EXPLORING CANCER PREVENTION AND SCREENING INFORMATION ENGAGEMENT ON FACEBOOK AMONG U.S. LATINOS

by
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Abstract

Latinos, the largest minority in the U.S., face a high burden of cancer, making it important to deliver evidence-based cancer prevention and screening information (CPSI) to them. Social media presents an innovative platform to engage with Latinos dialogically by allowing user interaction through posts, pictures, videos, and other information sharing. Due to its popularity, Facebook is a useful platform for Latinos without a history of cancer to engage with CPSI. This is particularly important among Latinos age 40-75, as they are eligible for breast, prostate, and/or colorectal cancer screenings. However, there is a dearth in scholarship exploring how Latinos engage with and act upon content encountered on social media, which may be influenced by cultural values. This qualitatively-driven, mixed methods dissertation explored how U.S. Latinos engage with, assess the credibility of, and act upon CPSI on Facebook.

During one-on-one, in-person encounters, participants (n=20) accessed their Facebook profiles and discussed engagement with cancer-related posts with the researcher. Engagement with content prompted semi-structured, in-depth interviews discussing reasons for engagement, credibility assessments, and subsequent actions. Data were analyzed via content analysis and thematic analysis. Results demonstrate that cultural values and other cultural connectors (e.g., language and country of origin) play a salient role in how message factors and source factors influence the way Latinos engage with and assess the credibility of CPSI. Furthermore, both engagement and credibility assessments – as influenced by culture – appear to impact how some Latinos choose to act upon CPSI, both online and offline. Actions taken were sometimes informed by inaccurate credibility assessments, which may lead to potentially harmful outcomes. Findings provide important methodological,
theoretical, and practical contributions to a growing area of public health research that is interested in curtailing the effects of misinformation on health outcomes.

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Meghan B. Moran, PhD

**Thesis readers:** Corrine Joshu, PhD (Chair)
Johannes Thrul, PhD

**Alternates:** Debra Roter, PhD
Caitlin Kennedy, MD
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Chapter 1: Introduction

Latinos currently represent the largest minority group in the U.S., accounting for 17.6% of the total population in 2017 (U.S. Census Bureau, 2019). However, while heart disease is the leading cause of death among the general U.S. population, cancer is the leading cause of death among Latinos (Murphy, Xu, Kochanek & Bastian, 2016). Of note is that breast, prostate, and colorectal cancers – which had the highest estimated incidence rates among Latinos in 2015 (American Cancer Society (ACS), 2018a) – are screenable cancers linked to preventable behaviors. Furthermore, although Latinos have lower incidence and mortality rates for these cancers compared to non-Hispanic Whites, they are more likely to be diagnosed with advanced stages of disease (National Cancer Institute (NCI), 2012); this has been partially associated with lower screening rates (ACS, 2018a). Given this unequal burden of disease, it is important to identify ways to effectively reach and educate Latinos on how cancer prevention and screening can reduce these cancer health disparities (NCI, 2015a).

Empowering Latinos to actively participate in their health is an important facet of reducing cancer health disparities. Programs using lay community health workers – known as *promotores* – have been deemed an effective vehicle to educate communities about cancer prevention and screening (Office of Minority Health (OMH), 2015; Scheel et al., 2015; Fernández et al., 2009; Mojica, Morales-Campos, Carmona, Ouyang & Liang, 2015; Morález, Rao, Livaudais & Thompson, 2012; Larkey et al., 2012). *Promotores* also empower communities and link them with local health and social services (Spencer, Gunter, & Palmisano, 2010). However, poor funding and planning many times hamper the sustainability of *promotores* initiatives (Koskan, Friedman, Messias, Brandt & Walsemann, 2013a). Traditional communication platforms have also played a role in educating Latinos
about cancer prevention and screening (Davis et al., 2015; Baezconde-Garbanati et al., 2014; Simmons et al., 2008). These platforms, however, are not participatory in nature. As the communications landscape continues to rapidly change, NCI has acknowledged the need to shift cancer communication from traditional platforms to those in the new media landscape (NCI, 2015b; 2016). There is particular emphasis on research exploring social media platforms as innovative communication tools that encourage participative communication among communities with high cancer burden. Among these are social networking sites (SNSs), which present a way to engage with Latinos dialogically by allowing user interaction through posts, pictures, videos and other information sharing (Chou, Prestin, Lyons & Wen, 2013). As such, studying SNSs presents itself as a budding area of research in the realm of cancer health disparities affecting U.S. Latinos.

Latinos utilize social media regularly: 8 out of 10 Latinos are on at least one SNS, and 73% of these are on Facebook – the most popular SNS among Latinos (Krogstad, 2015). However, little research has been conducted exploring cancer prevention and screening information on SNSs in the general population – particularly among adults eligible for cancer screenings (Koskan et al., 2014; Allem, Chu, Cruz & Unger, 2017; Chu, Allem, Cruz & Unger, 2016; Adhikari, Sharma, Arjyal & Uprety, 2016; Gage-Bouchard, LaValley, Mollica & Beaupin, 2017; Kent et al., 2015; Abramson, Keefe & Chou, 2015; Strekalova & Damiani, 2016; Strekalova & Krieger, 2015; Kapahi Theiss, Burke, Cory & Fairley, 2016). A recent review on social media utilization in cancer research noted most studies have focused on cancer survivorship (primarily among breast cancer survivors) via content analyses of online blogs and forums (Koskan et al., 2014). Since this review was published, nine additional studies were identified assessing cancer information on SNSs: six conducted content analyses exploring cancer information sharing (Allem et al., 2017; Chu et al., 2016; Adhikari et al., 2016; Gage-Bouchard et al., 2017; Kent et al., 2015; Abramson et al., 2015), while the remaining
assessed user engagement with national and state-level cancer prevention campaigns (Strekalova & Damiani, 2016; Strekalova & Krieger, 2015; Kapahi Theiss et al., 2016). However, no studies to date have been found that focus specifically on how Latinos utilize and engage with cancer information on SNSs.

