

The Relationship of Media Attention to Colorectal Cancer-Related Risk Appraisals in Older Japanese Americans: Using Structural Equation Modeling to Develop an Explanatory Model

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Abstract

Objectives: The goals of this study were: (1) to explore how personal attributes and media attention are related to colorectal cancer (CRC)-related risk appraisals (i.e., causal attribution, and fatalism/misconception) among Japanese Americans at risk; and (2) to identify segments of the population that should be targeted for education programs, topics of interest, and health communication channels. **Methods:** Structural equation modeling was used to cross-sectionally test a proposed model derived from the Heuristic-Systematic Model (HSM) and Attribution Theory for understanding the relationship between media attention and cognitive processes related to CRC in a population-based community sample of 341 asymptomatic Japanese Americans aged 50 and over residing in the Greater New York region. **Results:** Accounting for 30% of the variance in risk appraisals, the data fit a model ($\chi^2(136)=231.41$, $p<.001$; GFI=0.936, CFI=0.911, RMSEA=0.045). Fatalism/misconception was directly associated with older age, more psychological distress, and lower acculturation level, but with no media attention. Attention to non-interactive multimedia increased diet-related and genetic casual attribution and mediated the effects of age and income. While younger age, higher income and greater acculturation increased attention to Internet, attention to Internet was not related to risk appraisals. **Conclusions:** Fatalism/misconception appears to be unrelated to attention to media, and rather attributed to certain personal factors. Findings indicate that beliefs about dietary and genetic influences on CRC are a function of levels of media attention for this population, underscoring the roles media can play in raising awareness of CRC risk factors.

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Keywords: colorectal cancer, attribution theory, Japanese American, risk appraisal

Introduction

Despite their relatively high socioeconomic status and good access to health care (Bureau of Census, 2000), Japanese Americans continue to have high incidence of and mortality from colorectal cancer (CRC) (Baquest and Commiskey, 1999; Ries, Kosary, Hankey, Miller, Clegg, Edwards, 1999). In age-adjusted incidence rates for colorectal cancer, Japanese American men rank second highest after Alaskan native men, and Japanese American women rank third highest after Alaskan native and African-American women (Baquest and Commiskey, 1999). Primary and secondary prevention of CRC in the context of ethnic and immigrant populations arguably requires careful

attention to the unique cultural contexts of these groups, which are likely to differ from their host cultures and may hinder or promote certain cancer beliefs and prevention behaviors (Flynn, van Schaik, van Wersch, Ahmed, and Chadwick, 2004; Kreps and Kunimoto, 1994). Traditional Japanese beliefs, such as those pertaining to fatalism or "Giving-up-spirit" (*Akirame-no seishin*), deep-rooted in Buddhism (Nakamura, 1962; Yamamoto, 1989), for example, may be important to understanding cancer beliefs and prevention behaviors among traditional Japanese American individuals. In Japanese society, resignation (*akirame*) is often urged, and learned helplessness (*shikata ga nai*) is often experienced when things have irreversibly gone

against a person's wishes. A person's capacity for resignation is often taken as a proof of maturity and wisdom. The Buddhist concept of *satori*, "enlightenment," is closely associated with attainment of *akirame* for Japanese (Lebra, 1976). A recent study showed that US-born Japanese Americans were more similar to Japanese living in Japan than to Caucasian-Americans with respect to optimism about cancer's curability and concepts of cancer, indicating that certain aspects of cultural patterns may persist over generations (Gotay, Shimizu, Muraoka, Ishihara, Tsuboi, and Ogawa, 2004). Similar findings were reported by others (Matsumura, Bito, Liu et al., 2002), suggesting that cultural patterns of cancer-related beliefs and attitudes hold for even those immigrants who are highly assimilated. Furthermore, a study by Glanz, Grove, Lerman, Goaty, and Le Marchand (1999), found that Japanese Americans in Hawaii, despite their widely publicized elevated CRC rates, were significantly less likely than Caucasians to be interested in genetic testing for CRC susceptibility. One possible reason for this lack of interest in genetic testing may be that Japanese culture espouses fatalistic beliefs and encourage "avoidance."

