Correlates of Receipt of Colorectal Cancer Screening among American Indians in the Northern Plains

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Research has consistently documented lower colorectal cancer (CRC) screening rates for racial and ethnic minority populations, with the lowest screening rates among American Indians (AIs). Given the low CRC screening rates among AIs residing in the Northern Plains region, the objective of this research was to identify CRC screening correlates for Northern Plains AIs. With a sample of 181 AIs age 50 years or older, the authors used Andersen's behavioral model to examine the following factors related to receipt of CRC screening: (a) predisposing factors—age, education, marital status, and gender; (b) need factors—personal and family history of cancer; and (c) enabling factors—having a particular place to receive medical care, annual health checkup, awareness of the availability of CRC screening, knowledge of CRC, and self-efficacy of CRC. Nested logistic regression identified the following correlates of receipt of CRC screening: (a) predisposing factors—older age; (b) need factors—having a personal history of cancer; and (c) enabling factors—having an annual health checkup, greater awareness of CRC screening, and greater self-efficacy of CRC. Given the findings, prevention and intervention strategies, including public awareness and education about CRC screening, are promising avenues to reduce cancer screening disparities among AIs.

KEY WORDS: *American Indians; colorectal cancer screening; health disparities; indigenous; Native Americans*

Although colorectal cancer (CRC) is highly treatable with early screening and detection, it is the third leading cause of cancer-related deaths and the third most commonly diagnosed form of cancer for men and women in the United States (American Cancer Society [ACS], 2015a). ACS (2015a) estimated that 132,700 people would be diagnosed with CRC and 49,400 would die from the disease in 2015. The incidence of CRC has declined significantly over the last 20 years, largely due to early detection and screening (ACS, 2014b). CRC typically develops slowly over time, with precancerous growths often taking 10 to 15 years to develop into CRC, making early CRC detection and screening highly effective (ACS, 2014b).

Although receipt of CRC screening in the United States is lacking for all races and ethnicities, the low screening rates among racial and ethnic minority groups are alarming. Not only does research consistently document lower screening rates for racial and ethnic minority populations (Escoffery et al., 2015), but also the lowest screening rates have been found for American Indians and Alaska Natives (AIANs) (Johnson-Jennings, Tarraf, Xavier Hill, & González, 2014). The 2010 Behavioral Risk Factor Surveillance System data indicate that prevalence of CRC screening among AIANs was 51% versus 61% for African Americans and 60% for white Americans (Johnson-Jennings et al., 2014). Thus, there is an urgent need to increase the receipt of CRC screenings (Kelly, Alberts, Sacco, & Lanier, 2012) and for more research to understand CRC disparities among AIANs (James et al., 2013).

CRC SCREENING DISPARITIES AMONG AIANS

Representing more than 5 million people (U.S. Census Bureau, 2010) across 566 federally recognized tribes (Bureau of Indian Affairs, 2014) and approximately 400 non–federally recognized tribes (U.S. Government Accountability Office, 2012), extensive diversity and variability in geographic regions, languages, historical contexts, and cultural practices are present across AIAN populations. Moreover, relatively little is known about the AIAN cancer

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experience (Espey et al., 2007). Although data on CRC among AIANs are lacking, research has documented disparities in the incidence of CRC by race and ethnicity (ACS, 2014a). These rates are highest for non-Hispanic African Americans, followed by AIANs, non-Hispanic white (NHW) Americans, Hispanics, and Asian/Pacific Islanders (ACS, 2014a). Although CRC is higher for men across all races and ethnicities, this same pattern of racial and ethnic disparities persists for both sexes (ACS, 2014a).