Due to its popularity, Facebook may be a useful platform for Latinos without a history of cancer to engage with cancer prevention and screening information (CPSI). This is particularly important among Latinos age 40 to 75, as they are eligible to be screened for breast, prostate and/or colorectal cancers. This population is also an active audience on Facebook: 47% of Latinos 50 and older have reported using Facebook within the past 30 days (Nielsen, 2018), and 74% of Latinos age 50 to 64 with smartphones actively use Facebook’s mobile app (Nielsen, 2015). Given the dearth in literature exploring how to best engage with Latinos about cancer prevention and screenings on SNSs, the proposed mixed methods study explores engagement with cancer information on Facebook among Latino adults age 40 to 75 without a history of cancer. Specifically, the study aims to:

**Aim 1.** Explore how and why Latino adults age 40 to 75 without a history of cancer engage with CPSI on Facebook

**Aim 2.** Understand how Latino adults age 40 to 75 without a history of cancer assess the credibility and accuracy of CPSI they engage with on Facebook

**Aim 3.** Identify factors of engagement with CPSI on Facebook that contribute to further action

These findings will provide insight to specific attributes in CPSI on SNSs that attract user engagement through likes, comments, message sharing and/or other activities. Additionally, results can provide valuable evidence pertaining the influence of cultural
values on how Latino users engage with cancer information and information sources on Facebook. These interactions may also shed light on how Latino Facebook users assess the accuracy and credibility of information shared by different sources in their network, which may be influenced by cultural values and other unique factors. Furthermore, identifying how engagement with cancer information may translate to actions both online and offline (i.e. joining a cancer-related Facebook Page; scheduling a cancer screening) may assist in developing better ways to expose Latinos to online messages that promote cancer prevention and screening behaviors. Lastly, findings will contribute to the limited body of literature on the utilization of SNSs as a vehicle to reducing cancer health disparities among minority populations.

Overview of Dissertation Chapters

This dissertation is divided into eight chapters. Chapter 1 provides a brief description of the dissertation background, its aims and significance. Chapter 2 presents a literature review that discusses important topics for this dissertation. First, it describes factors that impact cancer health disparities among Latinos in the U.S. Then, it discusses shared cultural values in the Latino community and how they interact with cancer disparities. This is followed by a discussion of current public health and health communication efforts to reduce cancer disparities tailored to Latino audiences. It ends by discussing the role of social media in disseminating cancer information and presents current gaps in research surrounding how to best use social media to engage with Latinos about CPSI. Chapter 3 discusses the theoretical underpinnings of the dissertation, specific aims and research sub-questions, and its significance and public health implications. Chapter 4 outlines the qualitatively-driven mixed methods developed for this study. It also discusses epistemology, reflexivity, positionality, and ethics. Chapter 5 presents the first manuscript, which provides an in-depth discussion and justification of the social media content and context (SoCo) elicitation method
developed for this dissertation. This is followed by the second manuscript in **Chapter 6**, which describes the reasons and way Latinos engage with and act upon CPSI, as influenced by cultural values and a cultural connection to content. Then, **Chapter 7** discusses the role of culture and cognitive heuristics in how Latinos assess the credibility of the content with which they engaged, most of which is not evidence based. The dissertation concludes with **Chapter 8**, which integrates the findings of all three manuscripts, highlights its methodological and theoretical contributions, discusses the implications of this work in public health and health communication, and proposes directions for future research.
References


Chapter 2: Literature Review

Latinos\(^1\) currently represent the largest minority group in the U.S. In 2017, 56.5 million Latinos lived in the U.S., accounting for 17.6% of the total population (U.S. Census Bureau, 2019). Although commonly agglomerated under one ethnic group, U.S. Latinos stem from a myriad of backgrounds (Table 2-1). The majority of Latinos are of Mexican origin (64%), followed by Puerto Ricans (9.5%), Salvadorans (3.8%), Cubans (3.7%) and Dominicans (3.3%) (Stepler & Brown, 2015). Documentation status also differs by country of origin among Latinos, with the majority of undocumented immigrants in 2012 being of Mexican descent (Passel & Cohn, 2014) (Table 2-2). Meanwhile, although Puerto Ricans are excluded from these numbers given their status as U.S. citizens, approximately 250,500 Puerto Ricans residing in the island moved to the U.S. mainland between 2010 and 2015 since the beginning of its current economic recession, resulting in a 7% decline of the island’s population (Krogstad, 2016).

\(^{1}\)“Hispanic” refers to individuals with ancestry from Spanish-speaking countries and includes Spanish-Americans in the U.S. “Latino” generally refers to individuals of Latin American origin or ancestry; these include Portuguese-speaking countries in Latin America. Throughout this proposal, Latino will be used in reference to individuals of origin or ancestry from predominantly Spanish-speaking countries in Latin America.
### Table 2-1. Latinos living in the U.S. in 2014, by country of origin

<table>
<thead>
<tr>
<th>Country</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>35,371,314</td>
<td>64.0</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>5,319,961</td>
<td>9.6</td>
</tr>
<tr>
<td>El Salvador</td>
<td>2,100,000</td>
<td>3.8</td>
</tr>
<tr>
<td>Cuba</td>
<td>2,045,970</td>
<td>3.7</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>1,763,651</td>
<td>3.2</td>
</tr>
<tr>
<td>All Other Hispanic/Latino</td>
<td>1,683,332</td>
<td>3.0</td>
</tr>
<tr>
<td>Guatemala</td>
<td>1,324,694</td>
<td>2.4</td>
</tr>
<tr>
<td>Colombia</td>
<td>1,046,332</td>
<td>1.9</td>
</tr>
<tr>
<td>Honduras</td>
<td>812,731</td>
<td>1.5</td>
</tr>
<tr>
<td>Ecuador</td>
<td>659,166</td>
<td>1.2</td>
</tr>
<tr>
<td>Peru</td>
<td>614,151</td>
<td>1.1</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>414,136</td>
<td>0.7</td>
</tr>
<tr>
<td>Venezuela</td>
<td>302,778</td>
<td>0.5</td>
</tr>
<tr>
<td>Argentina</td>
<td>268,099</td>
<td>0.5</td>
</tr>
<tr>
<td>Panama</td>
<td>189,748</td>
<td>0.3</td>
</tr>
<tr>
<td>Chile</td>
<td>149,113</td>
<td>0.3</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>140,581</td>
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<td>Bolivia</td>
<td>110,101</td>
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<tr>
<td>Uruguay</td>
<td>67,226</td>
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</tr>
<tr>
<td>Other Central American</td>
<td>47,223</td>
<td>0.1</td>
</tr>
<tr>
<td>Other South American</td>
<td>38,639</td>
<td>0.1</td>
</tr>
<tr>
<td>Paraguay</td>
<td>27,590</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