A substantial body of research attests to the beneficial effects of exposure to multimedia channels of communication on cancer awareness and education (Kreps, Chapelsky, and Massimilla, 2002; Kreps, Gustafson, Salovey, Perocchia, Wilbright, Bright et al., 2004). It is interesting, however, that there is a paucity of empirical research testing whether exposure to such health information mediates the relationship between personal sociocultural characteristics and cancer-related beliefs and risk appraisals. We think it is useful to focus on the exposure to media about health information (i.e., levels of media attention) as an essential variable in understanding how individuals formulate their view on cancer, because the use of multiple media channels for cancer education in diverse populations has been dramatically increased (Bader and Strickman-Stein, 2003; Kreps, 2005). Specifically, understanding factors influencing at-risk ethnic minorities' perceptions of cancer and comprehension of risk factors is

crucial, given that cognitive *bias* such as a sense of fatalism or learned helplessness appears to be evident and may become a significant barrier for cancer prevention in some ethnic groups (Powe and Finnie, 2003; Liang, Yuan, Mandelblatt, and Pasick, 2004; Magai, Consedine, Conway, Neugut, and Culver, 2004; Holroyd, Twinn, and Adab, 2004).

A Proposed Model

The proposed model was derived from concepts from Eagly and Chaiken's Heuristic Systematic Model of information and processing (HSM) (Eagly and Chaiken, 1993) and Attribution Theory (Kelley, 1967, 1973) to explain the relationship between media attention and cognitive processes related to CRC among older Japanese Americans (Figure 1). Explaining how people come to attend to information, the HSM postulates that "attitudes are formed and modified as people gain information about attitude objects" (Eagly & Chaiken, 1993, p. 257). Embracing a dual-process approach, the HSM posits that individuals adopt the form of processing that they use for a given message based on: (1) their capacity to process the information in each manner, and (2) their motivation to go beyond more superficial ("heuristic" or "affective") processing to engage in "systematic" processing, which can occur along with heuristic processing (Eagly and Chaiken, 1993). Similarly, according to attribution theory (Kelley, 1967, 1973), individuals attribute the causes of their own and others' behaviors to either a situation or a disposition. For example, when we make a situational attribution, we identify the cause in the situation ("cancer is caused by unhealthy behaviors"); when we make a dispositional attribution ("cancer is caused by fate or luck"), we identify the cause in the person as an enduring trait. Kelley's theory implies that all cognitive processes (causal attributions) are logical and rational and at the same time appear to be influenced by errors and biases, such as "fundamental attribution error" (the tendency to over-emphasize dispositions or internal causes) and "self-serving bias" (taking credit for successes and denying responsibility for failures) (Kelley, 1967, 1973). Overlapping substantially with parallel concepts of a dual

mode of “heuristic” and “systematic” processing in the HSM, Attribution Theory (Kelley, 1967,

1973) considers cognitive processes as being rationally motivated and emotionally driven.

