual's knowledge of CRC screening modalities and their preferred modality, the continued examination of gender's role in CCSP should be aimed to understand the decision-making process of how and why certain screening modalities are selected and executed.

In aiming to understand the determinants to AA subgroup's CCSP, Study 3 embarked on a slightly different approach in that it did not examine CRC screening as the outcome variable, but rather, physician's recommendation to CRC screening as the outcome variable. A notable finding was that higher proportions of Chinese, Filipino, Korean, and Vietnamese reported not having a physician recommendation for CRC screening. The exception was among Japanese of which a higher proportion reported receiving physician recommendation. Moreover, cultural factor such as limited English proficiency (LEP) played a significant role in physician recommendation among Chinese. For Filipino and Korean, different factors including being employed for Filipino and having healthcare insurance for Koreans showed to decrease the likelihood of receiving a physician recommendation.

It is evident that different factors influence AA subgroups' CCSP and to varying degrees. Researchers should remain cognizant of unique factors that play a more influential role in AA subgroups' decision to undergo and complete CRC screening. This may be critical when developing and implementing tailored interventions with specific AA subgroups.

Research Recommendations

Currently in research literature, efforts to collect data on the disaggregated AA population have gone underway. This was in response to the growing awareness and concern of inaccurately representing AA subgroups' health behaviors and outcomes due to the aggregation of AA data

samples. Misinterpretation of AA subgroups' health can consequently lead to improper allocations of resources to address healthcare needs if resources are provided at all (Srinivasan & Guillermo, 2000). Hence, researchers have advocated for the necessity of maintaining concerted efforts in maximizing the data collection of distinct AA subgroups to understand the health needs, behaviors, and outcomes of this extremely diverse population (Holland & Palaniappan, 2012; Srinivasan & Guillermo, 2000).

Holland and Palaniappan (2012) state that the "disaggregation of AA population is only the first step in providing meaningful health data for this group" (p. 397). Opportunities to advance the implementation of quality research studies on CCSP among AA using rigorous study designs and sampling methods are presented for researchers and community-based organizations. If optimized, great potential to advance research and community's knowledge base in developing effective and appropriate interventions can be achieved. Community-based participatory research (CBPR) can continue to play a pivotal role here utilizing the fundamental approach of building a trusting and respectable rapport with ethnic communities (Agency for Healthcare Research and Quality [AHRQ], 2014). By designating AA ethnic communities as equal partners in research studies, communities can feel empowered by their experience with researchers and promote their willingness to participate in research studies that can support a more accurate investigation of AA subgroup's CCSP. The investment to initiate, support, and strengthen the bridge between research and ethnic communities can lead to promising longstanding developments in reducing CRC screening disparities across AA subgroups. The benefits of utilizing a CBPR approach is its capacity to be implemented throughout the research study (i.e., various study designs including qualitative and quantitative, data collection methods, data analyses, and dissemination of findings) (AHRQ, 2014). Thus, conducting research studies

that maintains a perspective on combining scientific rigor and ethnic community's wisdom and realities may be the best approach when addressing health disparities (Gehlert & Coleman, 2010).

An important finding to further investigate is the operationalization of culture which typically includes acculturation measurements. Each of the three studies in this dissertation made mention of culture's likely intersection with various other factors that can impact CCSP. For instance, although Study 2 did not include cultural measures in its analyses, previous studies have shown that higher acculturation level is associated with cancer screening among Asians (Jun & Oh, 2013). This understanding was used to provide an explanation for the low screening participation experienced among Filipino in Study 2 as they are the most recent immigrant group to migrate to Hawai'i (Hawai'i: Cancer Facts & Figures, 2010). In addition, LEP had different associations with CRC screening by AA subgroups, as well as with physician's recommendation for CRC screening in Study 1 and Study 3 respectively. These cultural factors have been linked to various other factors (i.e., socioeconomic status, access to healthcare, health literacy) that can exacerbate the barriers experienced to undergoing CCSP. Nevertheless, a notable observation in this dissertation was the seemingly under examination of one's host culture's health advantages and potentially facilitative role on CCSP, rather than the facilitative role of their higher acculturation level to U.S. A study by Kagawa-Singer, Dadia, Yu, and Surbone (2010) shared an essential reminder of the strengths-based definition of culture. It was further stated that despite the current efforts to practice cultural responsive care, the concept of culture remains ambiguous and insufficiently applied in the clinical setting (Kagawa-Singer et al., 2010). The multifaceted nature of culture is inclusive to the cultural/traditional practices or health advantages of one's host country. As such, the inclusion of AA subgroup's innate health advantages may be

beneficial in understanding that subgroup's decision-making patterns regarding CCSP. Moreover, the exposure of innate health advantages may shed light on important facilitators, that when properly acknowledged and fostered, may address the current and continued disparities observed in AA subgroup's CCSP. Findings from this dissertation begs the question, what culturally innate factors can serve as a facilitator to undergoing CCSP among AA subgroups? Future studies should examine this understudied lens of culture.