Source: Stepler & Brown, 2015

### Table 2-2. Estimates of undocumented immigrants living in the U.S. in 2012

<table>
<thead>
<tr>
<th>Country</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>5,850,000</td>
</tr>
<tr>
<td>El Salvador</td>
<td>675,000</td>
</tr>
<tr>
<td>Guatemala</td>
<td>525,000</td>
</tr>
<tr>
<td>Honduras</td>
<td>350,000</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>170,000</td>
</tr>
<tr>
<td>Colombia</td>
<td>150,000</td>
</tr>
<tr>
<td>Ecuador</td>
<td>130,000</td>
</tr>
<tr>
<td>Peru</td>
<td>120,000</td>
</tr>
</tbody>
</table>

Source: Passel & Cohn, 2014
Cancer health disparities among Latinos in the U.S.

While heart disease is the leading cause of death among the general U.S. population, cancer is the leading cause of death among Latinos (Murphy et al., 2016). Table 2-3 lists the top five cancer incidence and mortality estimates for 2015 among U.S. Latinos; breast, prostate and colorectal cancers – all screenable cancers linked to preventable behaviors – are included on both lists (ACS, 2018a). Among the preventable risk factors for these cancers are smoking, poor diet, lack of exercise, obesity, and increased alcohol consumption. Screening guidelines for breast, colorectal and prostate cancers have also been established. Screening guidelines from the ACS for the general population recommend mammograms for women ages 45 and above (with an option of starting annual mammograms at age 40); colorectal cancer screenings for men and women ages 45 and above; and informed decision making for prostate cancer screenings between physician and men ages 50 and above (ACS, 2018b). Breast and colorectal cancer screenings are recommended by the U.S. Preventive Services Task Force (USPSTF) until age 75 for the general population, while prostate cancer screenings are recommended until age 70 (USPSTF 2016a; 2016b; 2017). Promoting cancer screenings among the Latino population is of particular importance because, although Latinos have lower incidence and mortality rates for breast, colorectal and prostate cancers compared to non-Hispanic Whites, they are more likely to be diagnosed with advanced stages of disease (NCI, 2012). This has been partially attributed to lower screening rates: in 2015, 61% of Latinas had received mammograms within the last two years compared to 65% of non-Hispanic Whites, while only 43% of Latinos ages 50 to 64 reported receiving a colorectal cancer screening, compared to 61% of non-Hispanic Whites (ACS, 2018).
Table 2-3. Top five cancer incidence and mortality 2018 estimates among Latinos in the U.S, by gender

<table>
<thead>
<tr>
<th>Estimated Incidence</th>
<th>Estimated Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td><strong>Females</strong></td>
</tr>
<tr>
<td>Prostate (13,900)</td>
<td>Breast (24,000)</td>
</tr>
<tr>
<td>Colorectal (7,900)</td>
<td>Thyroid (6,800)</td>
</tr>
<tr>
<td>Lung/Bronchus (5,600)</td>
<td>Uterine (6,700)</td>
</tr>
<tr>
<td>Kidney/Renal (4,800)</td>
<td>Colorectal (6,500)</td>
</tr>
<tr>
<td>Liver/Bile Duct (4,500)</td>
<td>Lung/Bronchus (5,000)</td>
</tr>
</tbody>
</table>

Source: American Cancer Society, 2018a

Research highlights multiple individual and structural barriers to cancer prevention and screening among U.S. Latinos. Among these is language, which has been perceived as a barrier to accessing cancer prevention and screening information (CPSI) among predominantly Spanish-speaking Latinos (Díaz et al., 2013; Scarinci, Bandura, Hidalgo & Cherrington, 2012; Vanderpool, Kornfeld, Finney Rutten, & Squiers, 2009; Stein & Fox, 1990). Compared to 89% of U.S.-born Latinos, only 34% of Latinos born outside the U.S. report either only speaking English at home or stating they speak English very well (Stepler & Brown, 2015). These differences have been reported to affect access to and understanding of cancer information. One study found that Spanish-speaking Latinos were 63% more likely to find it difficult to understand sought cancer information than English-speaking Latinos; they were also 65% more likely to report it taking a lot of effort to search for cancer information (Vanderpool et al., 2009). Another study by Díaz and colleagues (2013) reported that language is a stronger barrier to getting screened for colorectal cancer among Latino men: those with limited English proficiency reported being 52% less likely to get screened than non-Hispanic Whites. They also reported screening rates 10% lower than their Spanish-
speaking female counterparts, as well as both male and female English-speaking Latinos (Díaz et al., 2013). Study authors argue that language barriers may affect patient-provider communication and subsequent cancer screening, a finding that has been substantiated in other research (Savas, Vernon, Atkinson & Fernández, 2015; Becerra, Androff, Messing, Castillo & Cimino, 2015; Jibara, Jandorf, Fodera & DuHamel, 2011). Language barriers have also been linked to acculturation and access to care, each of which are further described below.

Acculturation – the process by which immigrants adopt the customs, attitudes, beliefs, and behaviors of a new culture (Abraído-Lanza, Chao, & Florez, 2005) – also plays an important role in cancer rates among Latinos, although results have been mixed regarding its positive and negative impacts (Lara, Gamboa, Kahramanian, Morales & Hayes Bautista, 2005). For example, acculturation has been seen to improve access to healthcare services (Becerra et al., 2015), cancer screenings (Savas et al., 2015; Harmon, Castro & Coe, 1997), and HPV vaccine uptake (Gerend, Zapata & Reyes, 2013). However, it has also been reported to increased uptake of behaviors linked to cancer, such as smoking (Castro et al., 2009; Otero-Sabogal, Sabogal, Pérez-Stable & Hiatt, 1994; Marín, Perez-Stable & Marín, 1989), poor dietary behaviors (Neuhouser, Thompson, Coronado & Solomon, 2004), and increased alcohol consumption (Otero-Sabogal et al., 1994; Marks, García & Solis, 1990).