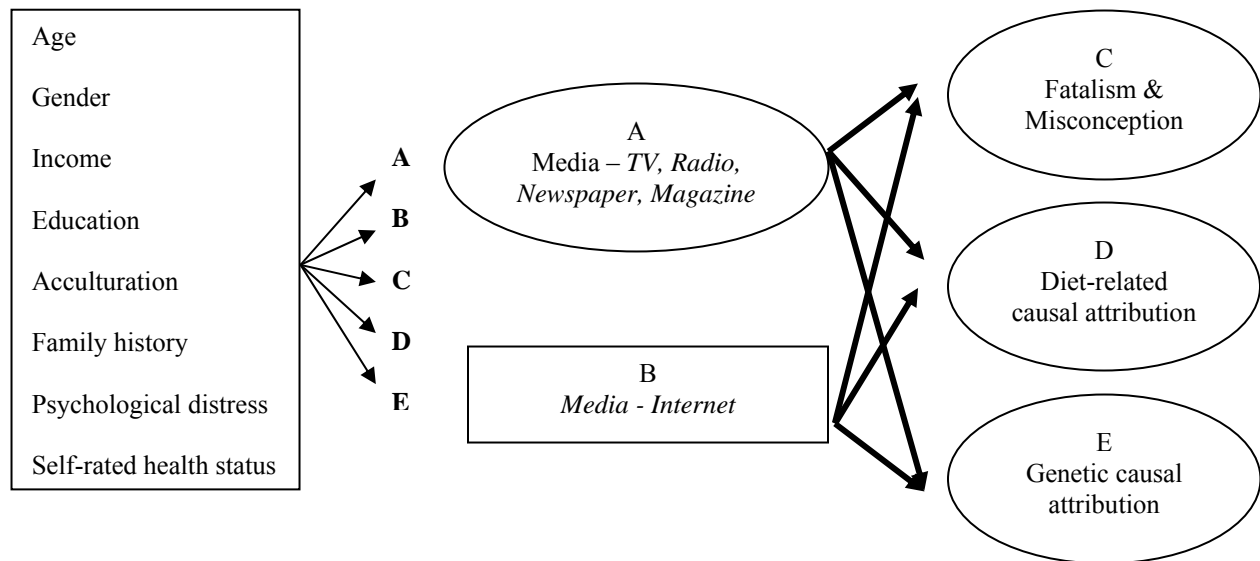


Figure 1
The proposed model to explain the relationship between media attention and cognitive processes related to CRC among older Japanese Americans

These two very influential theories arguably have considerable applied utility in studies of cancer communication, because they can form effective links among the questions of who gets health information, how people deal with the information, and how this influences their subsequent risk appraisals. Figure 1 depicts this model and its principal hypotheses. As part of our adaptation of these theories, we will concentrate our efforts on investigating exposure/attention to health information (via both interactive and non-interactive multimedia) as a mediating variable and a potential predictor of CRC risk appraisals. The proposed model begins with a set of variables representing the demographic/ sociocultural background of respondents, including age, gender, education, income, acculturation, family history, self-rated health status, and psychological distress, in response to previous findings in the literature (Bradley, Given, and Roberts, 2002; Fiscella, Franks, Gold, and Clancy, 2000; Friedman, Webb, Richards, and Plon, 2000). A recent study

of Japanese American, non-Japanese Asian American, and Caucasian cancer patients in Hawaii (Kakai, Maskarinec, Shumay, Tatsumura, Tasaki, 2003) examined a possible association between patients’ education and ethnicity and sources of health information and found that Japanese Americans predominantly relied on non-interactive media and commercial sources such as TV, newspapers, and magazines, while other ethnic groups relied more on interactive (such as Internet) and interpersonal communication. Therefore, it is useful to draw distinctions concerning which types of media, interactive (e.g., Internet) versus non-interactive (e.g., TV, radio, newspapers, and magazines) might have the relationship with variables of interest in this population.

Methods

Participants & Study Design

Data for the present study were drawn from a cross-sectional survey on the colorectal cancer screening of a randomly chosen sample of 341

asymptomatic Japanese men and women aged 50 and older residing in the Greater New York City metropolitan region (New York, New Jersey, Connecticut). Study procedures were approved by Columbia University's Human Subjects Committee. The sampling frame came from a commercially available mailing list extracted by Japanese names (both first- and surname), age, and geographic location by the mailing list company. Using a simple random sampling, 900 names of individuals were selected based on a target sample size of 360 with an expected return rate of 50% and a 5% sampling error. The total design survey method (Dillman, 1978) was used to allow participation to be anonymous and voluntary. Twenty dollar incentives were given to all participants. The survey instrument was developed in English, translated into Japanese, back-translated, reconciled, and pilot-tested for refinement. Accompanying the bilingual questionnaire was a self-addressed, stamped return envelope; an introductory letter; and a pre-stamped post-card with an identification number linked to the respondent's name. A reminder postcard was sent to all recipients of the original mailing one week later, and a second follow-up mailing was sent to non-respondents three weeks after the original mailing.

Of 900 surveys originally mailed, 256 (28%) were returned as undeliverable; 380 completed surveys were returned (59% response rate) in which 39 (10%) were deemed unusable because they did not meet the inclusion criteria ($n=25$) and did not provide any demographic information ($n=14$). The final sample size was 341. The study participants ranged in age from 50-92, with a mean age of 64.0 ($SD= 11.4$); 63% were female. About 50% were married. Approximately 76% had some education beyond high school, and 21% earned less than \$24,999 per year, 49% earned \$25,000 to \$74,999 per year, 30% earned more than \$75,000 per year. The majority of the participants (66%) had limited English proficiency, while the overwhelming majority (88%) was foreign-born. Most (96%) had some form of health insurance.