Incidence rates for CRC vary for AIANs by geographic locale (ACS, 2014a; Espey, Paisano, & Cobb, 2005; Espey et al., 2007; Filippi et al., 2013). To illustrate, AIANs living in Alaska experience CRC at more than twice the incidence rate of those living in New Mexico (85.7 and 31.2, respectively) (ACS, 2014a). Geographic variations in CRC rates reflect the broader diversity in AIAN lifestyles across the United States. For example, many lifestyle-related risk factors for CRC (ACS, 2015b), including diets high in red meats and processed food, physical inactivity, obesity, and smoking, vary by geographic context. AIANs living along the coast may eat less red meat and more fish than those living in the interior of the United States, whereas AIANs living in arctic climates may have more challenges related to physical activity than those living in more temperate climates. In spite of regional variations, some research has presented AIAN cancer incidence statistics based on information derived from one or two regions, which can lead to misleading information and overgeneralizations (Parker, Davis, Wingo, Ries, & Heath, 1998).

To mitigate the lack of understanding of AIAN cancer disparities across geographic regions, one study examined cancer incidence across the six Indian Health Service regions (Espey et al., 2007). Among AIANs, cancer rates tended to be significantly higher in the Northern and Southern Plains and Alaska compared with those in the Southwest (Espey et al., 2007). CRC is one of the three most prevalent forms of cancer across regions for both sexes, with the exception of the Southwest, which followed a different pattern (Espey et al., 2007). Other research has identified CRC as one of the most common forms of cancer among AIANs (Paltoo & Chu, 2004). AIANs have been found to be less likely than NHW Americans to be diagnosed with CRC in its early stages, and these screening disparities were most pronounced in the Northern Plains, Southwest, and Southern Plains (Espey et al., 2007). In addition, AIAN CRC death rates are 1.26 times higher than those for white people in the United States; these rates also vary significantly by geographic region. In comparison with white people, death rates for AIANs were 1.84 in the Northern Plains, 2.12 in Alaska, 1.48 in the Southern Plains, 0.66 in the Southwest, 1.41 in the Southwest, and 0.87 in the East (White et al., 2014).

Disparities are present not only in the incidence and mortality rates associated with CRC, but also in screening practices for CRC by race and ethnicity (Johnson-Jennings et al., 2014). Overall, Espey et al. (2007) reported that the prevalence for cancer screening tended to be lower for AIAN groups than for NHW people, and the incidence of cancer varied greatly by region. A recent study focused on people age 50 years or older in the Behavioral Risk Factor Surveillance system (2001–2010) to determine whether disparities in CRC screening practices for AIANs exist compared with those for African Americans and white Americans (Johnson-Jennings et al., 2014). Although receipt of screening for AIANs has increased over time, per the U.S. Preventive Services Task Force guidelines, AIANs had the lowest percentage of endoscopy screenings (45% versus 56% for African Americans and 55% for white Americans) and the lowest percentage of mixed (endoscopy or fecal occult blood test) CRC screenings (51% versus 61% for African Americans and 60% for white Americans) (Johnson-Jennings et al., 2014). Given that mortality rates for racial and ethnic minorities with cancer tend to be higher, early screening and detection are urgently needed (Edwards et al., 2010; Gorin, Heck, Cheng, & Smith, 2006; Pandhi, Guadagnolo, Kanekar, Petereit, & Smith, 2010; Swan et al., 2006; White et al., 2014).

THEORETICAL FRAMEWORK: ANDERSEN'S BEHAVIORAL MODEL

Our study used Andersen's behavioral model of health services use, one of the most extensively researched help-seeking models (Andersen, Davidson, & Baumeister, 2014; Baernholdt, Hinton, Yan, Rose, & Mattos, 2012; Snowden &Yamada, 2005). It has been used by other researchers to examine receipt of CRC screening among Asian Americans and Pacific Islanders (Lee, Lundquist, Ju, Luo, & Townsend, 2011) and help-seeking behaviors of older AIANs (Roh et al., 2014). The model includes predisposing, need, and enabling factors thought to be associated with the receipt of CRC screening

(Andersen et al., 2014; Baernholdt et al., 2012; Snowden & Yamada, 2005). Predisposing factors include (a) demographic characteristics that may make people more or less inclined to use health services; (b) need factors, such as health status, that indicate the necessity of health services (Andersen et al., 2014; Surood & Lai, 2010); and (c) enabling factors, such as knowledge, awareness, and self-efficacy for CRC screening, that facilitate or impede service use.