Access to healthcare is another key factor in cancer prevention, screening, and treatment service utilization (ACS, 2015). However, according to the 2015 Latino Health Survey conducted by the University of New Mexico’s Center for Health Policy, 16% of Latinos reported having no health insurance during the previous 12 months, while another 19% went without health insurance at some point during the year (Latino Decisions, 2015). Additionally, only 78% of foreign-born Latinos had health insurance in 2015, compared to
87% of those born in the U.S. Furthermore, among the 82% of Latinos with health insurance coverage, 12% were on Medicaid, while another 19% were on Medicare, likely affecting the type of care received (Latino Decisions, 2015). Lastly, because they are ineligible for Medicare, Medicaid, and other health insurance through the Affordable Care Act, many undocumented Latinos are limited to receiving cancer screenings at low-cost and free clinics (Centers for Medicare & Medicaid Services, 2014). In many instances, these services are limited to Pap tests and mammograms. Limited transportation is also cited as a barrier to accessing cancer screenings for some Latinos in the U.S., such as undocumented immigrants, migrant farmworkers, and Latinos with low acculturation levels (Scarinci et al., 2012; Natale-Pereira et al., 2008; Coronado, Thompson, Koepsell, Schwartz & McLerran, 2004). Similarly, fear of documentation status disclosure, feeling mistreated and receiving poorer care due to being Latino are perceived as structural barriers to seeking cancer prevention and screening services (Becerra et al., 2015; Natale-Pereira et al., 2008). The influence of education (Chávez, Hubbell, McMullin, Martínez, & Mishra, 1995; Scarinci, Beech, Kovach & Bailey, 2003) and income (Swan, Breen, Coates, Rimer, & Lee, 2003) on cancer health disparities among Latinos in the U.S. has also been well documented.

It is important to acknowledge the immense diversity that exists among Latinos in the U.S. As noted above, Latinos encompass different countries of origin, socioeconomic status, acculturation levels, and language preferences, among others. However, there are several shared values that have been attributed to Latino communities at varying levels, many of which result from a shared Spanish colonial history. Literature highlights the following shared cultural values among many Latino communities: machismo, marianismo, fatalismo, familismo, personalismo, and simpatía. A brief historical context of each is discussed below, followed by examples of how some of these cultural values can impact cancer health disparities among U.S. Latinos.
The role of cultural values in Latino cancer health disparities

From the late 1400s through the 1800s, the vast majority of Latin American countries remained under Spanish and Portuguese colonial rule, which was led by the Catholic Church. The influence of patriarchal Catholic monarchies is still present in Latin America’s cultural fabric and is manifested through familial, religious, educational, and other social structures. Within many of these structures, male superiority continues to take a leading role, contributing to the perpetuation of machismo – a male gender-role identity influenced by the interaction of sociocultural and behavioral components (Quiñones Mayo & Resnick, 1996; Torres, 1998). Machismo has been given both positive and negative weight: some research highlights negative attributes such as male dominance, authoritarianism and oppressive behaviors towards women and children (Torres, 1998; Stevens & Soler, 1974), while others highlight positive traits including self-confidence, assertiveness, respect for self and others (including family), dignity, and honor (Mayo, 1993; De la Cancela, 1991). Similarly, marianismo – oftentimes referred to as the counterpart of machismo – has been used to describe ideals of female virtuosity that embody values ascribed to the Virgin Mary and serves to perpetuate stipulated gender roles (Stevens & Soler, 1974; Suleiman González, 2002). Among the traits attributed to marianismo are virginity, purity, submissiveness, loyalty, compassion, motherhood, self-sacrifice, and generosity (Stevens & Soler, 1974; Suleiman González, 2002; Gil & Vázquez, 1996).

Another common cultural value attributed to Latinos is fatalismo – the belief that events are predetermined or externally caused and cannot be prevented or changed (Flórez et al., 2009). Some attribute fatalismo to the oppressive social structures of colonialism, which still contribute to the internalization of oppression among many Latin Americans and prolong a sense of deference and silencing among the marginalized (Lacerda Jr., 2014). In regard to fatalismo as a ramification of internalized oppression, Paulo Freire writes:
“Fatalism in the guise of docility is the fruit of a historical and sociological situation, not an essential characteristic of a people’s behavior. It almost always is related to the power of destiny or fate or fortune – inevitable forces – or to a distorted view of God.” (Freire, 1970, p.43)

While fatalismo has been viewed as a source of distress and pessimism (Mirowsky & Ross, 1984; Pérez-Stable, Sabogal, Otero-Sabogal, Hiatt & McPhee, 1992), it has also been contrasted to a general sense of spirituality that is common among many Latinos, which emphasizes “God is in control” and is seen in a positive light (Leyva, Allen, Tom, Ospino, Torres & Abraído-Lanza, 2014; Abraído-Lanza et al., 2007).

Collective, spiritual and religious values attributed to Catholicism have also influenced how Latinos conceptualize relationships with friends and family. Familismo embraces a sense of family loyalty, closeness, and interdependence (Rivera, Guarnaccia, Mulvaney-Day, Lin, Torres & Alegria, 2008; Mindel, 1980), while personalismo highlights importance of interpersonal relationships and is characterized by empathy, closeness, and warmth (Campesino & Schwartz, 2006). These values are also seen in characteristics of respeto and simpatía, which emphasize the importance of treating others with respect, kindness and affection (Campesino & Schwartz, 2006; Marín, 1989; Marín & Triandis, 1985).

Some of the aforementioned cultural values have been reported to impact cancer health disparities among Latinos in the U.S. For example, fatalismo has been associated with decreased breast and cervical cancer screenings (Otero-Sabogal, Stewart, Sabogal, Brown & Pérez-Stable, 2003; Powe & Finnie, 2003; Hubbell, Chavez, Mishra & Valdez, 1996). Meanwhile, machismo has also been identified as an influential barrier to participating in colorectal cancer screenings for Puerto Rican and Dominican men in the U.S. (Goldman, Díaz & Kim, 2009). It has also been perceived as a barrier to prostate cancer screenings (Rivera-Ramos & Buki, 2011). Machismo has further been documented to impact uptake of cervical
and breast cancer screenings among Latinas (Erwin, Treviño, Saad-Harfouche, Rodriguez, Gage & Jandorf, 2010; Chávez, 2008). However, it is important to note that these cultural values are not inherent barriers to cancer prevention and screening efforts. A recent study exploring the extent to which fatalismo and other barriers mediate the effects of acculturation and socioeconomic status on mammography screenings among Dominican women did not find an association between fatalismo and mammographies (Abraído-Lanza, Martins, Shelton & Flórez, 2015). Fatalismo has also been linked to religious and spiritual beliefs that “God is in control” and that doctors are “instruments of God”, leading to positive views on cancer prevention and screening (Leyva et al., 2014). Literature also suggests Latinos may also choose to embrace the positive aspects of machismo, such as the role of men as respectful, dignified, and honorable protectors of the family (Torres, 1998). For example, Erwin et al. (2010) utilize focus group discussions to explore the positive, negative, and neutral influences of machismo in the lives of the Latinas they provided services to, bolstering the inclusion of men in conversations about the importance of breast and cervical cancer screenings.