Another important finding that emerged in this dissertation when considering CCSP across the AA subgroups was the need for sufficient time from the physician or other appropriate healthcare workers. More specifically, sufficient time is needed to first initiate the conversation on CRC screening, next provide proper education about the screening options, and finally, engage the patient in the shared decision-making process in selecting the most appropriate screening modality that will yield a higher likelihood for completion of the screening. This was indicated in Study 1 and Study 3 findings: Study 1 findings indicated that having a physician recommendation increased the likelihood for having CRC screening across AA subgroups; and Study 3 indicated that higher proportions of AA subgroups except for Japanese experienced lack of physician recommendation for CRC screening. Additionally, both Study 1 and Study 3 showed that the top reasons for not having CRC screening was due to "being unaware of tests" and "having no health problems." These reasons are concerning and raise questions regarding whether CRC screening discussions are being initiated by their physicians, and if so, what is the quality of these discussions in terms of the content being discussed and what is the patient's subjective experience regarding their discussions with their physician. The necessity of quality education and to support patient's equal participation in shared decision making with their primary care physician cannot be underestimated. The decision to underestimate physician's role

in promoting CRC screening, and in turn, to disregard the information sharing process between physician and patients may contribute to the AA population's low screening rates.

Education efforts to inform AA ethnic communities on the disease process of CRC and the primary role of screening to prevent cancer is another arena that warrants prioritization. It is important to note that to optimize education efforts especially among AA subgroups, healthcare workers should consider appropriate culturally accepted sites (e.g., faith-based organizations, community centers, etc.) for health information sharing and various channels of information sources (e.g., newspapers, television, etc.) The Asian American Network for Cancer Awareness, Research, and Training (AANCART)'s culturally responsive initiative to address the unique cancer burden affecting AA initiated the development of various cancer education materials: these are readily available online and include educational videos regarding the use of fecal occult blood test (FOBT) and fecal immunochemical test (FIT) geared for both physicians and patients and available in the following languages: Ilokano (language of the Philippines) and Hmong (AANCART, 2012a). In addition, educational materials including brochures were developed to promote CRC screening in various languages including Tagalog/Ilokano, Korean, and Hmong (AANCART, 2012b).

Social Work Implications

Social workers in the healthcare field (also referred to as medical social workers) maintain a social lens to health behavior and outcomes across the healthcare setting spectrum (NASW, 2016). Thus, fundamental approaches to practice are cemented on a person-in-environment framework that recognizes the social determinants of health including the systemic forces and oppression underlying many challenges faced by ethnic communities (NASW, 2016). The social work profession's guiding principles maintains pertinence to findings in this

dissertation. For instance, varying dimensions of predisposing factors, including cultural factors were shown to be important when examining AA subgroup's CCSP. Thus, one significant role social workers can take the initiative on is the investigation and inclusion of strengths-based cultural factors that highlight one's heritage as a facilitator to CRC screening and practice. This is a skillset and approach social workers should possess and be able to execute as part of the profession's hallmark for culturally competent practice (NASW, 2016).

In addition, a major task that social workers employ in their practice is their aim to empower historically disadvantaged and oppressed groups. In turn, a significant guiding principle the social work profession adheres to is patient's self-determination (NASW, 2016). Social worker's role in assisting with advancing patient's CRC knowledge base and identifying and clarifying their CRC screening preference can be pivotal tasks for social workers working with AA subgroups. Findings from the dissertation also highlighted the importance of properly informing AA ethnic groups regarding CRC screening options to support their decision-making process to undergo CRC screening. Discussions regarding CRC's disease process, screening options, and psychosocial barriers to screening can be influential on the patient's decision-making process and showcases one way medical social workers, with their social work skillsets, can advance their roles and take the lead in the area of CRC prevention across various program sectors (e.g., medical centers, community-based health programs, etc.)

