ABSTRACT

Title of Thesis: DOES PATIENT-CENTERED COMMUNICATION AND TRUST IN PHYSICIAN INFORMATION VARY BY CANCER SURVIVORSHIP STATUS? AN ANALYSIS OF THE HEALTH INFORMATION NATIONAL TRENDS SURVEY (HINTS) 2017

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Master of Public Health
2019

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Trust is the foundation of the patient-physician relationship. Patients' trust in a physician has been associated with patient satisfaction, adherence to treatment, continuity of care, and improved health outcomes. Trust in a physician is especially important for health-vulnerable populations, such as cancer survivors, as they tend to endure complex emotional needs related to re-acclimating to the new normal post cancer diagnosis. The patient-physician relationship also relies heavily on effective patient-centered communication (PCC), however, associations between PCC and trust in physician information overall and by cancer survivorship status is not well understood. Using nationally representative data (N = 2604) ascertained from Cycle 1 of the fifth iteration of the 2017 Health Information National Trends Survey (HINTS), a cross-sectional analysis was conducted to examine PCC in relation to trust in physician information. PCC was assessed on a 4-point Likert scale using responses from seven sub-questions that address the main functions of PCC: 1) fostering healing relationships, 2) exchanging clinical information, 3) responding to emotional needs, 4) managing uncertainty, 5) facilitating shared decision-making, and 6) enabling patient self-management. Trust in physician information was analyzed dichotomously (high versus low) based on responses from a single item question. PCC was analyzed as individual components (optimal versus sub-optimal) and as an overall score. Confounders included age, sex, race/ethnicity, education, and household annual income. Odds ratios (OR) and 95% confidence intervals (CI) for the relationship between PCC and trust in physician information were estimated using multivariable logistic regression. Analyses of cancer survivorship status (cancer survivor versus never had cancer) as an effect modifier of the relationship between PCC and trust in physician information was also conducted using an interaction term. Results from the weighted multivariable models revealed that for every one-unit increase in the overall PCC score (range 1 to 100), the odds of having high trust in physician information increased by 4% (adj OR = 1.04, 95% CI = 1.03–1.05). The odds of reporting high level of trust in physician information were significantly associated with each individual component of PCC when comparing those who felt their communication component was optimal versus sub-optimal (PCC components: exchanging clinical information (adj OR = 2.57, 95% CI = 1.82–3.62), responding to emotional needs (adj OR = 2.34, 95% CI = 1.65–3.30), facilitating in shared decision-making (adj OR = 2.35, 95% CI = 1.70–3.26), enabling patient self-management (adj OR = 2.88, 95% CI = 2.11–3.92), managing uncertainty (adj OR = 2.45, 95% CI =

1.74–3.44), fostering healing relationships (adj OR = 2.79, 95% CI = 2.18–3.57), and spending enough time with you (adj OR = 2.09, 95% CI = 1.49–2.93)). When examining relationships by cancer survivorship status, estimates among cancer survivors were of greater magnitude compared to persons who reported never having cancer, however, no significant interactions were observed in the weighted multivariable models (all p-interaction>0.05). These findings provide insight on how optimal experiences of PCC influence trust in physician information and can help inform the development of PCC strategies to ultimately improve health outcomes and reduce consequences related to poor patient-physician trust overall and among cancer survivors.

DOES PATIENT-CENTERED COMMUNICATION AND TRUST IN PHYSICIAN INFORMATION VARY BY CANCER SURVIVORSHIP STATUS? AN ANALYSIS OF THE HEALTH INFORMATION NATIONAL TRENDS SURVEY (HINTS) 2017

by

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Thesis submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Master of Public Health
2019

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Chapter 1: Introduction

Trust is the foundation of the patient-physician relationship (Kao, Green, Zaslavsky, Koplan, & Cleary, 1998). The patient-physician relationship is characterized by "a knowledge and power imbalance in which patients depend on the physicians' expertise and execution of treatments to solve their health problems" (Hillen, Haes, & Smets, 2011; Calnan & Rowe, 2006; Becker & Roblin, 2008). Patients' trust in a physician is known to be associated with patient satisfaction, adherence to treatment, continuity of care, and improved health outcomes (Safran et al., 1998; Dugan, Trachtenberg, & Hall, 2005; Hall et al., 2002; Wu et al., 2015). Trust in a physician is especially important for health-vulnerable populations, such as cancer survivors as they tend to endure complex emotional needs related to re-acclimating to the new *normal* post cancer diagnosis (Alfano & Rowland, 2006; Annette et al., 2005; Blanch-Hartigan et al., 2015). Cancer survivors commonly face anxiety about their health and the fear of recurrence is often reported as a major concern (Blanch-Hartigan et al., 2015).

The patient-physician relationship also relies heavily on effective patient-centered communication. Prior studies have found that more patient-centered communication experiences are correlated with higher ratings of quality of health care and that these experiences are especially important for delivering quality cancer care (Finney Rutten, Agunwamba, Beckjord, Hesse, Moser, & Arora, 2015; IOM [Institute of Medicine], 2013); however, the direct relationship between patient-centered communication and trust in physician information overall and by cancer survivorship status is not well understood. Furthermore, despite these prior studies which assessed consequences of patient-physician trust, limited research has examined patient-centered communication and rated quality of health care overall (Newell & Jordan, 2015) and among cancer survivors (Finney Rutten, Agunwamba, Beckjord, Hesse, Moser, & Arora, 2015) as correlates of trust in information provided by a doctor using nationally representative data. Given this, the following analysis examined the role of patient-centered communication, perceived quality of health care, and sociodemographic characteristics in relation to trust in information provided by a physician, using Cycle 1 of the fifth iteration of the 2017 Health Information National Trends Survey (HINTS).

Specific Aims

The overarching goal of the study is to assess relationships between patient-centered communication and trust in physician information overall and among cancer survivors as a means of providing insight on the impact optimal experiences of patient-centered communication have on trust in physician information in relation to health outcomes. The study seeks to address the following specific aim:

Aim 1: To examine the role of patient-centered communication in relation to trust in physician information, overall and by cancer survivorship status.

Specifically, six main functions of patient-centered communication were assessed: 1) fostering healing relationships, 2) exchanging clinical information, 3) responding to emotional needs, 4) managing uncertainty, 5) facilitating shared decision-making, and

6) enabling patient self-management (Epstein & Street, 2007). Trust in physician information was measured using a 4-point Likert scale, where 1 represents “A lot”, 2 represents “Some”, 3 represents “A little”, and 4 represents “Not at all”. Responses from this single-item question were dichotomized into two variables: *High Level of Trust* (which represents “A lot”), and *Low Level of Trust* (which represents “Some”, “A little”, and “Not at all”). The relationship between trust in physician information and reported patient-centered communication was analyzed overall (via scale score) and individually for each sub-question.

Hypotheses:

- Respondents who report lower levels of patient-centered communication will be more likely to report less trust in physician information compared to those who report higher levels of patient-centered communication.
- Associations between patient-centered communication and trust in physician information will vary by cancer survivorship status.

Assessing these relationships can provide insight on existing disparities in trust in physician information and help inform the development of patient-centered communication strategies to ultimately improve health outcomes and reduce consequences related to poor patient-physician trust, such as avoidance behavior.

Chapter 2: Background

In the United States (US), an estimated 1,762,450 new cases of cancer will be diagnosed in 2019 (NCI, 2019). The National Cancer Institute (NCI) estimated that 15.5 million cancer survivors were living in the US in 2016 (NCI, 2019) and by 2026, the number of cancer survivors is expected to increase to 20.3 million (NCI, 2019). Additional research is essential to assist in guiding optimal care during the post-treatment period for cancer survivors. Exploring patient-centered communication in relation to trust in physician information will help clarify the needs of this growing population. A detailed review of prior studies examining patient-centered communication and patient-physician trust can be found in Appendix A.

Patient-Centered Communication

The patient-physician relationship relies heavily on effective patient-centered communication. The Institute of Medicine (2017) identified patient-centered care as one of six elements that comprise high-quality care. The patient-centered approach to care is based on the following three goals: 1) Eliciting the patient's perspective on the illness; 2) Understanding the patient's psychosocial context; and 3) Reaching shared treatment goals based on the patient's values (Hashim, M.J., 2017). Positive patient-centered communication has been shown to improve chronic disease management, quality of life, adherence to treatment recommendations, and disease-related outcomes (Finney Rutten, Agunwamba, Beckjord, Hesse, Moser, & Arora, 2015).

Effective patient-centered communication is especially important for delivering quality cancer care (IOM, 2013). A National Cancer Institute monograph outlines six main functions of patient-centered communication essential for cancer survivorship care: 1) Fostering a healing patient-provider relationship through building rapport and trust; 2) Exchanging clinical information and understanding patients' representations of that information; 3) Responding to patients' emotional needs; 4) Helping patients manage uncertainty; 5) Involving patients in the decision-making process; and 6) Enabling patient self-management through supporting patient autonomy and providing appropriate resources (Epstein & Street, 2007). Cancer survivors often endure complex emotional needs as they commonly experience a lack of certainty regarding their future health and potential recurrence (Alfano & Rowland, 2006; Annette et al., 2005; Blanch-Hartigan et al., 2015).

Patients require adequate health information to increase communication with their physician (Committee on Quality of Health Care in America, 2001; Hou & Shim, 2010; Joosten, Weert, Staak & Jong, 2008; Joosten, DeFuentes-Merillas, Weert, Sensky, Staak & Jong, 2008; Eysenbach & Diepgen, 2001). Despite the countless studies on quality of cancer care (Edward, Chipman, Giandinoto & Robinson, 2019), the overwhelming barriers to reaching excellent care for all cancer patients are, in part, due to lack of patient-centeredness in care delivery (IOM, 2013). Unfortunately, when it comes to cancer care, the goals of patient-centered communication are not always achieved (Lown, Rosen, Marttila, 2011). Prior studies have found that poor patient-provider communication can have significant negative consequences, including less patient satisfaction with cancer care (Thind, Liu, & Maly, 2011; Venetis et al., 2009), less trust in physicians (Gordon, Street, Sharf, Kelly, & Souchek, 2006), fear of being abandoned (Epner, Ravi, & Baile, 2011; Francis, Worthington, Kypriotakis, & Rose, 2010), poorer pain control (Street et al., 2014), feelings of hopelessness (Robinson, Hoover, Venetis, Kearney, & Street, 2013), less commitment to treatment decisions (Kahn, Schneider, Malin, Adams, & Epstein, 2007), lower rates of cancer screening (Ho, Lai, & Cheung, 2011), and disparities in cancer care (Karliner, Hwang, Nickleach, & Kaplan, 2011; Fiscella et al., 2011). Although these prior studies have examined consequences of patient-centered communication among cancer survivors, the gap in knowledge regarding the direct relationship between patient-centered communication and trust in physician information by cancer survivorship status still remains.

Trust in Physician Information

Trust is defined as the extent to which patients have confidence in their health care providers (Abdelhamid, Gaia, & Sanders, 2017) and is the foundation of the patient-physician relationship (Kao, Green, Zaslavsky, Koplan, & Cleary, 1998). Prior studies suggest that patients' trust in their physician is associated with patient satisfaction, adherence to treatment, continuity of care, patient activation, and improved health outcomes (Safran et al., 1998; Dugan, Trachtenberg, & Hall, 2005; Hall et al., 2002; Becker & Roblin, 2008; Wu et al., 2015). Trust in a physician is especially important among cancer survivors and "possibly even more essential, due to the life-threatening nature of cancer" (Hillen, Haes, & Smets, 2011). Further research focusing on “gaining a thorough understanding of the nature and impact of cancer patients’ trust in their physician, and how the interaction between physician and patient may contribute to such trust” is necessary (Hillen, Haes, & Smets, 2011). Studies suggest that supportive interactions among physicians and staff within primary care teams facilitate trust-building interactions between practitioners and patients (Becker & Roblin, 2008). Furthermore, evidence suggests that supportive, trustworthy interactions, in turn, help to enrich the innate imbalance in power between patients and physicians, leading to patients taking a more proactive role in their health (Becker & Robin, 2008).

Although prior studies have examined the influence of patient-centered communication (Leyva, Taber, & Trivedil, 2017; Finney Rutten, Agunwamba, Beckjord, Hesse, Moser, & Arora, 2015) and patient-physician trust on health outcomes (Gordon et al., 2006; Safran et al., 1998; Dugan, Trachtenberg, & Hall, 2005; Hall et al., 2002; Becker & Roblin, 2008; Wu et al., 2015) separately, no prior research has examined patient-centered communication and reported quality of health care as correlates of trust in physician information, overall or by cancer survivorship status, using nationally representative data. One study assessed patient race and patients’ perceptions of patient-centered communication on the development of trust in physicians and health system, however, this data source was not nationally representative and the sample size was relatively small, including 103 patients focusing on race as the main factor (Gordon et al., 2006). A comprehensive assessment of these potential predictors can provide insight on existing disparities in trust in physician information and help inform the development of patient-centered communication strategies to ultimately reduce consequences related to poor patient-physician trust among health-vulnerable populations such as cancer survivors. Appendix A presents a detailed review of previous literature and their findings, with respect to the outcome and exposure variables examined in this analysis.

Chapter 3: Research Design and Methods

Study Design & Data Source

This study was a secondary analysis using data provided by the fifth iteration of Cycle 1 of the 2017 Health Information National Trends Survey (HINTS); a nationally-representative cross-sectional survey administered by the National Cancer Institute (NCI) since 2003. The HINTS target population consists of civilian non-institutionalized adults aged 18 years or older living in the United States. Questionnaires were administered via postal mail. Data collection for this study (HINTS 5 Cycle 1) was conducted from January 25, 2017 through May 5, 2017, with a goal of receiving 3,500 completed questionnaires. HINTS 5 provides a comprehensive assessment of the American public's health communication through various channels (HINTS 5 Cycle 2 Methodology Report, 2017).