As highlighted in the previous sections, cancer health disparities affect Latinos in the U.S at multiple levels. Addressing these disparities requires multifaceted approaches that embrace cultural values – a view that is supported by both the Centers for Disease Control and Prevention’s (CDC) Colorectal Cancer Control Program and NCI’s Center for Reducing Cancer Health Disparities (CDC, 2013; NCI, 2014; Glanz & Rimer, 2005). The following section highlights current strategies that have been successful at educating Latinos in the U.S. about cancer prevention and screening efforts that can reduce cancer health disparities.
Reducing cancer health disparities among U.S. Latinos: Efforts to-date

Empowering Latinos to actively participate in their health is an important facet of reducing health disparities. *Promotores*, also known as community health workers or health advocates, are typically community members trained to provide health education and prevention in culturally and linguistically appropriate manners (OHM, 2015). *Promotores* also play leading roles in capacity building and community empowerment by linking Latinos with local health and social services (Spencer et al., 2010). The Department of Health and Human Services has recognized the importance of *promotores* in Latino health initiatives, creating the Promotores de Salud/Community Health Workers Initiative as a way to help achieve Healthy People 2020 goals (OMH, 2015).

*Promotores* were inspired by the work of Paulo Freire, a Brazilian educator and a strong contributor to critical pedagogy (Minkler & Cox, 1980; Spencer et al., 2010). At the core of his philosophical views is the transformative nature of *praxis* – the process of critically reflecting and acting upon the world (Freire, 1970). Freire emphasizes that both action and reflection must co-exist in *praxis*, which then enables individuals to engage in the transformative process of achieving critical consciousness and subsequently enact changes to their realities. This process requires what Freire refers to as dialogical education, which promotes dialogue as a reflexive way to engage with communities. Dialogical education is also respectful of cultural values embedded within communities, encouraging community members to work collectively to critically reflect and act upon these values. This dialogical approach requires researchers and public health practitioners to have a comprehensive understanding of a community’s social and environmental contexts, as well as their perceptions of these contexts.
Promotores have been very successful at reaching underserved Latino communities to educate them about cancer and encourage them to follow a healthy lifestyle and receive appropriate screenings. Not only has their utilization successfully increased knowledge and attitudes about breast, cervical, and colorectal cancers among underserved Latino communities (Molokwu, Penaranda, Flores & Shokar, 2015; Scheel et al., 2015; Fernández et al., 2009), but they have also played leading roles in the increase of breast, cervical, colorectal, and prostate cancer screening and prevention (Mojica et al., 2015; Parra-Medina et al., 2015; Thompson et al., 2014; Byrd et al., 2013; Morález et al., 2012; Larkey et al., 2012; Chan et al., 2011; O’Brien, Halbert, Bixby, Pimentel & Shea, 2010; Erwin et al., 2010; Saueria et al., 2007), as well as smoking cessation (Woodruff, Talavera & Elder, 2002). An example of the success of using promotores to reduce cancer health disparities is AMIGAS, a cost-effective, bilingual cervical cancer screening educational intervention led by promotoras that has reported statistically significant increases in Pap smears among women of Mexican-American descent (CDC, 2014; Byrd et al., 2013).

Despite the success of promotores in empowering Latino communities to partake in cancer prevention and screening efforts, limitations pertaining to sustainability cannot be ignored. Programs that utilize promotores frequently work within the confines of time-bound funding mechanisms targeting specific types of cancers and screening efforts (Spencer et al., 2010). Koskan et al. (2013a) cite funding as the most influential barrier to program longevity among initiatives using promotores. Costs to sustain these programs include salaries, transportation, and curricula and other materials (Koskan et al., 2013a; Koskan, Friedman, Brandt, Walsemann & Messias 2013b; Pluye, Potvin, Denis, Pelletier & Manonni, 2005). Authors also highlight the importance of ensuring that long-term sustainability is discussed at the design phase of programs using promotores, particularly if these programs are linked to short-term grant-funded research initiatives (Koskan et al., 2013a). Time and resource
constraints also affect the development of programs that rigorously and reliably train future promotores, further impeding sustainability efforts (Koskan et al., 2013a).

Another strategy that has played an important role in educating U.S. Latinos about cancer prevention and screening is the use of traditional media and communication tools. Many health communication materials tailored to Latino individuals consider cultural values, acculturation, country of origin, and documentation status as a way to address both individual and structural issues related to cancer prevention and screening (Davis et al., 2015; Baezconde-Garbanati et al., 2014; Simmons et al., 2008). For example, Baezconde-Garbanati and colleagues used in-depth formative research and focus groups to develop a narrative film, Tamale Lessons, incorporating beliefs about familismo, personalismo, and fatalismo, as well as certain Spanish words and phrases (Baezconde-Garbanati, Murphy, Moran & Cortessis, 2013; Baezconde-Garbanati et al., 2014). Results of a subsequent randomized control trial highlighted that Mexican American women in the narrative film arm had the highest compliance with Pap test screening guidelines after viewing the film, with self-reported screening rates increasing from 32% to 83% (Murphy et al., 2015). However, even though traditional communication platforms have been successful at educating Latinos about cancer prevention and screenings, many are not participatory in nature and are thus limited in their ability to effectively empower Latino audiences. Therefore, it is important to identify other newer communication modalities that are successful at educating and empowering Latinos about ways to participate in cancer prevention and screening efforts.