Compared to the 2000 Census on Japanese Americans in NYC (Asian American Federation

of New York Census Information Center, 2004), our sample is somewhat similar in terms of the distribution of education, household income, place of birth, and language spoken. According to the US 2000 Census on Japanese Americans in NYC (Asian American Federation of New York Census Information Center, 2004), approximately 80% had some education beyond high school, about 30% of Japanese American households earned less than \$20,000, and 20% earned more than \$100,000. Nearly three-quarters (73%) were foreign-born, and about 44% had limited English proficiency.

Measures

The measure of media attention and cognitive variables were adapted from the Health Information National Trend Survey (HINTS) (Nelson, Kreps, Hesse, Croyle, Willis, Arora, et al., 2004) and are described in Table 1. The model's cognitive constructs were fatalism/misconception, dietary causal attributions, and genetic causal attribution. A misconception variable was added by the investigator based on the findings of focus groups using a sample of older Japanese Americans undertaken prior to the survey, and was assessed by a single item rated on 5-point scales ranging from 1 (strongly disagree) to 5 (strongly agree) (Table 1).

Data Analyses

Analyses were performed using full-information maximum-likelihood estimation (FIML) in AMOS 4.0 (Arbuckle and Wothke, 1999). The FIML in AMOS was used so that individuals with partial data could be included in the analyses. SEM offers advantages in that it provides information on: (1) the overall fit of the proposed model to the data, (2) strengths of association for specific pathways between latent variables included in the model, and (3) mediational roles of media attention included in the model. Model specification was done using the two-step procedure (Anderson and Gerbing, 1998). The first step involved using confirmatory factor analysis (CFA) to test an overall measurement model. Each measurement model was validated using CFA methods with a direct oblique rotation. The second step involved using SEM to test a structural model. The structural model depicted in Figure 1 consisted

of theoretically based relationships among the exogenous and endogenous variables. The R² value was reported for the endogenous variable

as an estimate of variance explained by the exogenous and endogenous variables.

Table 1
Description of Latent Variables & Confirmatory Factor Analysis

Measure	Description of Survey Items	Factor Loading ⁴
Fatalism/misconception ¹	Getting cancer is matter of fate	.714
	There is not much people can do to lower their chances of getting cancer	.741
	It seems like almost everything causes cancer	.493
	CRC is a white people's disease and irrelevant for Japanese people	.589
Diet-related causal attribution ^{2,3}	Not eating many vegetables and fruits	.760
	Eating high-fat foods	.744
	Not eating much fiber	.847
Genetic causal attribution ^{2,3}	Being a particular race of ethnicity	.627
	Having a family history of cancer	.663
Media attention about health	TV	.637
	Radio	.668
	Newspapers	.785
	Magazine	.775
	Internet	-----

¹ Respondents were asked to indicate their beliefs on a 5-point Likert scale (1 meaning "strongly disagree" and 5 meaning "strongly agree") with the statement.

² The specific question was "How likely or unlikely are the following things to increase a person's chances of getting colorectal cancer?"

³ Respondents were asked to indicate their beliefs on 4-point Likert scale (1 meaning "very unlikely" and 4 meaning "very likely") with the statement

⁴ Factor loadings are estimated from factor analysis using oblique rotation. Each number indicates the correlation between an indicator variable and its associated underlying latent factor. A loading of magnitude ≥ 0.50 is considered adequate

Model modifications were conducted using an iterative process that involved removing a single path with a nonsignificant *t* value and then reestimating the model (Jöreskog, 1993; Jöreskog and Sorbom, 1996). Paths with nonsignificant *t* values were removed because no substantively meaningful interpretation can be provided for the parameter estimates (Jöreskog, 1993). When the nonsignificant path was removed from the structural model we expected the model fit to be unchanged. Model fit was assessed by the following three fit indices: the goodness-of-fit (GFI), the comparative fit index (CFI), and the Root Square Error of Approximation (RMSEA).