Study Population

The sampling frame for the HINTS 5 Cycle 1 used the Marketing System Group (MSG) address database to obtain random samples of addresses. A total number of 13,360 addresses were selected for Cycle 1. The addresses in the MSG database subject to sampling include all non-vacant residential addresses in the United States, including post office (P.O.) boxes, throwbacks (i.e., street addresses that require mail to be redirected by the United States Postal Services to a designated P.O. box), and seasonal addresses. The sampling strategy involved two stages. The first stage used a file of residential addresses to select a stratified sample of addresses. Specifically, the addresses were grouped into two strata and an equal-probability sample of addresses were selected within each stratum: 1) addresses in areas with high concentrations of minority populations (*N* = 8,530); and 2) addresses in areas with low concentrations of minority populations (*N* = 4,830). The high and low minority classifications were formed using the census tract level characteristics from the 2011-2015 American Community Survey. The second stage of data collection implemented the Next Birthday Method to select one adult within each sampled household. To achieve this, Question 3 on the first page of the survey instrument states, "The adult with the next birthday should complete this questionnaire. This way, across all households, HINTS will include responses from adults of all ages". Among the 3,347 questionnaires received, 3,285 were determined eligible. The following section details the inclusion and exclusion criteria and the derivation of the final analytic sample (*N* = 2,604). Additional details are summarized in Figure 1. Appendix B contains an outline of the inclusion criteria variables along with clarifications on those excluded from the final analytic sample.

Inclusion Criteria

All persons that responded to the following questions were included in the study analyses:

1. "In general, how much would you trust information about health or medical topics from…a doctor?" (*n* = 3,182 valid responses)
2. "The following questions are about your communication with all doctors, nurses, or other health professionals you saw during the past 12 months…How often did they do each of the following":

   a. "Give you the chance to ask all the health-related questions you had" (*n* =2,771 valid responses)
   b. "Give the attention you needed to your feelings and emotions" (*n* = 2,748 valid responses)
   c. "Involve you in decisions about your health care as much as you wanted" (*n* = 2,756 valid responses)
   d. "Make sure you understood the things you needed to do to take care of your health" (*n* = 2,765 valid responses)
   e. "Help you deal with feelings of uncertainty about your health or health care" (*n* = 2,737 valid responses)
   f. "Explain things in a way you could understand" (*n* = 2,757 valid responses)
   g. "Spend enough time with you" (*n* = 2,753 valid responses)

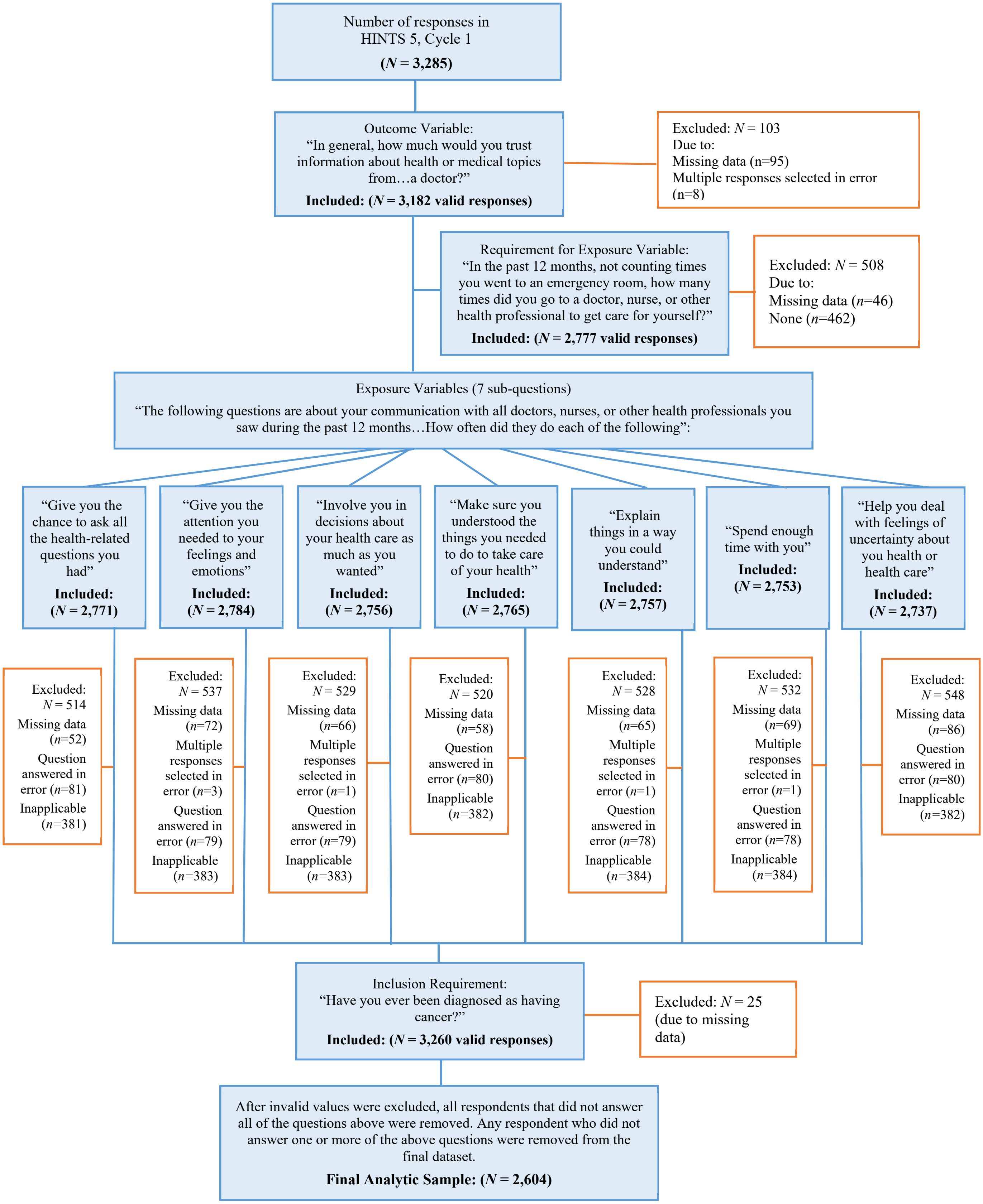
3. "Have you ever been diagnosed as having cancer?" (*n* = 3,260 valid responses)

Exclusion Criteria

Any persons with the following responses for the above listed questions in the "Inclusion Criteria" were excluded from the analyses: (1) did not respond (i.e., missing data); (2) selected multiple responses in error; (3) the question was not applicable to the respondent; or (4) answered question in error (commission error). Once the data was thoroughly cleaned and assessed, any cases with coding errors (e.g., multiple responses selected in error, or question answered when it should be considered inapplicable) were also excluded from the analyses.

Given that some households receive mail in multiple ways, duplication of household units were present in the sampling frame used for the address sample. To account for this, the following question was included on the last page of the questionnaire: “At which of the following types of addresses does your household currently receive residential mail?” Respondents were instructed to mark all that apply: “A street address with a house or building number”, “An address with a rural route number”, “A U.S. post office box (P.O. Box)”, and “A commercial mailbox establishment (such as Mailboxes R Us, and Mail Boxes Etc.®)”. HINTS identified 12 questionnaires as duplicates and thus deemed them as ineligible.

Figure 1: Cascade Deriving to Final Analytic Sample



Outcome (Dependent Variable)

Trust in Physician Information

The outcome variable assessed in this study was trust in physician information, determined by responses from one question: "In general, how much would you trust information about health or medical topics from…a doctor?" The response options were on a 4-point Likert scale, where 1 represents "A lot", 2 represents "Some", 3 represents "A little", and 4 represents "Not at all". Reponses from this single-item question was dichotomized into two variables when performing multivariable logistic regressions: *High Level of Trust* (which represents "A lot") and *Low Level of Trust* (which represents "Some", "A little" and "Not at all"). The probability being modeled for this analysis was *High Level of Trust*.

Exposure (Independent Variable)

Patient-Centered Communication

To assess patient-centered communication, responses were analyzed from Cycle 1 of the fifth iteration of the HINTS questionnaire which assessed six main functions of patient-centered communication: 1) fostering healing relationships, 2) exchanging clinical information, 3) responding to emotional needs, 4) managing uncertainty, 5) facilitating shared decision-making, and 6) enabling patient self-management (Epstein & Street, 2007). To address these functions, responses from seven sub-questions from Section C (Your Health Care) were analyzed; under Question C4 "The following questions are about your communication with all doctors, nurses, or other health professionals you saw during the past 12 months". Respondents were then asked, "How often did they do each of the following" (see applicable function noted next to response options):

- "Explain things in a way you could understand"
  (fostering healing relationships)
- "Give you the chance to ask all the health-related questions you had"
  (exchanging clinical information)
- "Give the attention you needed to your feelings and emotions"
  (responding to emotional needs)
- "Help you deal with feelings of uncertainty about your health or health care"
  (managing uncertainty)
- "Involve you in decisions about your health care as much as you wanted"
  (facilitating shared decision making)
- "Make sure you understood the things you needed to do to take care of your health" (enabling patient self-management)
- "Spend enough time with you" (This item was newly added in 2017 HINTS 5 Cycle 1, and was therefore analyzed in addition to the six main functions of patient-centered communication)

The response options for each sub-question were on a 4-point Likert scale, where 1 represents "Always", 2 represents "Usually", 3 represents "Sometimes", and 4 represents "Never". Similar to prior studies (Arora, Reeve, Hays, Clauser, & Oakley-Girvan, 2011; Blanch-Hartigan et al., 2015), patient-centered communication was analyzed in two ways: 1) Overall via scale score (1–100); and, 2) Individually for each sub-question using multivariable logistic regression. To create an overall scale score for reported patient-centered communication, responses were reverse coded, summed (for each individual sub-question) and averaged, then linearly transformed the scale score to 1–100 format, where higher scores represent greater patient-centered communication (Blanch-Hartigan et al., 2015; Grassi et al., 2007). To analyze each sub-question of patient-centered communication individually, the responses were dichotomized as *Optimal* (representing “Always”) and *Suboptimal* (representing “Usually”, “Sometimes”, and “Never”). The reference group was *Suboptimal* (Arora, Reeve, Hays, Clauser, & Oakley-Girvan, 2011; Blanch-Hartigan et al., 2015).

Effect Modifier

Cancer Survivorship Status

Cancer status was determined from responses to one question: “Have you ever been diagnosed as having cancer?” The dichotomous responses consist of “Yes” and “No”. After reviewing descriptive statistics on the distribution of type of cancer, it was determined that frequencies were too small to assess cancer types separately. Furthermore, due to small cell sizes in the age-adjusted and multivariable models, we were not able to stratify our analyses by cancer survivorship status as the models failed to converge. Instead, cancer status was analyzed as an interaction term.

Confounders

Age

Age was measured in years as a continuous variable from a single question: “What is your age?” Age was analyzed as a categorical variable: *18 to 34 years, 35 to 49 years, 50 to 64 years, 65 to 74 years,* and *75 or more years.*

Sex

Sex was measured as a binary variable via one question: “Are you male or female?” Sex was analyzed as a dichotomous variable.

Education

Education status was assessed using responses from one question: “What is the highest grade or level of schooling you completed?” The response options consist of: “Less than 8 years*”, “*8 through 11 years”, “12 years or completed high school”, “Post high school training other than college (vocational or technical)”, “Some college”, “College graduate”, and “Post graduate”. For this analysis, education was collapsed into the following categories (see HINTS response options represented next to each category):

- *Less than High School* (“Less than 8 years”, and “8 through 11 years”)
- *12 Years or Completed High School* (“12 years or completed high school”)
- *Some College* (“Post high school training other than college (vocational or technical)”, “Some College”)
- *College Graduate or Higher* (“College graduate”, and “Post graduate”)

Number of Years Living in the United States

Participants were asked the following questions to determine US born versus foreign born status and number of years living in the US: (1) "Were you born in the United States?", and (2) "In what year did you come to live in the United States?" (this year (continuous) was subtracted from the year the survey was administered (2017)). After reviewing the distribution, the following categories were created for this study: "Less than 5 years", "5 to 10 years", "11 to 19 years", and "20 or more years".

Race/Ethnicity

Race and ethnicity was assessed using responses to two questions: "Are you of Hispanic, Latino/a, or Spanish origin?" and "What is your race?" For both questions, HINTS allowed respondents to select one or more categories. For this analysis, categories were created using one of the HINTS recommended race/ethnicity variables (see HINTS option(s) represented next to each category):

- *Asian* ("Asian Indian", "Chinese", "Filipino", "Japanese", "Korean", "Vietnamese", "Other Asian")
- *Black or African American* ("Black or African American")
- *Hispanic or Latino/a* ("Yes, Mexican, Mexican American, Chicano/a", "Yes, Puerto Rican", "Yes, Cuban", "Yes, another Hispanic, Latino/a, or Spanish origin")
- *White* ("White")
- *Other* ("Native Hawaiian", "Guamanian or Chamorro", "Samoan", "Other Pacific Islander", "American Indian or Alaska Native")

Household Annual Income

This was measured using responses from the following question: “Thinking about members of your family living in this household, what is your combined annual income, meaning the total pre-tax income from all sources earned in the past year?” There are nine response options ranging from “$0 to $9,999” to “$200,000 or more”. The distribution of responses were assessed to determine appropriate income range categories to include in the analyses: *Less than $20,000, $20,000 to $49,999, $50,000 to $99,999,* and *$100,000 or more.*

Rated Quality of Care

Rated quality of care was assessed using responses from one question: “Overall, how would you rate the quality of health care you received in the past 12 months?” The response options ranged from 1 to 5, where 1 represents “Excellent”, 2 represents “Very good”, 3 represents “Good”, 4 represents “Fair”, and 5 represents “Poor”. Similar to prior studies (Arora et al, 2011; Blanch-Hartigan et al., 2015), the responses were dichotomized to *Optimal* (representing “Excellent” and “Very good”) and *Suboptimal* (representing “Good”, “Fair”, and “Poor”). The reference group was *Suboptimal.*

Data analysis

Data analyses were conducted using SAS statistical software, version 9.4. Data cleaning was performed to screen for coding errors, and/or implausible values and descriptive statistics were reviewed. Pearson chi-squared analyses were used to analyze the association between sociodemographic characteristics, patient-centered communication and trust in physician information overall and by cancer survivorship status. The relationship between patient-centered communication and trust in physician information was analyzed using the following approaches: 1) Overall (via scale score) using multivariable logistic regression; and 2) Individually for each sub-question (optimal versus sub-optimal) using multivariable logistic regression (where sub-optimal was the reference group). Variance inflation factor (VIF) was assessed to determine the presence of multicolinearity. Given the presence of multicolinearity, all sub-questions were not assessed simultaneously in one model. Instead, analyses were performed individually. Subgroup specific estimates were also calculated by cancer survivorship status. Crude and adjusted (adj) odds ratios (OR) and 95% confidence intervals (CI) for relationships between patient-centered communication (exposure) and trust in physician information (outcome) were calculated using logistic regression incorporating jackknife replicate weights recommended by HINTS. Models were performed for the overall study population and by cancer survivorship status (as an interaction term). Potential confounders were selected a priori based on prior studies and included age, sex, race/ethnicity, education, number of years living in the United States, and household annual income. Although the above referenced covariates were not associated with both the exposure and outcome variables in this study population, they were still included in the final multivariable model due to their associations in prior studies. For purposes of this study, respondents with missing information for the demographic characteristics are displayed in the table as “Unknown”. These respondents were therefore retained in the analysis.