Andersen's behavioral model is well suited to examine CRC disparities among AIANs as it includes contextual and social factors. Research using Andersen's model has found that ethnic and racial minorities, the poor, the uninsured, and older adults tend to have less access to health services (Stockdale, Tang, Zhang, Belin, & Wells, 2007). These and other contextual factors are highly relevant, given that AIAN populations tend to experience lower socioeconomic status and health services access than NHW Americans (Espey et al., 2007; Macartney, Bishaw, & Fontenot, 2013). Indeed, poverty rates among AIANs have been found to be three times higher than rates for NHW Americans (Espey et al., 2007). An examination of the 2007–2011 U.S. Census found that, on average, 27.0% of AIANs have income below the poverty level, in comparison with 11.6% for white people, 23.2% for Hispanics, 11.7% for Asians, 25.8% for African Americans, and 17.6% for Native Hawaiians and Pacific Islanders (Macartney et al., 2013). In comparison with the general population, of whom approximately 87% hold at least a high school degree, 77% of AIANs hold at least a high school degree (U.S. Census Bureau, 2012). The disproportionate lack of socioeconomic resources likely contributes to the lower CRC screening rates in AIAN populations.

Increased awareness of screening and access to a regular provider have been found to be predictive of receipt of cancer screening (Allgar & Neal, 2005; Gorin et al., 2006; Kolahdooz et al., 2014). Research has shown that AIANs have less knowledge of cancer screening and are less likely to have a particular place to receive medical care compared with their white counterparts (Espey et al., 2007; Kolahdooz et al., 2014). Moreover, access to screening, knowledge about cancer and screening, educational attainment, and perceived need for screening have been found predictive of knowledge, attitudes, and behaviors among indigenous communities worldwide (Kolahdooz et al., 2014). A recent qualitative study with 29 AI men age 50 years or older in the Midwest revealed that most men had CRC knowledge, which enabled greater use of screening (James et al., 2013). Knowledge of CRC generally came from television, community events, information packets, and family; barriers included insurance and cost, along with culturally specific factors, such as embarrassment and fear (James et al., 2013). Self-efficacy of CRC screening tends to be positively associated with the receipt CRC screening (Fernández et al., 2015), indicating "an individual's confidence in his or her ability to take action and to persist in that action despite obstacles or challenges" (Fernández et al., 2015, p. 3). In regard to CRC, self-efficacy includes patients' ability to discuss CRC with a medical professional, seek out care, and persist through treatment despite challenges that may emerge (Fernández et al., 2009).

Given the disparities in CRC screenings and the importance of screenings for the prevention and treatment of CRC, the purpose of our study was to identify factors correlated with receipt of CRC screening among American Indians (AIs) residing in the Northern Plains. We focused this research on AIs residing in the Northern Plains because CRC rates among these populations tend to be particularly high, with CRC screening rates, in contrast, being particularly low (Espey et al., 2007). Our study parallels existing research (see Babitsch, Gohl, & von Lengerke, 2012, for a systematic review) that relies on Anderson's behavioral model to examine (a) predisposing factors including age, education, marital status, and gender; (b) need factors as captured by personal and family history of cancer; and (c) enabling factors including income, having a particular place for medical care, and private health insurance. We also assessed enabling factors with awareness of CRC screening (Allgar & Neal, 2005; Gorin et al., 2006; Kolahdooz et al., 2014), knowledge of CRC screening (James et al., 2013; Kolahdooz et al., 2014), and self-efficacy of CRC (Fernández et al., 2009; Fernández et al., 2015).