In the face of a rapidly changing communications landscape, NCI has placed particular emphasis on research exploring social media platforms as innovative communication tools that encourage participatory communication among communities with a high cancer burden (NCI, 2015b; 2016). Among these platforms are social networking sites
(SNSs), which facilitate ways to engage with Latinos dialogically by encouraging user engagement through posts, pictures, videos, and other information sharing (Chou et al., 2013). SNSs are also distinct in that they allow for users to generate and disseminate their own content. Consequently, studying SNSs presents itself as a budding area of cancer health disparities research among U.S. Latinos.

Utilization of social media among U.S. Latinos

Latinos in the U.S. are avid consumers of social media, with 8 out of 10 reporting being on at least one SNS (Krogstad, 2015). Facebook is particularly popular among Latinos: 73% of Latinos on SNSs are on Facebook (Krogstad, 2015). The popularity of SNSs is not limited to younger Latino populations: 64% of Latinos 35 and older reported using any SNS within the past 30 days, and 52% reported using Facebook within the past 30 days (Nielsen, 2016). Furthermore, 81% of Latinos age 50 and over had a smartphone in 2015, and 74% of Latinos age 50 to 64 with smartphones were active Facebook mobile app users (Nielsen, 2015). Given its popularity, Facebook may be a useful platform for Latinos to engage with CPSI.

SNSs in cancer health communication research

SNSs have become a popular vehicle for public health research, particularly as a recruitment tool (Koskan et al., 2014; Kapp, Peters & Oliver, 2013; Landry, Vyas, Turner, Glick & Wood, 2015) and as a way to observe how individuals interact with both other users and health information online (Koskan et al., 2014; Patel, Chang, Greysen & Chopra, 2015). A recent literature review exploring social media utilization as a health promotion vehicle among Latinos reported similar findings (Hudnut-Beumler, Po’e & Barkin, 2016). Of the 27 studies identified, 52% used social media to recruit study participants, while 44% used social media as a health education tool. However, most studies in the review (86%) targeted sexual
health information among Latino men who have sex with men; only one study targeted Latino cancer survivors and their families by assessing the effectiveness of a social media campaign to promote and increase awareness of LIVESTRONG patient navigation services (Justice-Gardiner, Nutt, Rechis, McMillan & Warf, 2012).

Research exploring cancer topics on SNSs among the general population has been conducted in similar ways. In 2014, Koskan and colleagues conducted a literature review on social media utilization in cancer-related research that found most studies only integrate SNSs within their study design as a recruitment tool. They also reported that the majority of studies exploring the intersection of social media and cancer did so by conducting content analyses of online blogs and forums (Koskan et al., 2014). Additionally, they found that most social media research focused on issues pertaining breast cancer survivorship, such as emotional support, self-expression, treatment, and survivorship care. Lastly, authors highlight that while SNSs are among the most popular types of social media, cancer research is lagging in their utilization – particularly among groups with large cancer health disparities.

Since this review was published, nine additional studies were identified exploring cancer information through SNSs – none focusing on Latino populations. Six of these studies conducted thematic and/or content analyses either describing the availability of cancer-related information on a specific SNS (Allem et al., 2017; Chu et al., 2016; Adhikari et al., 2016) or exploring how individuals communicate and share information about cancer topics such as breast cancer awareness, caregiving, and obesity (Gage-Bouchard et al., 2017; Kent et al., 2015; Abramson et al., 2015). The remaining three studies explored message factors contributing to user engagement with cancer-related posts on Facebook Pages for national or state-level cancer prevention campaigns (Strekalova & Damiani, 2016; Kapahi Theiss et al., 2016; Strekalova & Krieger, 2015). All three studies quantified engagement by measuring
likes, comments and/or shares of the posts on their Facebook Page. Among the main factors for engagement was the inclusion of pictures in posts (Strekalova & Damiani, 2016; Strekalova & Krieger, 2015). However, given Facebook’s privacy settings, these studies were unable to assess the demographics of those seeing and engaging with campaign posts, instead inferring these based on the content within the post. For example, Strekalova & Damiani (2016) inferred audience smoking status by the content of messages with which they engaged. Furthermore, although analyzing content generated by or for Facebook Pages provides insight to certain factors that may enhance engagement with cancer information, it fails to understand how individuals engage with general cancer-related content on Facebook – such as user-generated or shared content that may not come from a reliable source.

Limited studies have explored issues surrounding health information accuracy and source credibility on social media. Credibility refers to an individual’s perceptions of a source’s qualities (Perloff, 2014, p.237). Park and colleagues (2016) utilized a committee of physicians to assess the accuracy of colorectal cancer information on Twitter, while Westerman, Spence and Van Der Heide (2014) examined how perceptions of source credibility are affected by the frequency with which heart health information is updated on Twitter. Only one study was found to assess source credibility on Facebook by manipulating pro-breastfeeding Facebook Pages to assess factors contributing to Page credibility (Jin, Phua & Lee, 2015). However, no studies were found exploring how users determine the credibility of the sources of health information they engage with on their personal SNSs, or whether users assess the accuracy of the information they consume. This is especially important to understand among Latinos, as cultural values may influence perceptions of source credibility among Facebook users in an individual’s network, regardless of the accuracy of the health information being shared.
In summary, little research has been conducted exploring CPSI on SNSs in the general population – particularly among adults eligible for cancer screenings. Furthermore, no studies to date have been found that focus specifically on how Latinos engage with cancer information on SNSs, or on how they assess the accuracy and credibility of these messages. This is particularly important among Latinos age 40 to 75 without a history of cancer, as they are eligible to be screened for breast, prostate and/or colorectal cancers. Chapter 3 applies multiple health communication theories to help tackles these questions and outlines the specific aims explored by this dissertation.
References


comparison of perceptions among Latinas, Anglo women, and physicians. *Medical anthropology quarterly, 9*(1), 40-74.


Chapter 3: Theoretical Foundations

This chapter discusses the theoretical underpinnings this dissertation uses to address the limitations of previous research exploring CPSI engagement outlined in Chapter 2. In doing so, it presents a conceptual framework for tackling the dissertation’s specific aims and concludes by outlining research significance and public health implications.