Chapter 4: Results

Table 1 presents the sociodemographic characteristics of the respondents included in this study (N=2,604). More than half of respondents were age 50 years or older at the time of the survey and more than 60% identified themselves as female or as White (60%), while 12.7% identified as Black or African American, 11% as Hispanic or Latino/a, 4% as Asian, and 4% as Other. Nearly half of the respondents reported graduating from college (45%) and approximately 67% reported living in a household where the annual household income is more than $50,000. A total of 286 respondents reported that they were not born in the United States. Of these, more than 85% reported living in the United States for eleven or more years. Among those who reported being diagnosed with cancer, approximately 13% were diagnosed less than one year since the time of the survey (2017), 22% were diagnosed two to five years ago, 20% were diagnosed six to ten years ago, and 45% were diagnosed eleven or more years ago.

Table 1 also details sociodemographic characteristics of study respondents by cancer survivorship status. Among cancer survivors (n=429), respondents aged 50-64 reported the lowest level of trust compared to the other age groups (47%). Low levels of trust were reported among females (69%) and those who identify as White (61%). Respondents who completed 12 years or high school reported the lowest level of trust (32%) compared to the other education categories as well as those who live in a household that earns a combined income of $50,000 to $99,999 (31%). Foreign-born cancer survivors who lived in the United States for twenty or more years reported the lowest level of trust (75%). Lastly, cancer survivors who have been living with cancer for eleven or more years reported the lowest level of trust compared to survivors who were diagnosed more recently (38%).

Among respondents who reported never being diagnosed with cancer (n=2,175), those aged 35-49 reported lower level of trust compared to the other age groups (34%). Similar to cancer survivors, low levels of trust were reported more often among females (52%) and those who identified as White (56%) compared to the other races. Low levels of trust were also reported among respondents who completed some college (32%) and those who live in a household that earns a combined income of \$20,000 to \$49,999 (29%). Similar to cancer survivors, foreign-born individuals who lived in the United States for twenty or more years reported the lowest level of trust (52%).

Table 1

Sociodemographic Characteristics of Cancer Survivors in HINTS 5 Cycle 1, by Cancer Survivorship Status and Level of Trust in Physician Information

	Total Sample[a] (N = 2604)	**Cancer Survivor (N = 429)**		**Never Had Cancer (N = 2175)**	
		High Level of Trust[ab] N (%)	Low Level of Trust[ab] N (%)	High Level of Trust[ab] N (%)	Low Level of Trust[ab] N (%)
Age[c] *(years)*					
18–34	280	4 (2.71)	0 (0)	223 (26.44)	53 (16.07)
35–49	510	18 (8.88)	8 (15.41)	346 (27.69)	138 (33.83)
50–64	879	108 (35.2)	44 (46.74)	552 (28.78)	205 (32.83)
65-74	551	102 (25.97)	27 (18.65)	305 (10.17)	117 (10.76)
75+	306	84 (27.25)	20 (19.20)	148 (6.92)	54 (6.51)
Unknown	78	11	3	38	26
Sex					
Male	1002	129 (43.08)	33 (30.96)	617 (47.25)	223 (47.62)
Female	1566	190 (56.92)	68 (69.04)	950 (52.75)	358 (52.38)
Unknown	36	8	1	15	12
Race/Ethnicity					
White (Non-Hispanic)	1566	232 (75.21)	69 (61.26)	976 (64.93)	289 (56.38)
Black or African American (Non-Hispanic)	331	30 (7.43)	15 (19.83)	187 (8.39)	99 (10.91)
Hispanic or Latino/a	298	21 (6.71)	5 (9.29)	191 (13.76)	81 (13.65)
Asian (Non-Hispanic)	95	4 (1.44)	1 (0.15)	66 (4.84)	24 (4.46)
Other (Non-Hispanic)	98	10 (2.22)	5 (4.85)	56 (2.76)	27 (3.21)
Unknown	216	30	7	106	73
Education					
Less than High School	148	13 (4.16)	8 (9.75)	82 (6.30)	45 (11.74)
12 Years or Completed High School	479	64 (24.22)	27 (32.10)	261 (20.89)	127 (27.69)
Some College	747	96 (35.64)	30 (30.13)	441 (33.15)	180 (31.59)
College Graduate or Higher	1179	145 (33.91)	34 (26.64)	775 (38.64)	225 (27.57)
Unknown	51	9	3	23	16
Household Annual Income					
Less than $20,000	414	41 (11.64)	28 (26.08)	225 (14.07)	120 (16.73)
$20,000 to $49,999	619	79 (21.24)	21 (14.55)	366 (22.06)	153 (29.31)
$50,000 to $99,999	735	97 (32.26)	27 (31.32)	452 (29.46)	159 (25.55)
$100,000 or More	600	74 (25.56)	16 (15.82)	413 (25.80)	97 (18.50)
Unknown	236	36	10	126	64
Number of Years Living in the US (*n*=286)[d]					
Less than 5 years	15	1 (6.04)	0 (0)	10 (9.04)	4 (6.77)

5 to 10 years	24	1 (5.62)	0 (0)	18 (22.15)	5 (7.04)
11 to 19 years	56	1 (9.51)	1 (25.31)	35 (21.49)	19 (34.47)
20 or More years	191	16 (78.82)	5 (74.69)	117 (47.32)	53 (51.72)
Number of Years With Cancer (*n*=405)[e]				-	-
Less than 1 year	52	39 (13.54)	13 (19.19)	-	-
2 to 5 years	88	66 (17.09)	22 (20.79)		
6 to 10 years	80	56 (19.84)	24 (21.54)	-	-
11 or more years	185	149 (49.54)	36 (38.48)	-	-

NOTE: The frequencies displayed above are unweighted values, and the sample percentages displayed are weighted values.

[a] Subcategories for each factor may not sum to the total N due to missing data.

[b] Level of trust was dichotomized into two variables: High Level of Trust (*A lot*) vs. Low Level of Trust (*Some / A Little / Not at All*).

[c] Weighted mean age = 56.6 years (SD = 15.9 years; SE = 0.32).

[d] Among US-born and foreign-born respondents. Weighted mean number of years = 30.2 years (SD = 17.8 years; SE = 1.1).

[e] Among cancer survivors only. Weighted mean number of years = 2.98 years (SD = 1.1 years; SE = 0.05).

Table 2 presents the distribution of all responses for levels of trust in physician information overall and by cancer survivorship status. Most of the respondents reported having “a lot of trust” in a doctor (73%). The remainder of the respondents reported “some” trust (23%), “a little” trust (3%) and no trust at all (1%). Levels of trust did not vary by cancer survivorship status (p=0.657). Among the cancer survivors (N=429), 76% reported having a lot of trust in a doctor, followed by some trust (20%), a little trust (4%) or no trust (less than 1%). The distribution of level of trust is also similar among respondents who never had cancer. After reviewing the distribution in Table 2, trust was dichotomized into two groups: High Level of Trust (“A lot” n=1,909) and Low Level of Trust (“Some”, “A Little”, and “Not at All”, n=695).

Table 2

Level of Trust in Physician Information, by Cancer Survivorship Status

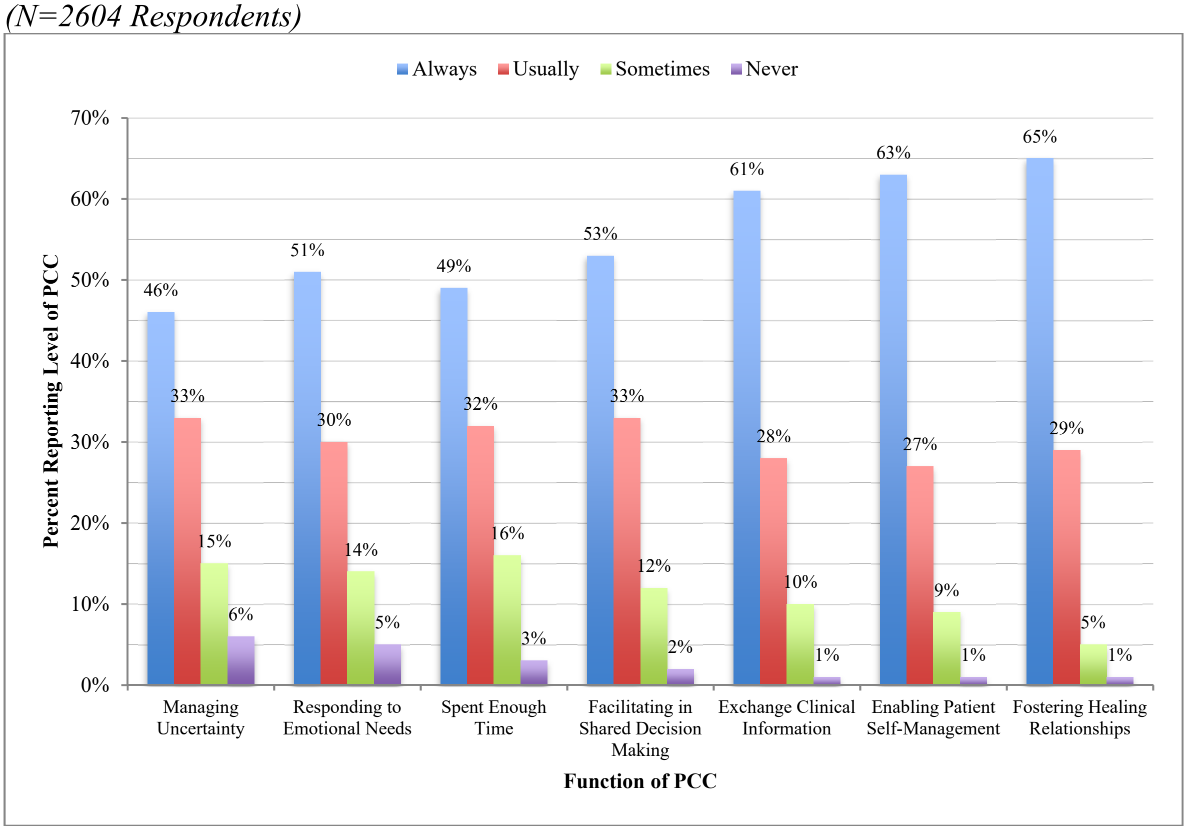
	Total Sample (*N* = 2604)		**Cancer Survivor** (*N* = 429)		**Never Had Cancer** (*N* = 2175)		
	n	(%)	*n*	(%)	*n*	(%)	*p-value*[a]
Level of Trust							0.657
A Lot	1909	(73.51)	327	(76.22)	1582	(72.74)	
Some	589	(22.62)	84	(19.58)	505	(23.22)	
A Little	90	(2.90)	17	(3.96)	73	(3.36)	
Not at All	16	(0.97)	1	(0.23)	15	(0.69)	

NOTE: The frequencies displayed above are unweighted values, and the sample percentages displayed are weighted values.

[a]Chi-square test for independence.

Figure 2 displays the breakdown of all responses for each level of PCC (4-point likert scale). More than a fifth of the respondents reported that their provider either never helps them manage their feelings of uncertainty (6%) or only sometimes helps with managing these feelings (15%). Approximately 16% of the respondents reported that they feel that their provider sometimes spends enough time with them versus 3% reported that they never spend enough time with them. Furthermore, 19% of the respondents reported that their provider either sometimes (14%) or never (5%) responded to their emotional needs.