Based on prior research, we hypothesized that (a) AIs who report a personal and/or family history of cancer will be more likely to receive CRC screenings than AIs without personal and/or family histories of cancer, and (b) AIs who report greater awareness of CRC screening, knowledge of CRC, and/or self-efficacy related to CRC will be more likely to receive CRC screenings than AIs with lower awareness of CRC screenings, knowledge of CRC, and self-efficacy related to CRC.

METHOD AND MEASURES

Sample and Data Collection

We used a survey research design with convenience sampling to examine factors correlated with receipt of CRC screening among AIs residing in the Northern Plains. Following the ACS's focus on people age 50 years or older being at greater risk for cancer (ACS, 2014b), we also focused on AIs age 50 and above in our sample. After approval from the lead author's institutional review board, a survey was conducted in rural areas with AIs between September 2013 and May 2014. Participants' recruitment sources included multiple locations, such as local AI churches, other religious organizations, senior housing facilities, senior centers, an annual Indian art market, and three powwows in South Dakota.

Although 208 AI adults participated in the study, 27 participants were excluded due to missing data, yielding an analytic sample of 181. Little's (1988) Missing Completely at Random Test of the study indicated no demographic differences between those with missing data and those without missing data. Therefore, bias in data analysis from using listwise deletion is not indicated for this sample. Although the study used a self-administered questionnaire, trained interviewers were available for anyone who asked for assistance in reading and understanding the questions; four participants required such assistance. The questionnaire took about 30 minutes to complete, and participants were offered $10 cash for their time.

Dependent Variable: Receipt of CRC Screening

To measure receipt of CRC screening, respondents were asked whether they had ever had a colonoscopy. Response options were yes = 1 or no = 0.

Independent Variables

Predisposing Factors. Demographic characteristics were collected to reflect predisposing factors, including age (in years) and education (a continuous variable), gender (female = 1, male = 0), and marital status (never married = 0, married = 1, and other = 2).

Need Factors. The following two questions were used to represent need factors: personal history of cancer, "Has the doctor ever told you that you had a cancer of any kind?" and family history of cancer, "Have any of your family (parents, grandparents, siblings, or close relatives) ever had cancer of any kind?" Responses to both items were coded 1 for yes and 0 for no.

Enabling Factors. We included five variables as enabling factors: (1) a particular place for medical care (yes = 1, no = 0); (2) receipt of an annual health checkup (yes = 1, no = 0); (3) awareness of CRC screening (yes = 1, no = 0); (4) knowledge of CRC; and (5) self-efficacy of CRC screening. To measure knowledge of CRC, we used a 13-item index adapted from other studies with true-or-false statements (ACS, 2014b; Fernández et al., 2015). This index included five CRC screening guideline (for example, "Both men and women at age 50 should begin CRC screening") and eight CRC risk factors (for example, "Several lifestyle-related factors, such as diet, weight, and exercise, have been linked to CRC"). Coding for this scale involved summing the "yeses" and the "nos" in this yes/no question format. Higher scores indicate higher CRC knowledge. Self-efficacy was measured by eight items, which we adapted from a preexisting scale developed for cervical cancer screening (Fernández et al., 2009). Higher scores indicate greater self-efficacy. Internal consistency was .94 in the present study.

The entire questionnaire was pilot tested with 10 AIs. The purpose of the pilot test was to see how well the research questions were understood, whether the questions were sufficiently clear, and whether the response options were sufficient. Those who participated in the pilot test were not included in our study sample. We tested level of understanding of these items during a pilot study. Slight modifications in wording were made as a result of the pilot study. Specifically, the response format was modified from a seven-point Likert scale to a five-point Likert scale for self-efficacy, with the following response options: very unsure = 1, unsure = 2, somewhat sure = 3, sure = 4, very sure = 5.