The GFI values close to 1.00 indicate a good fit (Byrne, 2001). The CFI measures the reduction in lack of fit of the model compared to a baseline model (values $>.95$ are desired) (Bentler, 1990). The RMSEA, a measure of error, indicates the mean of the squared discrepancies between all the elements of the predicted and observed correlation matrix (values $<.08$ is considered acceptable and $<.05$ is desired) (Steiger and Lind, 1980). In addition, the chi-square was examined; chi-square is a test of the difference between the specified model and the just identified model. As chi-square is sensitive to sample size, it is recommended that

chi-square be evaluated by dividing it by the degree of freedom; a value less than three is desirable (Bollen, 1989; Kline, 1998). Path coefficients were standardized and path significance was based on the critical ratios (CR), with a CR>2 in absolute value considered significant.

Results

Descriptive Statistics

While the majority of the respondents reported that they paid attention a lot or some to information about health via non-interactive multimedia such as TV (64.8%), newspapers (56.6%), and magazines (58.6%), less than one third (27.9%) used the Internet for health information. We examined bivariate inter-correlations between sociodemographics, media

attention, and risk appraisals (see Table 2). While attention to non-interactive media was significantly related to older age and higher acculturation level, attention to interactive media (Internet) was significantly related to younger age, male gender, higher educational and income levels. Family history of colorectal cancer was not related to media attention. As anticipated, fatalism was significantly associated with lower acculturation level and poorer health status, but unexpectedly, it was associated with greater psychological distress and lower income. Of particular interest is that those with higher level of dietary and genetic causal attributions were likely to be well educated and acculturated, have higher income, and more likely paid attention to media for health topics.

Table 2
Intercorrelations of Sociodemographics, Media Attention, and Risk Appraisals (N=341)

		1	2	3	4	5	6	7	8	9	10	11	12
1	Age												
2	Male	-.10											
3	Education	-.18	.24 ³										
4	Income	-.33 ³	.16 ³	.30 ³									
5	Acculturation	.27 ³	.01	.23 ³	.01								
6	Health status	-.10	.06	.08	.14 ¹	.02							
7	Family history	.11	.05	.00	.00	.18 ²	-.02						
8	Distress	.25 ³	.07	.01	.08	.15 ²	.40 ³	-.07					
9	Media	.18 ²	.00	.07	.08	.16 ¹	.03	-.03	-.06				
10	Media (interactive)	-.42 ³	.12 ¹	.27 ³	.26 ³	.05	.08	-.05	.14 ¹	.13			
11	Fatalism	.13	.12	-.12	-.18 ¹	-.17 ¹	-.19 ¹	.01	.29 ³	-.11	-.13		
12	Dietary attributions	-.07	-.07	.06	.12 ¹	.01	-.05	.00	.1-	.20 ²	.05	-.12	
13	Genetic attributions	-.10	.07	.25 ³	.22 ²	.17 ¹	-.02	.08	-.02	.23 ¹	.21 ¹	.01	.49 ³

¹p<.05; ²p<.01; ³p<.001

Confirmatory Factor Analysis

The results of the confirmatory factor analyses for the latent constructs are presented in Table 1. They confirm the existence of a single latent construct underlying each of the measures of fatalism/ misconception, diet-related causal attribution, genetic causal attribution, and media attention about health in this population. The latent variable of “Media attention about health” was only comprised of non-interactive multimedia, including TV, radio, newspapers,

and magazine. Therefore, attention to Internet was treated as a separate variable.

Structural Equation Modeling

The initial model (full model) did not fit the data [$\chi^2(168)= 315.51, P<.001$ GFI=0.925, CFI=0.874, RMSEA=0.051]. Three background variables (gender, family history, and self-rated health status) were not significant and dropped from the “full” to the “trimmed” model. Because a parsimonious model is preferable to one with more parameters, we next examined CR results

to identify nonsignificant paths that could be eliminated from the model. Figure 2 shows the final reduced model with statistically non-significant paths removed. This modification improved model fit, and the final model provided a fairly good fit to the data. Although the χ^2 statistic was significant [$\chi^2(136)= 231.41$, $P<.001$], the other fit indices [GFI=0.936, CFI=0.911, RMSEA=0.045] indicated a good fit to the data. Although model fit was good, the model accounted for only 30% of the variance in CRC-related risk appraisals (fatalism/misconception, diet-related causal attribution, and genetic causal attribution) in this population.