Figure 2
Percent Reporting Level of Patient-Centered Communication (PCC), by Function of PCC
(N=2604 Respondents)

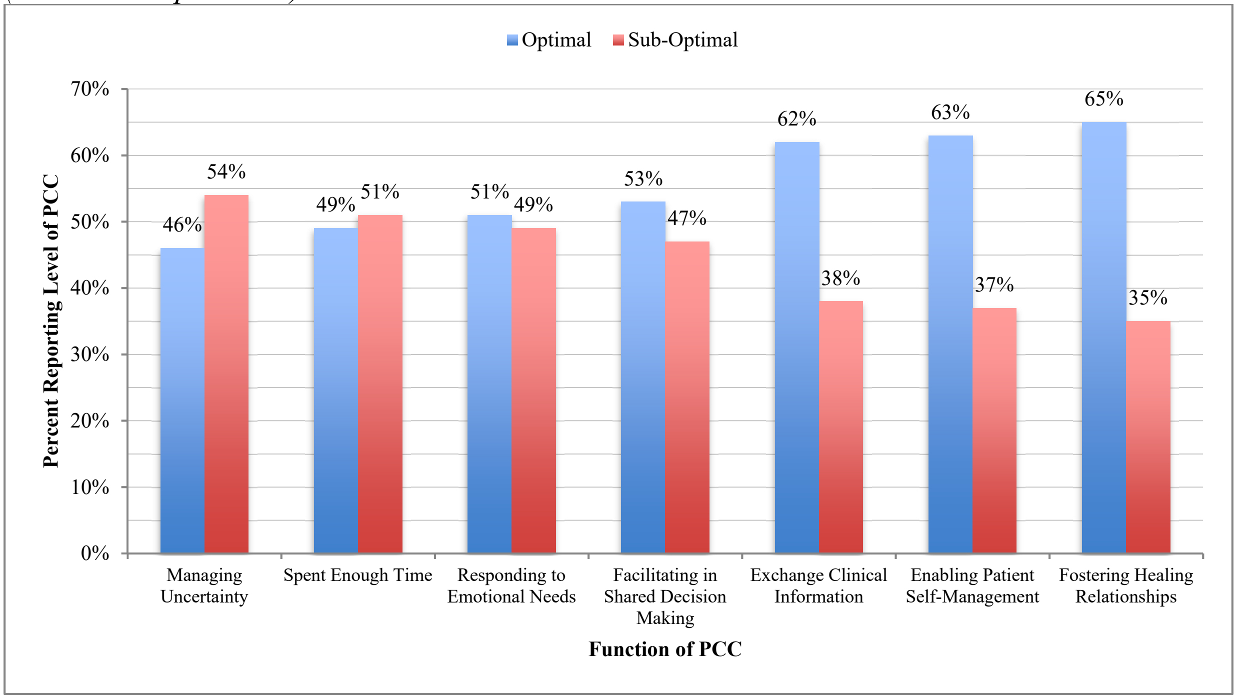


NOTE: The sample percentages displayed are weighted values.
The first six functions of PCC were outlined by a National Cancer Institute monograph. Responses from the HINTS5 Cycle 1 addressed the six main functions of PCC (see applicable HINTS question for each main function): 1) Exchange Clinical Information *(Chance to Ask Questions)*; 2) Responding to Emotional Needs *(Feelings Addressed)*; 3) Facilitating in Shared Decision Making *(Involved in Decisions)*; 4) Enabling Patient Self-Management *(Understood Next Steps)*; 5) Managing Uncertainty *(Help Uncertainty)*; 6) Fostering Healing Relationships *(Explained Clearly).* The last item listed in the above table ("Spending enough time with you") was newly added in 2017 HINTS5 Cycle 1.

Figure 3 shows the dichotomous distribution of responses for each function of PCC (optimal vs. sub-optimal). More than half of the respondents reported that providers did not always help them manage their feelings of uncertainty (54%) and did not always spend enough time with them (51%). Respondents also reported that their feelings were not always addressed as their providers did not always respond to their emotional needs (49%), nor did they feel that they were always involved in making shared decisions (47%). More than a third of the respondents reported that their providers did not always provide the opportunity to ask questions and exchange clinical information (38%), that their providers did not always make sure that they fully understood the next steps involved in how to take care of their health (37%), and that their providers did not always explained things clearly in order to foster healing relationships (35%).

Figure 3

Percent Reporting Optimal vs. Sub-Optimal Level of Patient-Centered Communication (PCC), by Function of PCC (N=2604 Respondents)



NOTES:
Patient-Centered Communication was dichotomized as Optimal (*always*) vs. Suboptimal (*usually/sometimes/never*).
The sample percentages displayed are weighted values.
The first six functions of PCC were outlined by a National Cancer Institute monograph. Responses from the HINTS5 Cycle 1 addressed the six main functions of PCC (see applicable HINTS question for each main function): 1) Exchange Clinical Information *(Chance to Ask Questions)*; 2) Responding to Emotional Needs *(Feelings Addressed)*; 3) Facilitating in Shared Decision Making *(Involved in Decisions)*; 4) Enabling Patient Self-Management *(Understood Next Steps)*; 5) Managing Uncertainty *(Help Uncertainty)*; 6) Fostering Healing Relationships *(Explained clearly).* The last item listed in the above table (“Spending enough time with you”) was newly added in 2017 HINTS5 Cycle 1.

The number of reports of optimal and sub-optimal PCC for each function is displayed in Table 3 by level of trust. Among the respondents who reported low level of trust (n=695), more than half reported sub-optimal PCC for every function of PCC. Nearly 69% reported sub-optimal levels related to their provider helping in managing their uncertainty, 64% reported sub-optimal levels of their provider spending enough time with them, 63% reported sub-optimal levels related to their provider responding to their emotional needs, and 62% reported sub-optimal levels related to their provider facilitating in shared-decision making. Among respondents who reported high levels of trust (N=1,909), more than half reported optimal PCC for every function of PCC.

Table 3

Number of Reports of Optimal and Sub-Optimal Patient-Centered Communication (PCC) for each Function of PCC, by Level of Trust in Physician Information (N = 2604 Respondents)

	High Level of Trust[a] (N = 1909)		**Low Level of Trust[a]** (N = 695)	
Functions of PCC[c]	Optimal[b] PCC n (%)	Sub-Optimal[b] PCC n (%)	Optimal[b] PCC n (%)	Sub-Optimal[b] PCC n (%)
Exchanging Clinical Information	1342 (67.4)	567 (32.6)	329 (45.4)	366 (54.6)
Responding to Emotional Needs	1063 (56.2)	846 (43.8)	243 (37.1)	452 (62.9)
Facilitating in Shared Decision-Making	1165 (58.3)	744 (41.7)	263 (38.1)	432 (61.9)
Enabling Patient Self-Management	1324 (69.6)	585 (30.4)	314 (45.3)	381 (54.7)
Managing Uncertainty	998 (51.1)	911 (48.9)	202 (31.2)	493 (68.8)
Fostering Healing Relationships	1352 (71.3)	557 (28.7)	334 (46.9)	361 (53.1)
Spending Enough Time With You	1063 (53.6)	846 (46.4)	250 (36.5)	445 (63.5)

NOTE: The frequencies displayed above are unweighted values, and the sample percentages displayed are weighted values.

[a] Level of trust was dichotomized into two variables: High Level of Trust (*A lot*) vs. Low Level of Trust (*Some / A Little / Not at All*).

[b] PCC was dichotomized as Optimal (*always*) vs. Suboptimal (*usually/sometimes/never*).

[c] The first six functions of PCC were outlined by a National Cancer Institute monograph. Responses from the HINTS5 Cycle 1 addressed the six main functions of PCC (see applicable HINTS question for each main function): 1) Exchange Clinical Information *(Chance to Ask Questions)*; 2) Responding to Emotional Needs *(Feelings Addressed)*; 3) Facilitating in Shared Decision Making *(Involved in Decisions)*; 4) Enabling Patient Self-Management *(Understood Next Steps)*; 5) Managing Uncertainty *(Help Uncertainty)*; 6) Fostering Healing Relationships *(Explained Clearly).* The last item listed in the above table ("Spending enough time with you") was newly added in 2017 HINTS5 Cycle 1.

Results from unadjusted analyses are displayed in Appendix C, while the results from the age-adjusted analyses of trust in physician information and patient-centered communication are summarized in Table 4. Results from analysis of the overall study population support statistically significant positive relationships between PCC and trust in physician information with age-adjusted odds ratio estimates ranging from 2.03 to 2.78 across the PCC components (Table 4). Furthermore, for every one-unit increase in the overall PCC score (range 1 to 100), the odds of having high trust in physician information increased by 4% (adj OR = 1.04, 95% CI = 1.03–1.05). The only sociodemographic characteristic that was statistically associated with high trust in physician information with cancer survivorship as an interaction term was age, specifically age group 35 to 49 years (interaction term p-value <0.05). See Appendix D for these estimates.

Patient-centered communication in relation to trust in physician information was also analyzed by cancer survivorship status using an interaction term (Table 4). For the age-adjusted model, among all of the functions of PCC, the only function that was statistically significantly modified by cancer status was "facilitating in shared decision-making" ($p<0.05$). Among cancer survivors, the odds of trust in physician information for patients who reported optimal experiences with facilitating in shared decision-making was 4.63 times the odds of trust in physician information among patients who reported sub-optimal experiences with facilitation in shared decision-making. The relevant odds ratio among those who never had cancer was 2.12 and the 95% confidence interval was 1.50–2.99 (Table 4). Although the interaction term with cancer survivorship is not statistically significant for all other PCC sub-questions, the observed magnitude of associations between PCC and trust in physician information is stronger among cancer survivors.

Similar to the age-adjusted model, results from the weighted multivariable models (Table 5) reveal that for every one-unit increase in the overall PCC score (range 1 to 100), the odds of having high trust in physician information increased by 4% (OR = 1.04, 95% CI = 1.03–1.05). The odds of reporting high level of trust in physician information were significantly associated with each individual component of PCC when comparing those who felt their communication component was optimal versus sub-optimal (PCC components: exchanging clinical information (OR = 2.57, 95% CI = 1.82–3.62), responding to emotional needs (OR = 2.34, 95% CI = 1.65–3.30), facilitating in shared decision-making (OR = 2.35, 95% CI = 1.70–3.26), enabling patient self-management (OR = 2.88, 95% CI = 2.11–3.92), managing uncertainty (OR = 2.45, 95% CI = 1.74–3.44), fostering healing relationships (OR = 2.79, 95% CI = 2.18–3.57), and spending enough time with you (OR = 2.09, 95% CI = 1.49–2.93)). While estimates among cancer survivors were of greater magnitude, no significant interactions were observed with cancer survivorship status in the weighted multivariable models (all p-interaction>0.05).

With regard to rated quality of care, those that reported high level of trust had the greatest magnitude consistently in the unadjusted (Appendix C), age-adjusted (Table 4) and multivariable (Table 5) models (adj. OR = 4.30, 95% CI = 3.03 – 6.09).

Multivariable logistic regression was also conducted to adjust for rated quality of care in addition to age, gender, education, race/ethnicity, and household annual income (Appendix E).

Table 4

Relationship Between Trust in Physician Information and Patient-Centered Communication and Rated Quality of Care, by Cancer Survivorship Status [Age-Adjusted, Weighted]

	Total Sample (*N* = 2604)		**Cancer Survivor** (*N* = 429)		**Never Had Cancer** (*N* = 2175)		
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	Interaction term p-value
Overall Patient-Centered Communication Score[a] (Range 1–100)	1.04	(1.03 – 1.05)	1.05	(1.03 – 1.07)	1.04	(1.02 – 1.05)	0.183
Functions of Patient-Centered Communication[b,c] (Dichotomous)							
Exchanging Clinical Information	2.57	(1.88 – 3.53)	2.99	(1.55 – 5.77)	2.54	(1.77 – 3.63)	0.685
Responding to Emotional Needs	2.15	(1.56 – 2.97)	3.12	(1.63 – 5.99)	2.09	(1.49 – 2.93)	0.247
Facilitating Shared Decision-Making	2.27	(1.65 – 3.12)	4.63	(2.56 – 8.36)	2.12	(1.50 – 2.99)	0.029*
Enabling Patient Self-Management	2.77	(2.08 – 3.68)	4.25	(2.48 – 7.30)	2.65	(1.94 – 3.63)	0.141
Managing Uncertainty	2.28	(1.64 – 3.17)	3.48	(2.05 – 5.89)	2.19	(1.52 – 3.14)	0.167
Fostering Healing Relationships	2.78	(2.21 – 3.48)	4.75	(2.60 – 8.68)	2.64	(2.04 – 3.41)	0.096
Spends Enough Time With You[d]	2.03	(1.49 – 2.75)	2.41	(1.36 – 4.25)	1.99	(1.42 – 2.79)	0.582
Rated Quality of Care[b,e]	4.30	(3.03 – 6.09)	4.17	(1.73 – 10.09)	4.31	(2.92 – 6.36)	0.950

The probability modeled for Trust in Physician Information is High Level of Trust.

[a] Overall patient-centered communication score ranged from 1 to 100 after linear transformation, where higher score represents better patient-centered communication.

[b] Separate logistic regressions of functions and quality of care on trust in physician information.

[c] Dichotomized as Optimal (*always*) vs. Suboptimal (*usually/sometimes/never*). The reference group is Suboptimal (*usually/sometimes/never*). The first six functions of PCC were outlined by a National Cancer Institute monograph. Responses from the HINTS5 Cycle 1 addressed the six main functions of PCC (see applicable HINTS question for each main function): 1) Exchange Clinical Information *(Chance to Ask Questions)*; 2) Responding to Emotional Needs *(Feelings Addressed)*; 3) Facilitating in Shared Decision Making *(Involved in Decisions)*; 4) Enabling Patient Self-Management *(Understood Next Steps)*; 5) Managing Uncertainty *(Help Uncertainty)*; 6) Fostering Healing Relationships *(Explained Clearly).* The last item listed in the above table ("Spending enough time with you") was newly added in 2017 HINTS5 Cycle 1.

[d] This is calculated in addition to the 6 main core functions.

[e] Dichotomized as Optimal (*Excellent/Very good*) vs. Suboptimal (*Good/Fair/Poor)*. The reference group is Suboptimal (*Good/Fair/Poor).*

*p-value <0.05.