Data Analysis

We used nested logistic regression to identify correlates of receipt of CRC screening in our sample. Predisposing factors consisted of the first set of correlates, need factors were the second set of correlates, and enabling factors were added in the third step. We used IBM SPSS Statistics (Version 21) for our analyses (George & Mallery, 2013). We detected no multicollinearity issues among the correlates, with variance inflation factor scores all greater than 1.09 (Mertler & Vannatta, 2002). In addition, we used a square-root transformation for

the age variable because it was not normally distributed.

RESULTS

Demographic Characteristics

As presented in Table 1, the age of respondents ranged from 50 to 95 years, with a mean of 59.3 (±*SD* = 7.3) years. Slightly more than half were female and about 38% were married. About 77% of participants had at least a high school diploma or a GED. Approximately one-third of the respondents earned less than $1,000 per month. About 14% reported experiencing personal history of a cancer, and 72% reported a family history of cancer. About 84% had a particular place to receive medical care and about 64% had an annual health checkup. About 81% heard about the CRC screening, with a mean score of 8.4 (±*SD* = 2.7) for CRC knowledge, ranging from 1 to 13, indicating that respondents selected about 65% of correct answers. The mean score of self-efficacy was 25 (±*SD* = 8.0), ranging from 8 to 40, indicating that respondents feel able to discuss CRC with a medical professional, seek out care, and persist through treatment despite challenges that may emerge. In addition, about 48% reported that they received a CRC screening.

Table 1: Descriptive Characteristics of Study Participants (*N* = 181)

Characteristic	% (*M*, *SD*)
Age (years)	
Ranged from 50 to 95	(59.3, 7.3)
Gender	
Female	53.8
Male	46.2
Marital status	
Married	37.7
Never married	20.8
Other	41.5
Education	
Lower than high school diploma/GED	23.0
High school diploma/GED	25.5
Greater than high school diploma/GED	51.5
Monthly income	
Less than $1,000	33.8
$1,001 to $2,000	25.3
$2,001 to $3,000	20.4
Over $3,001	20.4
Personal cancer history	
Yes	14.4
No	85.6
Family cancer history	
Yes	71.6
No	28.8
One particular place for medical care	
Yes	84.1
No	15.9
Annual health checkup	
Yes	63.8
No	36.2
Awareness of CRC screening	
Yes	80.7
No	19.3
Knowledge of CRC	
Ranged from 1 to 13	(8.4, 2.7)
Self-efficacy of CRC screening	
Ranged from 8 to 40	(25.0, 8.0)
Receipt of CRC screening	
Yes	47.8
No	52.2

Note: CRC = colorectal cancer.

Bivariate Correlations among All Variables

As shown in Table 2, there was a positive relationship between two predisposing factors and receipt of CRC screening: age ($\beta = .15$, $p \leq .05$) and being married ($\beta = .14$, $p \leq .05$). Also, five enabling factors were significantly correlated to CRC screening: (1) a particular place to receive medical care ($\beta = .15$, $p \leq .05$), (2) annual health checkup ($\beta = .28$, $p \leq .001$), (3) knowledge of CRC ($\beta = .15$, $p \leq .05$), (4) CRC screening awareness ($\beta = .37$, $p \leq .001$), and (5) self-efficacy ($\beta = .33$, $p \leq .001$).

CRC Screening Correlates

The results of the nested logistic regression are presented in Table 3. The Hosmer and Lemeshow test indicated the good fit of our models because the *p* values in step 1 ($\chi^2 = 4.553$), step 2 ($\chi^2 = 8.233$), and step 3 ($\chi^2 = 2.143$) were greater than the established cutoff (.05) (Hosmer & Lemeshow, 2013). The roles of independent variables on CRC screening were explained by using the odds ratios. Among the predisposing factors, only age was a significant correlate of receipt of CRC screening in all steps. In step 3, older respondents were over two and half times more likely than younger respondents to have a CRC screening ($\beta = 0.960$, $p \leq .05$). In terms of need factors, respondents who previously had cancer were over three and half times more likely than those with no prior history of cancer to receive the CRC screening ($\beta = 1.292$, $p \leq .05$). In terms of enabling factors, respondents who had an annual health checkup were over two and half times more

likely than those who did not have a checkup to have had a CRC screening ($\beta = 0.942$, $p \leq .05$). Respondents who heard about the CRC screening awareness were around 22 times more likely than those who had not heard about CRC screening to have had a CRC screening ($\beta = 3.089$, $p \leq .001$). Respondents with higher levels of self-efficacy were more likely than those who had lower levels of self-efficacy to receive the CRC screening ($\beta = 0.072$, $p \leq .01$).