Conceptual Framework

A theoretical framework that may assist in understanding how Latinos engage with information on Facebook is Uses and Gratifications Theory (UGT), which posits that individuals utilize media sources to fulfill cognitive, affective, social, and tension-release needs (Katz, Blumler & Gurevitch, 1974; Rubin, 2010). UGT also acknowledges that communication is purposive, with many actively selecting media and content. However, this involvement is influenced by social and psychological characteristics, societal structure, social groups and relationships, and personal interest (Rubin, 2010). It is also influenced by an individual’s communication orientation – what motivates engagement with media and/or content. According to UGT, individuals preferring a medium (such as Facebook) for diversion or to consume time may favor ritualized orientations, while those accessing content to fulfill specific purposes may favor instrumental orientations (Rubin, 2010). Lastly, UGT highlights that, depending on a variety of factors, individuals may be motivated to engage with media and share its content with others.

Stemming from UGT is Johnson’s Comprehensive Model for Information Seeking (CMIS), which posits that cancer information seeking is triggered by communication channel utilities, characteristics and individual antecedents (Johnson, Andrews & Allard, 2001;
Johnson, 1997). Antecedents include demographics, salience of cancer, beliefs about cancer and personal experiences with cancer. CMIS has been used to understand how cancer survivors actively seek cancer information through various types of media (Johnson & Meischke, 1993). It has also been used to advance understanding of how individuals never diagnosed with cancer access cancer-related information (Neiderdeppe et al., 2007; Johnson, 1997).

The theoretical underpinnings of UGT and CMIS may assist in interpreting the reasons and ways Latinos engage with cancer information on Facebook, as well as how this engagement can contribute to further information seeking and other actions. Drawing from these models, the proposed conceptual framework suggests that there are specific domains and factors that contribute to engagement with cancer posts among Latinos on Facebook (Figure 3-1). The first domain encompasses the uses and gratifications experienced by Latinos on Facebook. Within this domain are the reasons for utilizing Facebook. A recent study suggests individuals utilize SNSs to fulfill the following uses and gratifications: social interaction (88%), information seeking (80%), passing time (76%), entertainment (64%), relaxation (60%), communicatory utility (56%), expression of opinions (56%), convenience utility (52%), information sharing (40%), and surveillance/watching of others (20%) (Whiting & Williams, 2013). Another study focusing on Latinos on Facebook and Twitter found advocacy and cultural identity to be additional uses and gratifications sought by this population (Radlick, 2014). These may all play a role in how and why Latinos 40 to 75 engage with cancer information on Facebook.
Another important factor contributing to the uses and gratifications experienced by Latinos on Facebook are the social interactions they have in their network. A person’s Facebook network may include real-life and virtual connections under the following labels: Friends, Groups, and Pages. Friends may include both real-life and virtual friendships, while Groups facilitate people with similar interests to interact through a joined platform. Lastly, Pages may include celebrities, businesses, organizations and other connections. All this content appears on an individual’s Facebook News Feed, which refers to the main page individuals encounter when they log onto their Facebook account. News Feeds allow Facebook users to see the content recently posted or shared by anyone they follow. These are all potential sources of information on Facebook and may influence both the content individuals see on their News Feed and whether or not they engage with that content. Furthermore, engagement may be influenced by the perceived credibility of these sources. Credibility may be influenced

Figure 3-1. Proposed framework exploring engagement with CPSI on Facebook
by perceptions of the source being an expert, having goodwill and/or being trustworthy (Perloff, 2014, p.242-243).

Lastly, as suggested by UGT, *social and individual characteristics* also influence the uses and gratifications experienced by Latinos on Facebook. These include (but are not limited to) age, gender, language preferences, communication orientation, acculturation level, offline social networks, cultural values, and other sociocultural factors that may motivate Facebook utilization. These, too, may impact the reasons and ways Latino Facebook users engage with cancer information on the SNS.

A second domain that may impact engagement with cancer posts is the **content available on Facebook**. Facebook’s participatory platform allows for users to actively post *general content* that encompasses a variety of topics, including *cancer-related content*. This content can be either user-generated (for example, an individual posts about their experience getting a mammography, or a cancer Page posts information pertaining a mammography educational campaign), or shared from another source (for example, an individual shares a news article about colorectal cancer, or a celebrity promotes their participation in Susan G. Komen’s breast cancer awareness efforts).

How the aforementioned domains and factors interact with each other will have an impact on how Latinos on Facebook **engage with cancer posts**. Engagement may be operationalized as actively interacting with a Facebook post by liking it, commenting on it, and/or sharing it with other Facebook users; it may also occur in other ways not captured quantitatively (such as reading a posted article). Research by Niederdeppe and colleagues (2007) suggests that while individuals not diagnosed with cancer are less likely to actively search for cancer information, information scanning among interviewed 50-70 year olds
contributed to cancer prevention and screening decisions more than 25% of the time. As such, measuring engagement can provide insight to instances where information scanning triggered engagement with CPSI vis-à-vis Facebook’s News Feed. Lastly, as suggested by CMIS, salient messages may contribute to further information seeking or other actions (Johnson, 1997). As such, this model suggests engagement may contribute to action by making cancer prevention and screening more salient to Latinos without a history of cancer. Here, action is operationalized as recalling whether a post that a user engaged with had any role in changing knowledge, attitudes, or behaviors related to cancer prevention and screening. These actions may include (but are not limited to) searching for additional cancer information, joining a cancer-related Facebook Page/Group, talking about the cancer information with friends or a provider, or scheduling a cancer screening appointment.

It is important to note the factors depicted in this model do not represent all factors that may influence Latinos to engage with and act upon CPSI. As posited by UGT, there are multiple sources providing CPSI that both compete with and complement each other. However, understanding the role Facebook’s participatory platform may have in these interactions may assist in developing better ways to expose Latinos to online messages that promote cancer prevention behaviors, as well as tailoring cancer education interventions using social media to improve cancer screening rates. Exploring these interactive mechanisms may also provide insight to the unique features of SNSs that promote Freireian principles of dialogical education and critical consciousness raising among Latinos. Understanding these mechanisms may help maximize educational efforts that translate into empowerment.
Specific Aims

Given the dearth in literature exploring how to best engage with Latinos about cancer prevention and screenings on SNSs, the proposed mixed methods study explores engagement with cancer information on Facebook among Latino adults age 40 to 75 without a history of cancer. Specifically, this study aims to:

Aim 1. Explore how and why Latino adults age 40 to 75 without a history of cancer engage with CPSI on Facebook. This aim integrates findings from sub-questions 1a-1c (below) to interpret the contextual factors influencing engagement with relevant cancer prevention and screening posts.