Table 5

Relationship Between Trust in Physician Information and Patient-Centered Communication and Rated Quality of Care, Overall and by Cancer Survivorship Status [Multivariable Model, Weighted]

	Total Sample (*N* = 2604)	**Cancer Survivor** (*N* = 429)	**Never Had Cancer** (*N* = 2175)	
	OR (95% CI)	OR (95% CI)	OR (95% CI)	Interaction term p-value
Overall Patient-Centered Communication Score[a] (Range 1–100)	1.04 (1.03–1.05)	1.05 (1.03–1.07)	1.04 (1.02–1.05)	0.239
Functions of Patient-Centered Communication[b,c] (Dichotomous)				
Exchanging Clinical Information	2.57 (1.82–3.62)	2.92 (1.49–5.72)	2.53 (1.71–3.75)	0. 738
Responding to Emotional Needs	2.34 (1.65–3.30)	3.11 (1.56–6.19)	2.27 (1.58–3.27)	0.392
Facilitating Shared Decision-Making	2.35 (1.70–3.26)	4.41 (2.30–8.44)	2.21 (1.55–3.14)	0.072
Enabling Patient Self-Management	2.88 (2.11–3.92)	4.20 (2.44–7.24)	2.76 (1.96–3.89)	0.212
Managing Uncertainty	2.45 (1.74–3.44)	3.64 (2.10–6.33)	2.35 (1.62–3.41)	0.198
Fostering Healing Relationships	2.79 (2.18–3.57)	4.31 (2.35–7.90)	2.67 (2.01–3.54)	0.190
Spends Enough Time With You[d]	2.09 (1.49–2.93)	2.48 (1.38–4.46)	2.05 (1.42–2.96)	0.585
Rated Quality of Care[b,e]	4.10 (2.82–5.95)	4.05 (1.66–9.89)	4.10 (2.70–6.22)	0.983

Multivariable model adjusted for age, gender, education, race/ethnicity, and household annual income. The probability modeled for Trust in Physician Information is High Level of Trust.

[a] Overall patient-centered communication score ranged from 1 to 100 after linear transformation, where higher score represents better patient-centered communication.

[b] Separate logistic regressions of functions and quality of care on trust in physician information.

[c] Dichotomized as Optimal (*always*) vs. Suboptimal (*usually/sometimes/never*). The reference group is Suboptimal (*usually/sometimes/never*). The first six functions of PCC were outlined by a National Cancer Institute monograph. Responses from the HINTS5 Cycle 1 addressed the six main functions of PCC (see applicable HINTS question for each main function): 1) Exchange Clinical Information *(Chance to Ask Questions)*; 2) Responding to Emotional Needs *(Feelings Addressed)*; 3) Facilitating in Shared Decision Making *(Involved in Decisions)*; 4) Enabling Patient Self-Management *(Understood Next Steps)*; 5) Managing Uncertainty *(Help Uncertainty)*; 6) Fostering Healing Relationships *(Explained Clearly).* The last item listed in the above table ("Spending enough time with you") was newly added in 2017 HINTS5 Cycle 1.

[d] This is calculated in addition to the 6 main core functions.

[e] Dichotomized as Optimal (*Excellent/Very good*) vs. Suboptimal (*Good/Fair/Poor)*. The reference group is Suboptimal (*Good/Fair/Poor).*

Chapter 5: Discussion

Findings from this analysis support a positive relationship between trust in physician information and patient-centered communication, suggesting that those who reported optimal patient-centered communication have a higher odds of trust in physician information compared to those who reported sub-optimal patient-centered communication. Moreover, the odds of reporting high level of trust in physician information were significantly associated with each individual component of patient-centered communication when comparing those who felt their communication component was optimal versus sub-optimal. In analyses of the overall study population, optimal levels of each patient-centered communication component were associated with approximately a two-fold increase in odds of high trust in physician information as compared to those who reported sub-optimal levels. Similar positive associations were observed in analyses by cancer survivorship status (as an interaction term), however, the magnitude of effect among cancer survivors in the weighted age-adjusted models ranged from 2.41 to 4.75, depending on the specific patient-centered communication component.

While to our knowledge, no prior study has evaluated the relationship between patient-centered communication and trust in physician information using nationally representative data, the findings observed in the overall analysis are generally consistent with previous literature which examined patient-centered communication in related to various health outcomes (Song, et al., 2013; Blanch-Hartigan, et al., 2016; Rutten, et al., 2015; Blanch-Hartigan, et al., 2015; Leyva, et al., 2017). These prior studies, which utilized data from the Health Information National Trends Survey, suggest that positive interactions of patient-centered communication are associated with positive effects on the variable under study such as healthcare avoidance (Leyva, et al., 2017), and quality of healthcare (Finney Rutten, et al., 2015). Other cross-sectional studies were performed using data other than HINTS, and have found that positive interactions of patient-centered communication are associated with more patient activation (Palmer, et al., 2014), self-efficacy (Palmer, et al., 2014), patient-satisfaction (Song, et al., 2013), and help ameliorate the inherent imbalance in power between patients and physicians, which contribute to patients taking a more active role in their health (Becker & Roblin, 2008). One study examined the effects of shared decision-making on women's adherence to breast and cervical cancer screenings using the 2017 HINTS 5 Cycle 1 and found that a higher shared decision-making score was associated with women's adherence to treatment (Han, et al., 2018). Among the studies that assessed patient-centered communication using prior HINTS data, the majority analyzed the components of patient-centered communication as both a scale score and categorical (dichotomizing into Optimal versus Sub-Optimal) (Blanch-Hartigan, et al., 2016; Spooner, et al., 2016; Blanch-Hartigan, et al., 2015), while two studies analyzed these components using scale score only (Leyva, et al., 2017; Finney Rutten, et al, 2015). Our findings provide additional support to the positive impact patient-centered communication has on health outcomes as well as the influence trust in physician information has on healthcare behavior. These findings can help inform the development of patient-centered communication strategies to ultimately improve health outcomes and reduce consequences related to poor patient-physician trust overall and among cancer survivors.

To be consistent with prior literature (Leyva, et al., 2017; Spooner, et al., 2016; Blanch-Hartigan, et al., 2015; Blanch-Hartigan, et al., 2016; Finney Rutten, et al., 2015) patient-centered communication was analyzed as a scale score and dichotomously. Assessing the main functions of patient-centered communication separately, in addition to an overall score, allowed the following to be assessed: 1) whether any particular function is more significantly associated with trust in physician information compared to another; and 2) the variability between each function. Overall, the direction of effect for the associations between patient-centered communication components and high level of trust in physician information were positive with multivariable adjusted odds ratios between 2.0 and 2.9 in the overall population. Estimates among cancer survivors were of greater magnitude as compared to those who did not report ever having cancer, however, no significant interactions were observed in the weighted multivariable models (all p-interaction>0.05). More variability was observed across the patient-centered communication components among cancer survivors. Among cancer survivors, the odds of trust in physician information for patients who reported optimal experiences of fostering healing relationships was 4.75 times the odds of trust in physician information among patients who reported sub-optimal experiences of fostering healing relationships (95% CI = 2.60–8.68). On the other hand, the component that was observed to have the least impact was cancer survivors who report feeling that a physician spends enough time with them (adj OR = 2.41, 95% CI = 1.36– 4.25). A prior study using similar HINTS data (HINTS 4, Cycle 2) examined the functions of patient-centered communication among cancer survivors only, specifically on receipt of treatment summaries, and found less variation between each function (adj OR range from 1.54 for "Responding to Emotional Needs" to 2.13 for "Fostering Healing Relationships") compared to the variation found in this analysis (Blanch-Hartigan, et al., 2015). Contrary to the findings present herein, the study by Blanch-Hartigan et al. (2015), did observe significant interactions with patient-centered communication and receipt of treatment summaries among cancer survivors (Blanch-Hartigan, et al., 2015), however, those analyses did not incorporate the HINTS recommended weights nor did they have the same outcome variable of trust in physician information.

To our knowledge, one prior study assessed patient race and patients' perceptions of patient-centered communication on the development of trust in physicians and health system, however, the data source was not nationally representative and the sample size was relatively small including 103 patients (Gordon et al., 2006). Therefore, the study presented herein is unique in analyzing this relationship using nationally representative data. Although no prior studies have examined the direct relationship of patient-centered communication (exposure) and trust in physician information (outcome) using nationally representative data, nine studies have assessed trust in relation to tobacco use (Brown-Johnson, et al., 2018; Vereen, et al., 2018), health literacy (Chen, et al., 2018), physician's pay (Kao, et al., 1998), healthcare access measures (Hesse, et al., 2005), race and ethnicity (Nguyen, et al., 2017) patient activation (Becker & Roblin, 2008), knowledge of the Tuskegee study (Brandon, et al., 2005), and medical care avoidance (Leyva, et al., 2017). These studies found an association between trust and the variables under study. Prior studies have also revealed that a patient's trust in a physician may be associated with patient satisfaction, adherence to treatment, continuity of care, and improved health outcomes (Safran et al., 1998; Dugan, Trachtenberg, & Hall, 2005; Hall et al., 2002; Wu et al., 2015). However, this study was unable to assess these associations as HINTS did not include questions on adherence to treatment, continuity of care, and improved health outcomes. Further research is necessary to address these components. Despite studies conducted in this area (Brown-Johnson, et al., 2018; Chen, et al., 2018; Han, et al., 2018; Vereen, et al., 2018; Abdelhamid, Gaia, & Sanders, 2017; Leyva, et al., 2017; Nguyen, et al., 2017; Blanch-Hartigan, et al., 2016; Spooner, et al., 2016; Blanch-Hartigan, et al., 2015; Finney Rutten, et al., 2015; Palmer, et al., 2014; Song, et al., 2013; Arora, et al., 2011; Francis, et al., 2010; Jensen, et al., 2010; Becker & Roblin, 2008; Gordon, et al., 2006; Brandon, et al., 2005; Hesse, et al., 2005; Kao, et al., 1998;). Further research is needed to corroborate our findings and to further understand the relationship between patient-centered communication and trust in physician information overall and by cancer survivorship status using nationally representative data.

This was a cross-sectional study that assessed the relationship between patient-centered communication and trust in physician information. Although prior research has not examined this direct relationship, previous studies have examined these variables using similar cross-sectional methods (Bryan, et al., 2017; Abdelhamid, et al., 2017; Becker, et al., 2008; Gordon, et al., 2006; Hesse, et al., 2005; Kao, et al., 1998; Vereen, et al., 2018; Brown-Johnson, et al., 2018; Nguyen, et al., 2017; Chen, et al., 2018; Brandon, et al., 2005), and several studies have analyzed these variables for prior HINTS iterations (Bryan, et al., 2017; Abdelhamid, et al., 2017; Hesse, et al., 2005; Vereen, et al., 2018; Nguyen, et al., 2017). However, despite these prior studies, this is the first study to our knowledge that used HINTS data to measure trust in physician information as the outcome. Moreover, further research is necessary to examine the relationship between patient-centered communication and trust in physician information by cancer survivorship status with adequate sample sizes and by type of cancer.

Strengths

Overall Study Design: To our knowledge, this is the first study to use nationally representative data to assess the relationship between patient-centered communication and trust in physician information by cancer survivorship status, thus increasing the generalizability of the findings. In addition, HINTS is the only national surveillance instrument that focuses exclusively on monitoring both the impact of and changes in cancer communication among American adults. HINTS' unique emphasis on cancer, health communication, and the health information environment makes it an invaluable survey compared to other population-level health surveys (HINTS FAQ, n.d.). Furthermore, HINTS implemented multiple methods to reduce nonresponse bias, which is a common limitation of postal surveys. The HINTS methodology addressed this by sending a reminder card and up to three additional questionnaire mailings after the initial mailing of questionnaires were sent to the select sample. Implementing these follow-up techniques aid in improving response rates for the study.

HINTS applied sampling weights to every respondent to "ensure valid inferences from the responding sample to the population, correcting for nonresponse and noncoverage biases to the extent possible" (HINTS 5 Cycle 1 Methodology Report, 2017). Analyses presented herein incorporated these recommended weights.

Questionnaire: The construct of patient-centered communication was measured using 7 items. These items were analyzed in two ways: as an overall score and individually. Assessing the main functions of patient-centered communication separately, in addition to an overall score, allowed us to determine if any particular function is more significantly associated with trust in physician information compared to another.

Limitations

As expected, there are several limitations that should be noted.

Overall Study Design: Due to the cross-sectional nature of this study, temporality cannot be established, inhibiting the ability to infer causal relationships between the variables under study (HINTS FAQ, n.d.). Furthermore, the study is susceptible to participant recall bias, which could affect responses of both the outcome and exposure variables, specifically misclassification.

Although the questionnaire was available in both English and Spanish, the Spanish version was only available upon request (via toll-free telephone number). This could have led to a lower response rate among Spanish-only speaking populations as these residents may be less likely to respond if they have to take the extra step to request the survey. There were a total of 44 packets mailed upon request that contained Spanish questionnaires. Among these, only 13 questionnaires were completed.

Due to the small sample sizes per variable category, the age-adjusted and multivariable logistic regression models were unable to properly converge the data to stratify by cancer survivorship status. Therefore, this study could only assess cancer survivorship status overall as an interaction term. Additionally, the sample size for foreign-born persons was 286 individuals, limiting our ability to assess the relationship by US-born and foreign-born status and to assess the number of years living in the United States due to small sample sizes within various categories. Further research with adequate sample sizes should assess this relationship.

Questionnaire: The construct of trust in physician information was measured using a single-item variable. A prior study, which specifically evaluates single-item measures in general, suggests that single-item measures are considered to be reliable if there is little room for the participant to misunderstand the question (Wanous, Reichers, & Hudy, 1997; Abdelhamid, Gaia, & Sanders, 2017). The question used for this construct solely asks about trust in information among doctors in general, rather than a specific type of doctor. A person's feeling of trust may differ among the various doctors they are currently being cared for by or have been cared for in the past. Thus, there is no way to account for persons that may trust the information provided by one of their doctors but not the other. Furthermore, the question asks about trust in information provided by *a* doctor, rather than *your* doctor. It is possible that respondents answer this question based on their own personal experience, however, this is not a valid assumption given the general wording of the question. Thus, this variable used for the study can only be described as overall trust in physician information.

Public Health Significance and Conclusions

Improving our understanding of patient-centered communication can provide insight on existing disparities, overall and among cancer survivors, in trust in physician information and help inform the development of patient-centered communication strategies to ultimately improve health outcomes and reduce consequences related to poor patient-physician trust. Furthermore, findings from this study can assist in guiding optimal care for follow-up and post-treatment care overall and among cancer survivors. Given the relatively limited sample of cancer survivors in our study, further research is necessary to examine the relationship between patient-centered communication and trust in physician information by cancer survivorship status as well as by type of cancer. Exploring patient-centered communication as a potential predictor of trust in physician information will enable future researchers and the overall public health community to better understand the needs of this growing population.