Fatalism/ misconception was directly associated with older age (gamma [γ]=.27), more psychological distress ($\gamma=.32$), and lower acculturation level ($\gamma=-.20$), but with no media attention. Attention to non-interactive multimedia increased diet-related ($\gamma=.20$) and genetic causal attribution ($\gamma=.21$) and mediated the effects of age and income. While age ($\gamma=-.43$), income ($\gamma=-.11$) and acculturation ($\gamma=.17$) were significantly associated with increased attention to Internet, attention to Internet was not related to risk appraisals. Education was directly associated with increased genetic causal attribution ($\gamma=.22$).

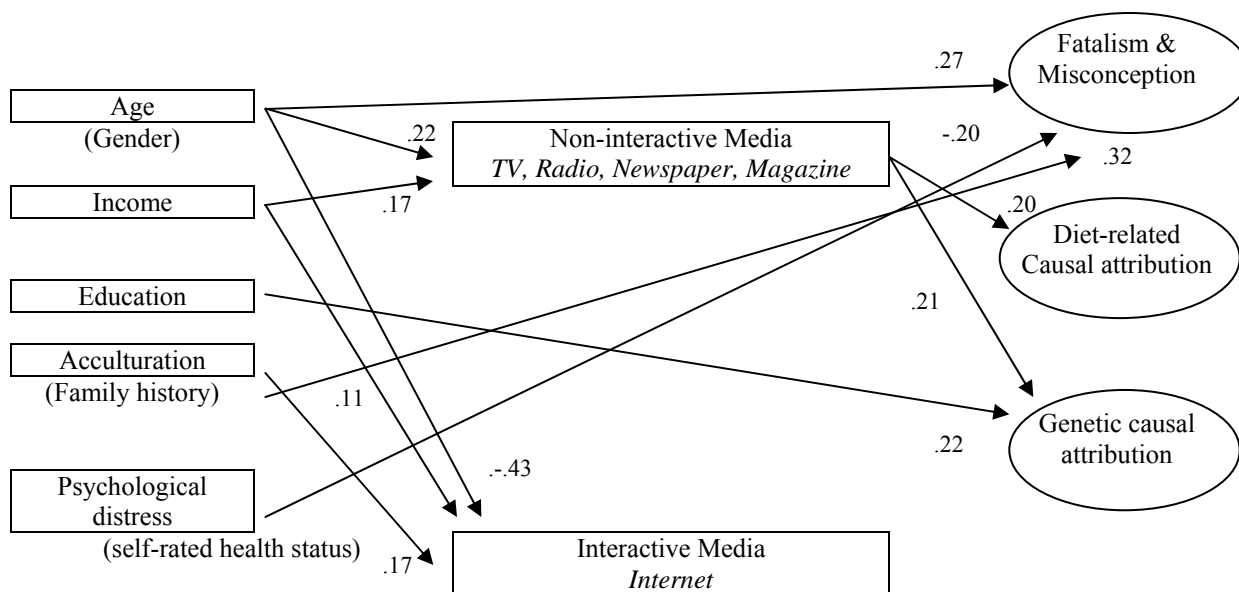


Figure 2
Final model to explain the relationship between media attention and cognitive processes related to CRC among older Japanese Americans. Note: Variables in parentheses indicate nonsignificance.

Discussion

Drawing from theoretical perspectives of the HSM and attribution theory, this study tested a conceptual model concerning the effects of personal attributes and media attention on cognitive processes related to CRC in older Japanese Americans. Results raised a number of issues pertinent to fatalism, impacts of culture on cancer risk appraisals, and cancer communication and culturally sensitivity. Our

SEM model, despite its simplicity, shows promise in revealing the mechanisms by which the influence of certain personal attributes may loom stronger for media attention and risk appraisals.