DISCUSSION

Regarding the purpose of our study—to identify factors correlated with receipt of CRC screening among AIs residing in the Northern Plains—results indicated several factors related to the receipt of CRC screenings. With respect to Andersen's model, the predisposing factors of age and being married were significantly correlated with screening receipt; however, education was not significantly correlated, which is in contrasts to other research (Kolahdooz et al., 2014). The need factors of having a personal or family history of cancer, however, were not correlated with a receipt of CRC screening at this level. All of the enabling factors of CRC screening knowledge (James et al., 2013; Kolahdooz et al., 2014), CRC screening awareness (Allgar & Neal, 2005; Gorin et al., 2006; Kolahdooz et al., 2014), and self-efficacy regarding CRC screening (Fernández et al., 2009; Fernández et al., 2015) were found to be correlated with receipt of CRC screening. With the full nested logistic regression model accounting for 30.5% of the variance (see Table 3), results revealed significant correlates regarding the purpose of this research.

We found partial support for the first hypothesis; a personal history of cancer (but not a family history of cancer) was correlated with receipt of CRC screening. Having a personal history of cancer would understandably increase one's cancer screening awareness and the importance of early detection to prevent future occurrences. Given that family history of CRC is a risk factor (ACS, 2014b), the lack of significant findings regarding a family history of cancer may be related to participants being asked about their general familial cancer history (that is, "a cancer of any kind") rather than history specific to CRC cancer. Thus, inquiring about the family history of CRC specifically may have yielded different results; future research obtaining the cancer-specific family background of CRC might be revealing.

We also found partial support for the second hypothesis, indicating that greater CRC screening awareness and greater self-efficacy were associated with receipt of CRC screening, whereas greater CRC knowledge was not associated with receipt of CRC screening. Our findings are similar to prior research that found increased awareness to be associated with receipt of cancer screening (Allgar & Neal, 2005; Gorin et al., 2006; Kolahdooz et al., 2014). Thus, educating physicians and AIAN community members about the importance of CRC screening is highly needed. Finally, mirroring existing research (Fernández et al., 2015), self-efficacy, or feeling able to advocate for CRC screening and persisting through treatment, significantly predicted concomitant screening.

Because CRC knowledge was not correlated with receipt of screenings, this may suggest that

Table 2: Correlations among Variables

	1	2	3	4	5	6	7	8	9	10	11
1. Receipt of CRC screening											
2. Age	.15*										
3. Gender	.08	.02									
4. Education	.08	.15*	–.05								
5. Married	.14*	.16*	–.04	.19**							
6. Personal cancer history	.13	.12	.08	.04	.02						
7. Family cancer history	.04	.01	.19**	.04	.03	.05					
8. A particular place for medical care	.15*	.19**	.07	.21**	.12	.18**	.18**				
9. Annual health checkup	.28***	.23***	.03	.12	.05	.14*	.02	.41***			
10. Knowledge of CRC	.15*	.03	–.12	–.00	–.04	.02	.18*	.17*	.24***		
11. Awareness of CRC screening	.37***	–.03	.21**	.10	.07	–.08	.21**	.12	.05	–.03	
12. Self-efficacy of CRC screening	.33***	.07	.04	.13	.09	.04	.12	.21**	.27***	.21**	.20**

Note: CRC = colorectal cancer.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