Human Subjects

This study utilized publically available data to conduct secondary analysis and thus, no human subjects were involved. After this study was approved, a Human Subject Research Determination application was submitted to the University of Maryland's Institutional Review Board (IRB) for exempt status. On January 31, 2019, the University of Maryland responded with a Determination of Not Research, and the study is therefore considered exempt status.

Chapter 6: MPH Competencies Addressed in Thesis

This study addressed nine of the competencies outlined by the University of Maryland's MPH in Epidemiology program. After thorough investigation, the primary researcher had the opportunity to *(1) identify vital statistics and other key sources of data for epidemiological purposes,* through the selection of Cycle 1 of the fifth iteration of the 2017 Health Information National Trends Survey (HINTS) as the primary data source. Further, the completion of an in-depth literature review provided the researcher with the ability to *(2) evaluate the strengths and limitations of epidemiologic reports, (3) describe epidemiologic study designs and assess their strengths and limitations,* and *(4) draw appropriate inferences from epidemiologic data.* Furthermore, the primary researcher successfully *(5) designed*, *analyzed, and evaluated an epidemiologic study, (6) demonstrated skills in public health [secondary] data collection and management,* and *(7) calculated advanced epidemiology measures.* The examination of whether patient-centered communication and trust in physician information vary by cancer survivorship status *(8) explained the importance of epidemiology for informing scientific, ethical, economic and political discussion of health issues.* This was achieved by providing insight on existing disparities in trust in physician information and help inform the development of patient-centered communication strategies to ultimately improve health outcomes and reduce consequences related to poor patient-physician trust. The completion of these addressed program competencies in combination with coordinating efforts with the primary researcher's Thesis Examining Committee will allow the researcher to *(9) demonstrate program administration and organizational leadership.*

Appendices

Appendix A: Background Summary Table, by Outcome and Exposure Variables

Trust				
Authors (Year)	**Study Design/Data Source**	**Sample and Objective**	**Exposure and Outcome Variables**	**Key Findings**
Brown-Johnson, C. G., et al. (2018)	Cross sectional – telephone surveys in Oklahoma. Variable Type: Continuous. Modeled log odds of a participant rating a source as "trustworthy" (SAS PROC SURVEYLOGISTIC). Trustworthiness for each source was collected on a five-point scale with 1 being "least trustworthy" and 5 being "most trustworthy." Measured as: Outcome Confounder Adjustment: **gender, race/ethnicity, education, income,** children in household, smoking status, e-cigarette use status, smokeless tobacco use status	Sample: N=1001 Oklahoma adults (age 18-65 years) Objective: To explore current **trust** and **moderators of trust** in health information sources given recent changes in digital health information access and delivery to inform design of future health interventions in Oklahoma.	Exposure: Sociodemographic factors and tobacco use. Outcome: **Trust** in health information sources.	Utilizing health care providers in social media settings could leverage **high-trust** and low-cost features of providers and social media, respectively.
Chen, X., et al. **(2018)**	Cross sectional. Online survey. Measured as: Outcome Confounder Adjustments: demographic characteristics.	Sample: N=600 Objective: To examined whether health literacy was associated with people's use of and **trust** in a range of potential health information sources.	Exposure: Health Literacy Outcome: Trust in health sources	-People with lower health literacy were less likely to trust health information from specialist doctors and dentists, but more likely to trust television, social media, blogs/celebrity webpages, friends, and pharmaceutical companies. -People with limited health literacy had higher rates of using and trusting sources such as social media and blogs, which might contain lower quality health information compared to information from healthcare professionals.
Vereen, R. N., et al. **(2018)**	Cross Sectional 2015 **HINTS** 4, FDA Cycle. TRUST: Responses were reverse coded. Study Design: Cross-sectional.	Sample: N = 3,738 Objective: To identify sociodemographic subgroups with more **trust** in tobacco product (tobacco and e-cigarette) companies than **health professionals** and explore associations between **this relative trust** and tobacco product use.	Exposure: Relative **trust** in tobacco and e-cigarette companies compared to **trust in health professionals**. Outcome: Tobacco product use. Variables: Tobacco-related relative trust (**trust in health professionals** vs. trust in tobacco companies), e-cigarette-related relative trust (**trust in health professionals** vs. trust in e-cigarette companies), **race/ethnicity**,	-Respondents who **trusted** tobacco or e-cigarette companies as much as or more than **health professionals** were disproportionately from **racial/ethnic** minority groups or had low levels of **income** or **education**. -Relative **trust** was not associated with smoking status. -Findings suggest that population subgroups with greater **trust** in e-cigarette companies

Trust

Authors (Year)	Study Design/Data Source	Sample and Objective	Exposure and Outcome Variables	Key Findings
			education, **income**, **gender**, geographic area, and **age**.	relative to **health professionals** are more prone to e-cigarette use.
Abdelhamid, M., Gaia, J., & Sanders, G. L. **(2017)**	Cross sectional. Survey-based study with 1600+ participants using the **HINTS** 4 Cycle 4 data to validate a model through various statistical techniques. Variable Type: Unclear/Continuous? [single question] Measured as: Exposure (1 of 5 exposures) Confounder Adjustment: **Age, gender, education, income level,** health insurance, seeking health information on the Internet, number of chronic diseases, frequency of doctor visits, and health status.	Sample: N=1606 adults Objective: To investigate the factors that influence individuals' intentions to share their personal health information (PHI) electronically with health care providers.	Exposures: Patient activation, issue involvement, privacy concerns, **trust in providers, patient-physician relationship.** Outcome: Intention to share PHI electronically	-**Trust in providers** showed no significant relationship with the intention to share PHI.
Leyva B., et al. **(2017)**	Cross sectional using **HINTS** 2008 Variable Type: Categorical. 1= "A Lot" vs. 0= "Some", "A Little", "Not at all" [single question] Measured as: Exposure (as part of psychosocial factors, along with other variables). Demographic Confounder Adjustments: **gender** (male / female); **race/ethnicity** (5 categories: NH White / NH Black / Hispanic / Biracial / Other); **Nativity** (US born / foreign born); marital status; **household income** (5 categories: <$20k / $20k to $34,999 / $35k to $49,999 / $50k to $74,999 / $75k or more); **education** (4 categories: Less than HS / HS graduate / some college / college graduate); and employment status.	Sample: N=2,155 adults aged 65 and older, who completed the 2008 HINTS Objective: To examine factors and reasons associated with medical care avoidance among older adults in the United States.	Exposures: Demographic factors, socioeconomic and access factors, health status indicators, health related practices, and psychosocial factors (e.g., **quality of care, patient-centered communication, trust**, etc.). Outcome: Medical care avoidance.	-Likelihood of avoidance was higher among those with **lower trust in doctors.** -Conclusion: Avoidance by older adults appears to be largely associated with evaluations of the **quality of care and provider communication.**
Nguyen, A. B., et al. **(2017)**	Cross sectional. **HINTS**-FDA 2015 Variable type: Continuous (kept 4-point scale and reported means and standard errors). Measured as: outcome. Confounder Adjustments: **age** (recoded into four levels: 18–24; 25–44; 45–64; 65+ years), **sex** (male; female), health insurance status, geographic region (urban; rural), marital status, and **educational attainment** (<high	Sample: N=3,788 Objective: To describe, among multiple racial/ ethnic groups: (1) sources of health information, (2) the types of tobacco information sought, and (3) trust in sources of tobacco information.	Exposure: Race/ethnicity Outcome: 1) first source of health information; 2) tobacco information seeking; 3) trust in sources of tobacco information.	-**Trust** was rated highest for doctors while trust for health organizations was rated second highest. -Asians and Pacific Islanders had higher **trust** in the government compared to all other groups.

Trust				
Authors (Year)	**Study Design/Data Source**	**Sample and Objective**	**Exposure and Outcome Variables**	**Key Findings**
	school diploma/high school graduate/GED; some college/vocational or technical training; college graduate; postgraduate), and **race/ethnicity (**Hispanic, NH White, NH Black, NH Asian and Pacific Islander, and NH Other).			
Becker, E. R., & Roblin, D. W. **(2008)**	Cross sectional (Atlanta, Georgia) Data were collected by surveys of adult enrollees and primary care teams of a group-model managed care organization in metropolitan Atlanta.	<u>Sample:</u> N=2224 (42% response rate). Persons ages 25–59 years were randomly sampled from 3 condition cohorts (diabetes, elevated lipids but no coronary artery disease history, and low risk). <u>Objective:</u> Examine the role of **trust in patient-physician relationships** for translating practice teamwork into patient activation.	<u>Exposure</u>: **Trust in patient-physician relationship** <u>Outcome</u>: Patient activation	-Found significant, positive associations between practice climate and **patient trust in their primary care physicians** and between **patient trust** and activation in their health.
Gordon, H. S., et al. **(2006)**	Questionnaires were used to determine patients' perceptions of the quality of the physicians' communication and were used to assess patients' previsit and postvisit **trust in physician** and trust in health care system. Patients responded on a 10-point scale. <u>Confounder Adjustments:</u> **age, sex, race, ethnicity, education level**, mental and physical status, first visit with physician, and length of visit.	<u>Sample</u>: Data were obtained for 103 patients (22% black and 78% white) visiting thoracic surgery or oncology clinics in a large Southern Veterans Affairs hospital for initial treatment recommendation for suspicious pulmonary nodules or lung cancer. <u>Objective</u>: Black patients report lower **trust in physicians** than white patients, but this difference is poorly studied. We examined whether racial differences in patient trust are associated with **physician-patient communication** about lung cancer treatment. <u>Hypothesis:</u> Racial differences in postvisit trust in physician would be associated with differences by race in previsit trust and with differences in perceptions of patient-centered communication.	<u>Exposures</u>: Patient race and patients' perceptions of **physician communication**. <u>Outcome:</u> development of (postvisit) **trust in physician** and health system	Perceptions that **physician communication** was less supportive, less partnering, and less informative accounted for black patients' lower **trust in physicians**. -Findings raise concern that black patients may have lower **trust in their physicians** in part because of poorer **physician-patient communication**.
Brandon, D. T., et al. **(2005)**	Cross-sectional. Telephone survey. <u>Variable type:</u> Continuous. Assessed using 7-item Medical Mistrust Index (MMI). Likert scale ranged from strongly disagree to strongly agree. <u>Measured as</u>: Outcome.	<u>Sample:</u> N=277 African Americans and 101 White adults aged 18-93 years in Baltimore, MD. <u>Objective</u>: To examine race differences in knowledge of the Tuskegee study and the relationship	<u>Exposure:</u> Knowledge of the Tuskegee study. <u>Outcome:</u> **Medical care mistrust**.	-Findings show no differences by race in knowledge of or about the Tuskegee study and that knowledge of the study was not a predictor of **trust of medical care**. -Significant race differences in **medical care mistrust** were found.

Trust

Authors (Year)	Study Design/Data Source	Sample and Objective	Exposure and Outcome Variables	Key Findings
	<u>Confounder Adjustments:</u> **Age, sex, race, income, education**, health insurance.	between knowledge of the Tuskegee study and **medical system mistrust**.		
Hesse B. W., et al. **(2005)**	Cross sectional using 2002-2003 **HINTS**	<u>Sample:</u> 6369 persons 18 years or older were studied <u>Objective:</u> To provide nationally representative estimates for health-related uses of the Internet, **level of trust in health information sources**, and preferences for cancer information sources.	<u>Exposures:</u> Sociodemographic and healthcare access measures <u>Outcomes</u>: Online health activities, **levels of trust**, and source preference	-Despite newly available communication channels, **physicians remained the most highly trusted information source** to patients with 62.4% of adults expressing a **lot of trust in their physicians.** -The HINTS data portray a tectonic shift in the ways in which patients consume health and medical information, with more patients looking for information online before talking with their physicians.
Kao, A. C., et al. **(1998)**	Cross-sectional telephone interview survey. Between January and June 1997. (Atlanta, GA; Baltimore, MD; Washington, DC area; Orlando, FL) <u>Confounder Adjustment:</u> Modified questions from the Picker survey on **patient-centered care**. Also, **race, education, income, health status**, length of physician relationship, and whether they had enough choice when selecting a physician.	<u>Sample:</u> N=2,086 adult managed care and indemnity patients. Setting: Health plans of a large national insurer in Atlanta, Ga, the Baltimore, Md–Washington, DC, area, and Orlando, Fla. <u>Objective:</u> To evaluate the extent to which methods of physician payment are related to **patient trust**.	<u>Exposures:</u> Physician's method of payment as (1) salary (physician's pay is based on a straight salary), (2) capitation (physician's pay is based on some fixed monthly amount, which is dependent on the number of patients in the physician's practice), or (3) FFS (physician's pay is based on the number of office visits). <u>Outcome:</u> Patient trust in physicians (using a 10-item scale)	-Most patients **trusted their physicians,** but fee-for-service (FFS) indemnity patients have higher levels of trust than salary, capitated, or FFS managed care patients. -Patients' reports of physician behavior accounted for part of the variation in patients' **trust in physicians** who are paid differently. -The impact of payment methods on **patient trust** may be mediated partly by physician behavior.

Patient-Centered Communication (PCC)

Authors (Year)	Study Design/Data Source	Sample and Objective	Exposure and Outcome Variables	Key Findings
Han, J., et al. **(2018)**	<u>Study Design:</u> Descriptive Cross-Sectional <u>Data Source:</u> 2017 HINTS 5, Cycle 1	<u>Sample:</u> N=742 women aged 40-64 years at average risk. <u>Objective:</u> Examined the effect of **shared decision-making (SDM)** on women's adherence to breast and cervical cancer screenings and estimated the prevalence and adherence rate of screenings.	<u>Exposure:</u> Effect of **SDM** <u>Outcome:</u> Adherence to breast and cervical cancer screenings	-A higher **SDM** score was associated with women's screening adherence. -The results suggest that the use of the **SDM approach for healthcare professionals' communication with patients** can improve screening adherence.