In conclusion, the importance of social workers' role and active participation in research is reminded. Social workers' active commitment in research is critical in maintaining and advancing the roles of social workers in healthcare sectors, a setting that is multifaceted and interdisciplinary in nature. An ongoing challenge perceived by medical social workers include other professions' lack of understanding of social worker's distinct contribution in the healthcare

setting (Cowles & Lefcowitz, 1992; Cowles & Lefcowitz, 1995). In addition, the social workers' perceived challenges of integrating social work's mission in a healthcare setting that presents with various system and institutional level forces appear to be common realities among medical social workers (Moore et al., 2017). Challenges and opportunities can arise for the medical social workers regarding the use of their eclectic skillsets (i.e., specific training to work with diverse populations and maintaining an ecological and strengths perspective) and innovative approach to building capacity to advance the roles of social work profession in an interdisciplinary setting.

References

Agency for Healthcare Research and Quality [AHRQ]. (content last reviewed 2014). Activities using community-based participatory research to address health care disparities. Agency for Healthcare Research and Quality, Rockville, MD. https://www.ahrq.gov/research/findings/factsheets/minority/cbprbrief/index.html

Asian American Network for Cancer Awareness, Research, and Training [AANCART]. (2012a). AANCART Educational Videos. Retrieved from http://www.aancart.org/cancer-research/publications/aancart-educational-videos

AANCART. (2012b). AANCART Educational Materials. Retrieved from http://www.aancart.org/cancer-research/publications/aancart-educational-materials

Chen, M. S. (2005). Cancer health disparities among Asian Americans. *Cancer, 104*(S12). 2895-2902.

Cowles, L. A. & Lefcowitz, M. J. (1992). Interdisciplinary expectations of the medical social worker in the hospital setting. *Health and Social Work, 17*(1), 57-65.

Cowles, L. A. & Lefcowitz, M. J. (1995). Interdisciplinary expectations of the medical social worker in the hospital setting: Part 2. *Health and Social Work, 20*(4), 279-286.

Hawaii: Cancer Facts & Figures. (2010). http://www.uhcancercenter.org/pdf/hcff-pub 2010.pdf. Accessed 22 November 2015.

Gehlert, S. & Coleman, R. (2010). Using community-based participatory research to ameliorate cancer disparities. *Health & Social Work, 35*(4), 302-309.

Hawaii: Cancer Facts & Figures. (2010). http://www.uhcancercenter.org/pdf/hcff-pub 2010.pdf. Accessed 22 November 2015.

Holland, A. T. & Palaniappan, L. P. (2012). Problems with the collection and interpretation of

Asian American health data: Omission, aggregation, and extrapolation. *Annals of Epidemiology, 22*(6), 397-405.

Jun, J. & Oh, K.M. (2013). Asian and Hispanic Americans' cancer fatalism and colon cancer screening. *American Journal Health Behavior, 37*(2), 145-154. doi:10.5993/AJHB.37.2.1

Kagawa-Singer, M., Dadia, A. V., Yu, M. C., & Surbone, A. (2010). Cancer, culture, and health Disparities: Time to chart a new course? *A Cancer Journal for Clinicians, 60*(1), 12-39.

Moore, M., Cristofalo, M., Dotolo, D., Torres, N., Lahdya, A., Ho, L., Vogel, M., Forrester, M., Conley, B., & Fouts, S. (2017). When high pressure, system constraints, and a social justice mission collide: A socio-structural analysis of emergency department of social work services. *Social Science & Medicine, 178*, 104-114.

National Association of Social Workers (NASW), (2016). NASW Standards for Social Work Practice in Health Care Settings. Retrieved from https://www.socialworkers.org/practice/standards/NASWHealthCareStandards.pdf

Office of Disease Prevention and Health Promotion [ODPHP]. (2014). Healthy People 2020: Determinants of Health. Retrieved from https://www.healthypeople.gov/2020/about/foundation-health-measures/Determinants-of-Health

Srinivasan, S. & Guillermo, T. (2000). Toward improved health: Disaggregating Asian American and Native Hawaiian/Pacific Islander data. *American Journal of Public Health, 90*, 1731-1734.

World Health Organization [WHO]. (2017). The Determinants of Health. Retrieved from http://www.who.int/hia/evidence/doh/e