Table 3: Nested Logistic Regression Model of Receipt of CRC Screening (*N* = 181)

	CRC Screening					
	Step 1		Step 2		Step 3	
Factor	β (*SE*)	Exp(β)[a]	β (*SE*)	Exp(β)[a]	β (*SE*)	Exp(β)[a]
Predisposing factors						
Age	0.961 (0.391)*	2.614	0.942 (0.391)*	2.565	0.960 (0.457)*	2.611
Gender	0.286 (0.310)	1.332	0.219 (0.319)	1.245	0.150 (0.376)	1.162
Education	0.077 (0.056)	1.080	0.075 (0.056)	0.181	0.030 (0.067)	1.031
Marital status (versus never married)						
Married	–0.056 (0.426)	0.945	–0.042 (0.431)	0.959	0.400 (0.510)	1.492
Other (divorced, separated, and so on)	0.494 (0.346)	1.638	0.485 (0.348)	1.624	0.647 (0.409)	1.910
Need factors						
Personal cancer history			0.559 (0.445)	1.748	1.292 (0.622)*	3.638
Family cancer history			0.198 (0.347)	1.218	–0.373 (0.435)	0.689
Enabling factors						
A particular place for medical care					–0.522 (0.575)	0.593
Annual health checkup					0.942 (0.415)*	2.565
CRC knowledge					0.103 (0.073)	1.108
CRC screening awareness					3.089 (0.741)***	21.959
Self-efficacy of CRC screening					0.072 (0.025)**	1.074
Model χ^2 (*df* = 12)	14.908*		1.967		50.142***	
Hosmer and Lemeshow test χ^2	4.553		8.233		2.143	

Note: CRC = colorectal cancer.
[a]Odds ratio.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

knowledge of the cancer does not necessarily translate to a perceived need for cancer screening. It could be that CRC awareness and self-efficacy are more robust predictors of CRC screening. Indeed, participants' CRC awareness increased the likelihood of CRC screening by over 20 times. Clearly, awareness of CRC screenings is a necessary precursor to receipt of screenings, and self-efficacy ensures the receipt of these screenings. Results of this study indicate that focusing on CRC awareness and self-efficacy may be more promising areas to focus prevention and intervention efforts than increasing knowledge of CRC. This finding is contrary to other research and warrants further investigation and replication (Espey et al., 2007; Kolahdooz et al., 2014).

Related to access to health care and screening services (Espey et al., 2007; Macartney et al., 2013), it should be noted that this sample experienced the socioeconomic constraints, particularly related to income and educational attainment, which paralleled the socioeconomic disadvantages reported among other AIAN populations (Kolahdooz et al., 2014). These contextual considerations are important to be mindful of, given that they are thought to be connected to health services access (Espey et al., 2007; Macartney et al., 2013). The cumulative disadvantages that AIANs tend to experience are part of a broader context of historical oppression (Burnette, 2015).

Limitations

Several limitations of the current study should be noted. The cross-sectional research design limits our ability to make causal conclusions about the findings. In addition, the sample is not representative of AI adults throughout the United States. The use of a convenience sampling method to recruit AI adults in a midwestern state limits the generalizability of the findings to AIs in other settings or states. Because AI race was self-identified, it is possible that some participants might not be considered AI if verification through tribal membership were used to identify the sample. In addition, because data on tribal membership were not collected, we could not examine tribal differences on any of the examined variables. Selection biases might have affected the findings in several ways. Those who participated in the study might have been more willing to discuss the cancer screening than those who did not participate. They also might have held more positive views about CRC screening. Studies with more representative samples of AI adults generally and also across different tribes and rural and urban contexts

will provide a fuller picture of CRC screening, thereby advancing CRC knowledge.