Patient-Centered Communication (PCC)

Authors (Year)	Study Design/Data Source	Sample and Objective	Exposure and Outcome Variables	Key Findings
Leyva, B. et al. **(2017)**	Cross sectional using **HINTS** 2008 Variable Type: Scale Score of 6 PCC sub-questions. Responses were reverse scored and averaged to create a score representing the overall degree of patient-centeredness of PCC. Measured as: Exposure (as part of psychosocial factors, along with other variables). Demographic Confounder Adjustments: **gender** (male / female); **race/ethnicity** (5 categories: NH White / NH Black / Hispanic / Biracial / Other); **Nativity** (US born / foreign born); marital status; **household income** (5 categories: <$20k / $20k to $34,999 / $35k to $49,999 / $50k to $74,999 / $75k or more); **education** (4 categories: Less than HS / HS graduate / some college / college graduate); and employment status.	Sample: N=2,155 adults aged 65 and older, who completed the 2008 HINTS Objective: To examine factors and reasons associated with medical care avoidance among older adults in the United States.	Exposures: Demographic factors, socioeconomic and access factors, health status indicators, health related practices, and psychosocial factors (e.g., **quality of care, patient-centered communication, trust**, etc.). Outcome: Medical care avoidance.	-Likelihood of avoidance was higher among those with **less patient-centered communication**. -Conclusion: Avoidance by older adults appears to be largely associated with evaluations of the **quality of care and provider communication.**
Abdelhamid, M., et al. **(2017)**	Cross sectional. Survey-based study with 1600+ participants using the **HINTS** 4 Cycle 4 data to validate a model through various statistical techniques. Variable Type: Unclear/Continuous? [7 questions] Measured as: Exposure (1 of 5 exposures) Confounder Adjustment: **Age, gender, education, income level,** health insurance, seeking health information on the Internet, number of chronic diseases, frequency of doctor visits, and health status.	Sample: N=1606 adults Objective: To investigate the factors that influence individuals' intentions to share their personal health information (PHI) electronically with health care providers.	Exposures: Patient activation, issue involvement, privacy concerns, **trust in providers, patient-physician relationship.** Outcome: Intention to share PHI electronically	**-Patient-physician relationship** is significant predictors of intentions of sharing PHI electronically.
Blanch-Hartigan, D. et al. **(2016)**	Cross Sectional HINTS 3 and HINTS 4 Cycles 1, 2, and 3. Variable Type: 6 sub-questions. Scale score: (averaged scores and linearly transformed the scale score to 0-100 format); and Categorical: Optimal (always) vs. Sub-Optimal (usually/sometimes/never). Measured as: Outcome	Sample: N = 1794 consisted of subsample of respondents who reported a personal history of cancer. Objective: 1) the prevalence of cancer survivors who report suboptimal **PCC**; 2) predictors of suboptimal **PCC**, including socioeconomic status and time since diagnosis; and 3) national trends in **PCC** for cancer survivors since the 2006 IOM report.	Exposure: Personal history of cancer. Outcome: **Patient-centered communication**	Despite increased attention to survivorship, many survivors continue to report **suboptimal communication** with their health care providers.

Patient-Centered Communication (PCC)

Authors (Year)	Study Design/Data Source	Sample and Objective	Exposure and Outcome Variables	Key Findings
	Confounder Adjustments: **Age, gender, education level, race/ethnicity**, insurance status, and **household income**, and general health status, whether or not they had a usual source of care, frequency of provider visits in the previous year, cancer type, and **time since cancer diagnosis**.			
Spooner, K.K. et al. **(2016)**	Cross Sectional **HINTS** 4 Cycles 1, 2, and 3 (2011-2013) Variable type: 7 sub-questions. Scale score: (summed to create composite score of 7 to 28, and then scaled to 0-100 format); and Categorical: Always vs. Usually/sometimes/never.	Sample: N=8,458 participants with complete responses to all PCC items. Objective: To describe disparities and temporal trends in the level of perceived **patient–provider communication** quality (PPPCQ) in the United States, and to identify sociodemographic and health-related factors associated with elements of PPPCQ.	Exposure: sociodemographic and health-related factors Outcome: perceived patient-provider communication quality (PPPCQ)	-Perceived **patient–provider communication** quality varies by patient characteristics. -Healthier patients perceived experiencing higher provider communication quality. -Not having a regular provider was linked to perceived poor communication quality.
Blanch-Hartigan, D. et al. **(2015)**	Cross sectional using 2012 **HINTS** 4 Cycle 2. Variable Type: 6 sub-questions. Scale score: (averaged scores and linearly transformed the scale score to 0-100 format); and Categorical: Optimal (always) vs. Sub-Optimal (usually/sometimes/never). Measured as: Exposure Confounder Adjustment: Cancer survivors' **age, gender, education, race/ethnicity**, and **annual income.** Survivors reported cancer-related characteristics including **cancer type**, time since cancer treatment.	Sample: N-464 (respondents who reported a personal history of cancer). Using HINTS 4 Cycle 2, fielded between October 2012 and January 2013. Objective: To assess the relationship between receipt of treatment summaries and reports of **PCC overall and for each of the six PCC functions.** The relationship between treatment summary receipt and **patient-centered communication (PCC)** and overall **quality of care (QOC)** are not well understood.	Exposures: **Patient Centered Communication** (PCC) and **Quality of Care**. Outcome: Receipt of treatment summaries (among cancer survivors)	The receipt of cancer treatment summaries may improve **patient-centered communication for survivors**.
Finney Rutten, L.J., et al. **(2015)**	Cross sectional (**HINTS** 4, Cycle 1) Variable Type: Continuous. 8 questions (overall score and individual questions on scale 1-4). Scale Score: Responses of 4-point (1-never to 4-always) scale were summed to create a composite score with potential range of 8-32, with higher scores indicating more positive PCC. Measured As: Mediator.	Sample: (N=3,959) HINTS 4, Cycle 1. October 2011 through February 2012. Objective: To determine how **patient-centered communication** between patients and physicians might mediate the relation between having a source of usual care and **ratings of health care quality**.	Exposure: Usual source of care Mediator: **Patient-centered communication** Outcome: Ratings of **quality of care**	Results confirm the importance of **patient-centered communication** in shaping patients' perceptions of the **quality of their care**, accounting for a significant portion of the observed relation between having a usual source of care and ratings of quality.

Patient-Centered Communication (PCC)

Authors (Year)	Study Design/Data Source	Sample and Objective	Exposure and Outcome Variables	Key Findings
	Confounder Adjustment: **Gender**; **age** (18–34, 35–49, 50–64, 65–74, and 75 + years); **education** (less than high school, high school graduate, some college, and college graduate); **race/ethnicity** (Hispanic, non-Hispanic White, non-Hispanic Black, and non-Hispanic other); and **annual household income** (less than $35K, $35K to less than $75 K, and $75 K or more).			
Palmer, N. R., et al. **(2014)**	Cross-sectional survey data from the Follow-Up Care Use Among Survivors (FOCUS). Conducted in March 2005 - July 2006. Variable type: Continuous and Categorical. Eight questions. Score: instrument means were rescaled to a 0-100 score. Higher scores indicated better communication. Categorical: 4-point scale (never to always). Confounder Adjustments: age, sex, education, health insurance, comorbidities, stage at diagnosis, time since diagnosis, and treatment, and follow-up-care-related factors.	Sample: African American, Asian/Pacific Islander (Asian), Hispanic, and non-Hispanic white (white) survivors who had seen a physician for follow-up care in the past 2 years (n = 1,196). Objective: To examine racial and ethnic disparities in **patient-provider communication**, **perceived care quality**, and patient activation among long-term cancer survivors.	Exposures; Race/ethnicity, and patient-provider communication. Outcomes: Quality of Care and Patient activation, self-efficacy, perceived control.	-Asian survivors reported poorer follow-up care **communication** and **care quality**. -More research is needed to identify contributing factors beyond **PCC**, such as cultural influences and medical system factors.
Song, L., et al. **(2013)**	Population-based survey. North Carolina–Louisiana Prostate Cancer Project (PCaP) Variable type: Continuous. Measured as: Outcome. Confounder Adjustments: sociodemographic factors.	Sample: N = 1011 African American and 1034 Caucasian American men with newly diagnosed prostate cancer. Objective: To examine the multidimensional concept of patient-health care provider (HCP) communication, its effects on patient satisfaction with oncology care services, and related racial differences.	Exposure: Newly diagnosed prostate cancer. Outcome: Satisfaction with healthcare services.	-Regardless of race, **patient-health care provider (HCP) communication** was related positively to interpersonal treatment by the HCP, HCP's contextual knowledge of the patient, and prostate cancer communication. -More **positive patient-HCP communication** was related to more satisfaction with health care services. -Racial differences were significant in the relationships between **patient- HCP communication** and prostate **cancer** communication. -Content and interpersonal relationships are important aspects of **patient-HCP communication** and affect patient satisfaction with **oncologic care** for prostate cancer.
Arora, N. K.,	Cross-sectional. Collected between April 2003 and November 2004.	Sample: N=623 participants part of population-based cohort of leukemia,	Exposure; Leukemia, bladder, and colorectal cancer survivor who have	-Delivery of quality follow-up care to cancer survivors may require efforts to

Patient-Centered Communication (PCC)

Authors (Year)	Study Design/Data Source	Sample and Objective	Exposure and Outcome Variables	Key Findings
et al. **(2011)**	Variable type: Continuous and Categorical Scale: Ten scales assessed survivors' perceptions of different aspects of care in the last 12 months, and an eleventh scale measured their overall ratings of care. All scores were linearly transformed to a 0-100 scale. Categorical: suboptimal as reference group. Confounder Adjustments: age, sex, race/ethnicity, education, marital status, insurance status, residence in a medically underserved area, cancer type, perceived health status, number of comorbidities, years since diagnosis, type of treatment received, remission status, length of relationship with physician, number of visits in the last 12 months, physician’s sex, survivor-physician sex match, physician specialty, and setting of care.	bladder, and colorectal cancer survivors diagnosed 2 to 5 years previously in northern California rate. Objective: Assessed cancer survivors' perceptions of the quality of their follow-up care.	received follow-up care in the last 12 months. Outcome: quality of cancer-related follow-up care.	improve **patient-centered communication** and coordination. -Important to adapt “whole person” orientation.
Francis, L. E., et al. **(2010)**	Telephone interviews with family caregivers.	Objective: This study explores how caregiver relationship quality with family, patient, and patient’s health care provider (HCP) is associated with subjective caregiver burden during the early treatment phase for late-stage cancer.	Exposure: Caregiver relationship quality with family, patient, and patient’s health care provider (HCP). Outcome: Caregiver burden	Findings demonstrate that caregiver relationship quality with family and with HCP are important factors in understanding caregiver burden during the early treatment phase of late-stage cancer care.
Jensen, J.D. et al. **(2010)**	Survey, oral measure of literacy, and semi-structured interviews about healthcare issues. Variable type: Categorical (4-point response scale), and continuous. Measured as: Outcome. Confounder Adjustments: **age, gender, race, education**, visitation history, literacy, numeracy, and optimism.	Sample: N=131 low income adults recruited from seven counties in Indiana through University extension programs. Objective: To assess whether literacy, numeracy, and optimism are related to low-income adults’ satisfaction with their **healthcare provider's communication** skills.	Exposure: literacy, numeracy, and optimism. Outcome: **Patient-provider communication** among low-income adults.	-In low-income populations, **communication satisfaction** may be lower for groups that are traditionally active in doctor–patient interactions (e.g., younger patients, patients with higher literacy skills).
Becker, E. R., & Roblin, D. W. **(2008)**	Cross sectional (Atlanta, Georgia) Data were collected by surveys of adult enrollees and primary care teams of a group-model managed care organization in metropolitan Atlanta.	Sample: N=2224 (42% response rate). Persons ages 25–59 years were randomly sampled from 3 condition cohorts (diabetes, elevated lipids but no coronary artery disease history, and low risk). Objective: Examine the role of **trust in patient-physician relationships**	Exposure: **Trust in patient-physician relationship** Outcome: Patient activation	-Found significant, positive associations between practice climate and **patient trust in their primary care physicians** and between **patient trust** and activation in their health. “Supportive interactions among practitioners and staff within primary care teams facilitate trust-building interactions between practitioners and patients. Supportive, trustworthy interactions, in

Patient-Centered Communication (PCC)

Authors (Year)	Study Design/Data Source	Sample and Objective	Exposure and Outcome Variables	Key Findings
		for translating practice teamwork into patient activation.		turn, help to ameliorate the inherent imbalance in power between patients and physicians, contributing to patients who take a more active role in their health.”
Gordon, H. S., et al. **(2006)**	Questionnaires were used to determine patients’ perceptions of the quality of the physicians’ communication and were used to assess patients’ previsit and postvisit **trust in physician** and trust in health care system. Patients responded on a 10-point scale. Confounder Adjustments: **age, sex, race, ethnicity, education level**, mental and physical status, first visit with physician, and length of visit.	Sample: Data were obtained for 103 patients (22% black and 78% white) visiting thoracic surgery or oncology clinics in a large Southern Veterans Affairs hospital for initial treatment recommendation for suspicious pulmonary nodules or lung cancer. Objective: Black patients report lower **trust in physicians** than white patients, but this difference is poorly studied. We examined whether racial differences in patient trust are associated with **physician-patient communication** about lung cancer treatment. Hypothesis: Racial differences in postvisit trust in physician would be associated with differences by race in previsit trust and with differences in perceptions of patient-centered communication.	Exposures: Patient race and patients’ perceptions of **physician communication**. Outcome: development of (postvisit) **trust in physician** and health system	Perceptions that **physician communication** was less supportive, less partnering, and less informative accounted for black patients’ lower **trust in physicians**. -Findings raise concern that black patients may have lower **trust in their physicians** in part because of poorer **physician-patient communication**.