First, intra-group variation must be documented before generalizations are made concerning impacts of culture on cancer beliefs and attitudes of population groups. While the Japanese

American populations in the Greater New York region are somewhat homogeneous in terms of immigration status, this study indicates the importance of discerning socioeconomic and acculturation status when understanding their health information-seeking and processing. For example, age and acculturation measured as English language proficiency are typically, but not always, an indicator of to what extent individuals hold traditional values and therefore have a relationship with cultural variables such as fatalism. The present study indicates that those who are older and less acculturated are more likely to believe that getting cancer is a matter of fate and CRC is a white people's disease and irrelevant for Japanese people. This is especially alarming, given that older Japanese Americans are at highest risk for developing CRC and those with limited English language skills are least likely to be informed about their risk and risk factors via the mainstream media and healthcare system. Furthermore, while this study suggests that education and income tends to be an important predictor of an individual's ability to seek, process and retain information, population-based media-led cancer education for those with lower education and income may be questionable in terms of dissemination and effectiveness.

Second, this study indicates that discerning the type of media used (interactive versus non-interactive) appears to be relevant in assessing the impact of media on risk appraisals in this population. While the majority of the respondents used non-interactive media for health information, attention to such media appears to influence their beliefs and attitudes toward CRC causal attribution. The reason for nonsignificance of Internet use on risk appraisals is uncertain, given that we do not know to what extent health information via multimedia are cancer-specific. While using the Internet for health information is arguably much more topic-targeted than use of TV and newspapers, the nonsignificant relationship between Internet use and CRC risk appraisals may be attributed to failure to measure the topics and quality of health information received from multimedia.

Third, the utility of the proposed conceptual model in studies of cancer communication needs to be explored. While value-laden, the underlying premise of the model is that individuals may use both processing modes, such as culturally-based cancer beliefs (heuristic or irrational) as well as factual-based cancer beliefs (systematic or rational), as they work to make a risk appraisal, and attention to media mediates the effects of personal attributes on such risk appraisals. Although fatalistic beliefs may sometimes act as a positive coping mechanism for certain cases (e.g., terminally ill patients) to promote psychological adjustment, fatalism may hinder individuals engaging unhealthy lifestyles to modify their behaviors by liberating them from self-blame and a sense of inadequacy, as Kelly would call as "self-serving bias." The negative implications of fatalism in cancer prevention should be highlighted when addressing cultural sensitivity for certain populations.

Several limitations of this study should be considered. First, the study was based on cross-sectional data, instead of a longitudinal study focusing on the temporal relationship between media attention and cognitive processes. Therefore, we cannot establish the direction of causality among constructs. It is highly plausible that personal cancer beliefs and attitudes may shape individuals' attitude toward multimedia for health topics. For theory testing, the prospective assessment is most ideal to test the proposed model. In addition, the data collected relied exclusively on self-report for assessment. This problem was compounded by the fact that no assessment of social desirability was obtained. However, the assessment of media attention for health topics and CRC-related cognitions is based on self-report in many national surveys (e.g., Health Information National Trends Survey). Second, since this sample was drawn from certain geographic areas (specifically, the metropolitan New York City area), caution is warranted in generalizing these findings to a larger population and other community settings such as Japanese Americans on the West Coast or in rural areas. Since this is a study of older Japanese Americans residing in a community, the results may differ for

institutionalized older individuals who might have additional barriers for media viewing and risk comprehension. Third, due to the limited number of variables that could be tested in the hypothesized model, other key predictors, including interpersonal health communication (health care providers and lay people), may also influence CRC-related beliefs and attitudes. Furthermore, other cultural factors that might influence media attention, such as channel credibility for example, were not measured in this study. In addition, causal attributions related to other factors, such as exercise, cigarette smoking, and environmental populations, which are widely communicated in multimedia, should be examined as a risk appraisal process. If these measures had been included, they may have contributed to a greater proportion of the explained variance. Future research should explore other models with a complete array of social-cognitive measures that are relevant to CRC-related risk appraisals. Yet, the model is

parsimonious, reasonable, and consistent with relevant theories. And, lastly, media attention was not measured as cancer-specific, rather for any health and medical topics, while risk appraisals were CRC specific. This discrepancy may dilute the relationship between media attention and risk appraisals.

In conclusion, this study takes one step toward closing the significant knowledge gap in the literature regarding the mechanisms by which personal attributes and media attention contribute to CRC risk appraisals. However, due to the cross-sectional nature of this study, firm conclusions regarding the mediating mechanisms of media attention cannot be reached, thereby suggesting the need for further studies. Additional research is warranted that does not rely on cross-sectional data and that assesses long-term effects including behavioral outcomes.

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