Several limitations are based on measurement choices used in the study. First, all of the data were based on self-report, and participants could have provided answers they considered to be socially desirable. Second, all measures had not been used previously with AIs. Culturally grounded cancer screening or wellness instruments might better assess the relationship between self-efficacy and CRC screening. Moreover, Andersen's model does not include non-Western conceptualizations of health or preference for traditional healing modalities over biomedical treatments, which are relevant for many AIANs (Beals et al., 2005; Hartmann & Gone, 2012, 2013). Finally, asking questions about specific family history regarding CRC might have provided insight about whether family history of specific cancers versus general cancer history was predictive of screening outcomes.

Implications and Recommendations

Given that CRC screening awareness and self-efficacy were significantly correlated with receipt of CRC screening, public awareness and education about the necessity of CRC screening, and how to advocate for this, may reduce CRC disparities among AIAN populations. Many researchers recommend culturally appropriate screening and prevention strategies (Becker, Affonso, & Beard, 2006; Burhansstipanov, 2005; Burhansstipanov, Tenney, Russell, & Plomer, 1996; Espey et al., 2007; Kagawa-Singer, Valdez Dadia, Yu, & Surbone, 2010; Kolahdooz et al., 2014), including culturally sensitive strategies (for example, translating screening tools to include multiple languages and adapting tools to be culturally relevant to populations) related to cancer treatment and prevention (Kagawa-Singer et al., 2010). For example, Becker et al. (2006) used talking circles to gain AIAN women's perceptions of key issues surrounding cancer as a health issue. Moreover, knowledge, attitudes, and behaviors toward cancer screening can vary for indigenous communities internationally, indicating a need for culturally appropriate cancer prevention programs (Kolahdooz et al., 2014).

Just as the heterogeneity across AIAN tribes cannot be overstated, individuals vary on the degree to which they prefer traditional or biomedical forms of treatment (Gone & Trimble, 2012); thus preventive and intervention strategies must be responsive and reflect this continuum of preferences. In a focus group study with 29 AI men age 50 years or older in the Midwest, participants described discussions with doctors as uncomfortable and uncommon, and discussed a need for traditional treatment practices to be used in conjunction with biomedical treatments (James et al., 2013). Despite no consensus on interventions preferred, men emphasized the need of multiple treatment and intervention modalities to provide individualized and well-matched services (James et al., 2013).

Other approaches to improving screening and prevention of CRC among AIAN communities can include improving tribal infrastructure and resources to educate, train, and conduct community outreach, as well as increasing community participation in developing culturally specific intervention and prevention strategies (Espey et al., 2007). Researchers have recommended four policy and research priorities to improve CRC screening for underserved populations: (1) promoting a CRC screening, (2) actively identifying underserved and underscreened populations, (3) developing infrastructure and approaches to systematically implement CRC screening, and (4) providing funding and programs to provide access to expertise on CRC for underserved populations across the United States (Gupta et al., 2014).

On an individual level, hiring AI physicians and clinicians is recommended as they may have greater familiarity with the culture and communication styles of AI community members and may be well suited to assess and overcome barriers related to CRC screening. Clinicians can take a more proactive role in advocating for AI clients to physicians to ensure that their needs are being met and they are receiving equitable medical care. We recommend having a social worker on staff in medical facilities to provide CRC knowledge and awareness as well as advocate and support AI members in receiving their health care needs.

CONCLUSION

CRC is a disparity among AIs that is preventable and treatable with early detection and screening (ACS, 2014a). Significant and targeted efforts at raising public, medical, and community awareness, training medical professionals on culturally sensitive communication, and training for AIs to increase self-efficacy are promising avenues to increase the health equity for these populations. Given that awareness and self-efficacy were associated with receipt of

CRC screening, the need for social workers and other health professionals to engage with AI communities and medical professionals to educate communities has never been greater. AI populations are more likely to be overlooked when CRC screenings are warranted (Espey et al., 2007), thus, more public awareness and advocacy for these populations are needed to prevent unnecessary cancer deaths. Finally, accountability is needed in the medical profession to ensure that systematic bias does not perpetuate CRC screening disparities among AI populations. **SWR**

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