Appendix B: Detailed List Describing Components Included and Excluded in Final Analytic Sample

Number of responses in the original file: N= 3,285
Number of responses in the **final analytic file: N = 2,604**

Below, lists the inclusion criteria variables and the details why responses were excluded from final analytic file.

Outcome Variable:
"In general, how much would you trust information about health or medical topics from…a doctor?"
N = 3,182 valid responses
The following responses were excluded from final analytic file (therefore, excluded from the count of valid responses in N above)

- (-9) Missing data (Not Ascertained): **n = 95**
- (-5) Multiple responses selected in error: **n = 8**

Exposure Variable:
[This question is included in my eligibility criteria because respondents must have answered this question to answer the questions pertaining to patient-centered communication.]
"In the past 12 months, not counting times you went to an emergency room, how many times did you go to a doctor, nurse, or other health professional to get care for yourself?"
N = 2,777 valid responses
The following responses were excluded from the final analytic file (therefore, excluded from the count of valid responses in N above)

- (-9) Missing data (Not Ascertained): **n = 46**
- (0) None: **n = 462**

[Below are the seven sub-questions that create my exposure variable of patient-centered communication.]
"The following questions are about your communication with all doctors, nurses, or other health professionals you saw during the past 12 months…How often did they do each of the following":
(NOTE: The criteria to receive this question are participants who went to a doctor, nurse, or other healthcare professional, not counting times they went to the emergency room, in the last 12 months, at least once.)

a. "Give you the chance to ask all the health-related questions you had"
   N = 2,771 valid responses
   The following responses were excluded from final analytic file (therefore, excluded from the count of valid responses in N above):
   - (-9) Missing data (Not Ascertained): **n = 52**
   - (-2) Question answered in error (Commission Error): **n = 81**
   - (-1) Inapplicable; coded 0 in FreqGoProvider: **n = 381**
b. "Give the attention you needed to your feelings and emotions"
   N = 2,748 valid responses
   The following responses were excluded from final analytic file (therefore, excluded from the count of valid responses in N above):
   - (-9) Missing data (Not Ascertained): **n = 72**

  - (-5) Multiple responses selected in error: **n = 3**
  - (-2) Question answered in error (Commission Error): **n = 79**
  - (-1) Inapplicable; coded 0 in FreqGoProvider: **n = 383**

c. "Involve you in decisions about your health care as much as you wanted"
N = 2,756 valid responses
The following responses were excluded from final analytic file (therefore, excluded from the count of valid responses in N above):
  - (-9) Missing data (Not Ascertained): **n = 66**
  - (-5) Multiple responses selected in error: **n = 1**
  - (-2) Question answered in error (Commission Error): **n = 79**
  - (-1) Inapplicable; coded 0 in FreqGoProvider: **n = 383**

d. "Make sure you understood the things you needed to do to take care of your health"
N = 2,765 valid responses
The following responses were excluded from final analytic file (therefore, excluded from the count of valid responses in N above):
  - (-9) Missing data (Not Ascertained): **n = 58**
  - (-2) Question answered in error (Commission Error): **n = 80**
  - (-1) Inapplicable; coded 0 in FreqGoProvider: **n = 382**

e. "Explain things in a way you could understand"
N = 2,757 valid responses
The following responses were excluded from final analytic file (therefore, excluded from the count of valid responses in N above):
  - (-9) Missing data (Not Ascertained): **n = 65**
  - (-5) Multiple responses selected in error: **n = 1**
  - (-2) Question answered in error (Commission Error): **n = 78**
  - (-1) Inapplicable; coded 0 in FreqGoProvider: **n = 384**

f. "Spend enough time with you"
N = 2,753 valid responses
The following responses were excluded from final analytic file (therefore, excluded from the count of valid responses in N above):
  - (-9) Missing data (Not Ascertained): **n = 69**
  - (-5) Multiple responses selected in error: **n = 1**
  - (-2) Question answered in error (Commission Error): **n = 78**
  - (-1) Inapplicable; coded 0 in FreqGoProvider: **n = 384**

g. "Help you deal with feelings of uncertainty about your health or health care"
N = 2,737 valid responses
The following responses were excluded from final analytic file (therefore, excluded from the count of valid responses in N above):
  - (-9) Missing data (Not Ascertained): **n = 86**
  - (-2) Question answered in error (Commission Error): **n = 80**
  - (-1) Inapplicable; coded 0 in FreqGoProvider: **n = 382**

"Have you ever been diagnosed as having cancer?"
N = 3,260 valid responses
The following responses were excluded from final analytic file (therefore, excluded from the count of valid responses in N above):
- (-9) Missing data (Not Ascertained): **n = 25**

Once all the invalid values detailed above were removed from the dataset, I removed all respondents that did not answer all of the questions listed above. Meaning, any respondent who did not answer one or more of questions listed above were removed from the final dataset. **Therefore, my final analytic file contains 2,604 respondents.**

Appendix C: Unadjusted Relationship between Trust in Physician Information and Patient-Centered Communication (Weighted)

	Unadjusted Total Sample (*N* = 2604)	
	OR	(95% CI)
Overall Patient-Centered Communication Score (Range 1–100)	1.04	(1.03 – 1.05)
Functions of Patient-Centered Communication[a,b]		
Exchanging Clinical Information	2.49	(1.79 – 3.47)
Responding to Emotional Needs	2.18	(1.57 – 3.01)
Facilitating Shared Decision-Making	2.28	(1.64 – 3.16)
Enabling Patient Self-Management	2.77	(2.08 – 3.68)
Managing Uncertainty	2.30	(1.66 – 3.19)
Fostering Healing Relationships	2.82	(2.22 – 3.57)
Spends Enough Time With You[c]	2.01	(1.48 – 2.73)
Rated Quality of Care[a,d]	4.02	(2.85 – 5.67)

The probability modeled for Trust in Physician Information is High Level of Trust.

[a] Separate logistic regressions of functions and quality of care on trust in physician information.

[b] Dichotomized as Optimal (*always*) vs. Suboptimal (*usually/sometimes/never*). The reference group is Suboptimal (*usually/sometimes/never*). The first six functions of PCC were outlined by a National Cancer Institute monograph. Responses from the HINTS5 Cycle 1 addressed the six main functions of PCC (see applicable HINTS question for each main function): 1) Exchange Clinical Information *(Chance to Ask Questions)*; 2) Responding to Emotional Needs *(Feelings Addressed)*; 3) Facilitating in Shared Decision Making *(Involved in Decisions)*; 4) Enabling Patient Self-Management *(Understood Next Steps)*; 5) Managing Uncertainty *(Help Uncertainty)*; 6) Fostering Healing Relationships *(Explained Clearly).* The last item listed in the above table ("Spending enough time with you") was newly added in 2017 HINTS5 Cycle 1.

[c] This is calculated in addition to the 6 main core functions.

[d] Dichotomized as Optimal (*Excellent/Very good*) vs. Suboptimal (*Good/Fair/Poor)*. The reference group is Suboptimal (*Good/Fair/Poor).*

Appendix D: Sociodemographic Characteristics of Respondents in HINTS 5 Cycle 1, by Cancer Survivorship Status and Level of Trust in Physician Information (PCC Score and Sociodemographic Characteristics)

	Total Sample (*N* = 2604)	**Cancer Survivor** (*N* = 429)	**Never Had Cancer** (*N* = 2175)	
	OR (95% CI)	OR (95% CI)	OR (95% CI)	Interaction term p-value
Overall Patient-Centered Communication Score[a] (Range 1–100)	1.04 (1.03–1.05)	1.05 (1.03–1.07)	1.04 (1.02–1.05)	0.239
Age *(years)*				
18–34	*ref*	*ref*	*ref*	
35–49	0.49 (0.25–0.96)	0.49 (0.26-0.97)	0.49 (0.26-0.97)	0.039*
50–64	0.51 (0.24–1.06)	0.51 (0.24-1.08)	0.51 (0.24-1.08)	0.077
65-74	0.58 (0.29–1.18)	0.58 (0.28-1.19)	0.58 (0.28-1.19)	0.139
75+	0.88 (0.40–1.93)	0.89 (0.39-1.99)	0.89 (0.39-1.99)	0.775
Unknown	0.59 (0.09–3.68)	0.59 (0.09-3.61)	0.59 (0.09-3.61)	0.561
Sex				
Male	*ref*	*ref*	*ref*	
Female	0.89 (0.61–1.34)	0.89 (0.61-1.34)	0.89 (0.61-1.34)	0.593
Unknown	1.06 (0.35–3.21)	1.04 (0.34-3.18)	1.04 (0.34-3.18)	0.940
Race/Ethnicity				
White (Non-Hispanic)	*ref*	*ref*	*ref*	
Black or African American (Non-Hispanic)	0.67 (0.41– 1.10)	0.68 (0.41-1.11)	0.68 (0.41-1.11)	0.118
Hispanic or Latino/a	0.90 (0.56–1.43)	0.90 (0.57-1.44)	0.90 (0.57-1.44)	0.663
Asian (Non-Hispanic)	1.04 (0.44–2.48)	1.03 (0.43-2.46)	1.03 (0.43-2.46)	0.944
Other (Non-Hispanic)	0.94 (0.41–2.17)	0.93 (0.40-2.17)	0.93 (0.40-2.17)	0.871
Unknown	0.44 (0.23–0.84)	0.44 (0.23-0.84)	0.44 (0.23-0.84)	0.015*
Education				
Less than High School	*ref*	*ref*	*ref*	
12 Years or Completed High School	1.51 (0.53–4.28)	1.49 (0.53-4.23)	1.49 (0.53-4.23)	0.438
Some College	1.92 (0.64–5.79)	1.91 (0.63-5.75)	1.91 (0.63-5.75)	0.244
College Graduate or Higher	2.39 (0.69–8.32)	2.37 (0.68-8.24)	2.37 (0.68-8.24)	0.169
Unknown	4.11 (0.61–27.72)	4.09 (0.61-27.52)	4.09 (0.61-27.52)	0.143
Household Annual Income				
Less then $20,000	*ref*	*ref*	*ref*	
$20,000 to $49,999	0.71 (0.39–1.29)	0.69 (0.38-1.29)	0.69 (0.38-1.29)	0.242
$50,000 to $99,999	0.94 (0.53–1.67)	0.94 (0.53-1.67)	0.94 (0.53-1.67)	0.829
$100,000 or more	1.09 (0.48–2.48)	1.08 (0.47-2.49)	1.08 (0.47-2.49)	0.854
Unknown	0.77 (0.39–1.51)	0.77 (0.39-1.51)	0.77 (0.39-1.51)	0.441

NOTES:

"ref"=Reference group.

*p-value <0.05.

Appendix E: Relationship Between Trust in Physician Information and Patient-Centered Communication, Overall and by Cancer Survivorship Status [Multivariable Model Adjusting for Quality of Care, Weighted]

	Total Sample (*N* = 2604)	**Cancer Survivor** (*N* = 429)	**Never Had Cancer** (*N* = 2175)	
	OR (95% CI)	OR (95% CI)	OR (95% CI)	Interaction term p-value
Overall Patient-Centered Communication Score[a] (Range 1–100)	1.02 (1.01–1.03)	1.04 (1.02–1.05)	1.02 (1.00–1.03)	0.146
Functions of Patient-Centered Communication[b,c] (Dichotomous)				
Exchanging Clinical Information	1.71 (1.14–2.56)	2.12 (1.07–4.20)	1.67 (1.05–2.65)	0. 605
Responding to Emotional Needs	1.43 (0.96–2.12)	1.97 (0.98–3.98)	1.38 (0.90–2.11)	0.349
Facilitating Shared Decision-Making	1.52 (1.07–2.16)	3.12 (1.54–6.25)	1.41 (0.95–2.07)	0.058
Enabling Patient Self-Management	1.83 (1.24–2.70)	2.90 (1.63–5.17)	1.74 (1.14–2.66)	0.143
Managing Uncertainty	1.52 (1.03–2.26)	2.29 (1.28–4.08)	1.46 (0.95–2.24)	0.193
Fostering Healing Relationships	1.85 (1.38–2.48)	2.95 (1.55–5.61)	1.76 (1.27–2.45)	0.183
Spends Enough Time With You[d]	1.27 (0.85–1.90)	1.47 (0.80–2.68)	1.25 (0.81–1.94)	0.654
Rated Quality of Care	2.57 (1.56-4.32)	2.59 (1.57-4.31)	2.59 (1.57-4.31)	0.146

Multivariable model adjusted for age, gender, education, race/ethnicity, household annual income, and rated quality of care. The probability modeled for Trust in Physician Information is High Level of Trust. Rated quality of care was dichotomized as Optimal (Excellent/Very good) vs. Suboptimal (Good/Fair/Poor). The reference group is Suboptimal (Good/Fair/Poor).

[a] Overall patient-centered communication score ranged from 1 to 100 after linear transformation, where higher score represents better patient-centered communication.

[b] Separate logistic regressions of functions and quality of care on trust in physician information.

[c] Dichotomized as Optimal (*always*) vs. Suboptimal (*usually/sometimes/never*). The reference group is Suboptimal (*usually/sometimes/never*). The first six functions of PCC were outlined by a National Cancer Institute monograph. Responses from the HINTS5 Cycle 1 addressed the six main functions of PCC (see applicable HINTS question for each main function): 1) Exchange Clinical Information *(Chance to Ask Questions)*; 2) Responding to Emotional Needs *(Feelings Addressed)*; 3) Facilitating in Shared Decision Making *(Involved in Decisions)*; 4) Enabling Patient Self-Management *(Understood Next Steps)*; 5) Managing Uncertainty *(Help Uncertainty)*; 6) Fostering Healing Relationships *(Explained Clearly)*. The last item listed in the above table ("Spending enough time with you") was newly added in 2017 HINTS5 Cycle 1.

[d] This is calculated in addition to the 6 main core functions.

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