1a. **How are Latinos engaging with CPSI on Facebook?** This question assesses the ways Latinos actively engage with relevant cancer prevention and screening posts by liking, commenting, and/or sharing posts through a content analysis. It also identifies and explores other types of engagement through a thematic analysis of qualitative interview data.

1b. **What kind of CPSI are Latinos engaging with on Facebook? Why?** This question assesses both CPSI content and features through a content analysis of all relevant cancer prevention and screening posts. It will also discuss the impact message content may have on the reasons for engaging with relevant cancer prevention and screening posts through a thematic analysis.

1c. **What sources of CPSI do Latinos interact with on Facebook? Why?** This question will assess the type of sources sharing relevant cancer prevention and screening posts (such as Friends, Groups, and Pages) through a content analysis. It will also discuss
the impact the relationship with the source may have on the reasons for engaging with relevant cancer prevention and screening posts through a thematic analysis.

**Aim 2. Understand how Latino adults age 40 to 75 without a history of cancer assess the credibility and accuracy of CPSI they engage with on Facebook.** This aim will explore how Latinos discern the credibility and accuracy of the relevant cancer prevention and screening posts they engaged with through a thematic analysis.

**Aim 3. Identify factors of engagement with CPSI on Facebook that contribute to further action.** This aim will assess whether Latinos that engaged with relevant cancer prevention and screening posts recall the relevance of the post in triggering further action (such as actively searching for more information, engaging in conversations about the information with others, scheduling an appointment with a provider, getting a cancer screening, etc.) through a thematic analysis.

**Significance**

The proposed research aims address current gaps in literature in multiple ways. Understanding the kind of cancer information Latinos are engaging with on Facebook may provide insight to specific attributes in CPSI that attract user engagement through likes, comments, message sharing or other activities. Such attributes may include whether a post has a link, picture or video attached to it (Strekalova & Krieger, 2015). Furthermore, delineating the sources of CPSI Latinos engage with and why they do so can provide insight to the cultural values that influence how Latino users engage with cancer information on Facebook. For example, individuals may report trusting information that is shared to them by relatives or close friends over other reliable sources, which may be influenced by *familismo* and *personalismo* (Marín, 1989; Mindel, 1980; Marín, et al., 1989). This may also provide insight
to how Latino Facebook users discern the accuracy and credibility of information shared by
different sources in their network, which is of increasing importance as the digital divide
among Latinos continues to narrow both by age and language dominance (Nielsen, 2015;

Exploring the reasons and ways in which Latinos engage with relevant cancer
prevention and screening posts can also provide insight to the degree individuals engage
with cancer information on Facebook. Commenting and/or sharing a post may be more
important than simply liking a post; these interactions may not only be influenced by
message content and utility, but also by the relationships participants have with the
information source. These combined characteristics may also influence how engaging with a
cancer information on Facebook may influence additional action by increasing the salience
of CPSI (Neiderdeppe et al., 2007; Johnson, 1997). Additional actions may include Facebook
activities such as searching for additional cancer information or joining a cancer-related
Facebook Page/Group; actions may also translate to offline activities, such as talking about
the information with friends, prompting patient-provider conversations about cancer
screening, or scheduling a cancer screening appointment. These findings may assist in
developing better ways to expose Latinos to online messages that promote cancer prevention
behaviors, as well as tailoring cancer education interventions using social media to improve
cancer screening rates. They also contribute to the limited body of literature on the utilization
of SNSs as a vehicle to reducing cancer health disparities among minority populations.

**Public Health Implications**

The implications of this research in efforts to reduce cancer health disparities among
Latinos in the U.S. are multifaceted. First, the number of Latinos online engaging on social
media platforms is rapidly growing (Krogstad, 2015). However, as previously noted, no
studies have been found to specifically focus on the utilization of SNSs as a source of cancer information among Latinos in the U.S. A thorough understanding of how Latinos engage with cancer information on Facebook can inform better educational efforts on social media platforms in general, providing insight to user engagement with posted information; triggers to sharing information with other Latino users; and differences in utilization by gender and language preferences. Public health programs and non-profit organizations can utilize these findings to develop online cancer prevention and screening materials that are tailored to the needs and utilization patterns of Latino communities.

Literature examining how non-profits and local health departments engage with CPSI on SNSs reveals that many organizations post information inconsistently and with minimal audience engagement (Jha, Lin & Savoia, 2016; Abramson et al., 2015; Fussell Sisco & McCorkindale, 2013). Understanding the reasons that trigger audience engagement among Latino Facebook users can assist in the development of local and state-level cancer campaigns and programs that actively communicate with their audiences online, answering questions about healthcare and cancer screening access, and dispelling cancer myths. This audience engagement can occur through Facebook Groups and Pages that provide a space for users to engage in conversations about structural and social barriers to cancer and other important health disparities. This highlights the importance of exploring how social media can incorporate Freireian principles of critical consciousness raising and dialogical education when engaging with Latino audiences. Lastly, findings from this research can be used to inform programs that integrate the use of promotores both in-person and on SNSs as a way to further empower and engage Latinos. In this way, promotores can reach a broader audience in ways that still encourage Latinos in the U.S. to take an active role in improving their health and wellbeing.
References


Chapter 4: Methods

This chapter provides an overview of the methods used in this dissertation. First, a discussion of the choice of qualitatively-driven mixed methods is presented. Next, the specific methods developed to elicit Facebook data are discussed; these are further outlined in Chapter 5. The chapter then presents my constructivist epistemological approach and discusses reflexivity and positionality. It concludes with a discussion of research ethics.

Study Design

This dissertation used a qualitatively-driven, mixed methods approach to explore how and why Latino adults age 40 to 75 without a history of cancer engage with CPSI on Facebook through a convergent parallel research design. Mixed methods research comprehensively and purposefully utilizes both qualitative and quantitative techniques to address an overarching research question that cannot be fully explored and contextualized by either strand independently (Creswell & Plano, 2011, p. 5). In this scenario, the integration of both qualitative and quantitative findings yields richer interpretations and solutions than either strand alone, allowing for a deeper exploration of the reasons and ways U.S. Latinos engage with CPSI on Facebook. A convergent parallel mixed methods design was selected because it allows for concurrent data collection, both independent and merged data analyses, and further data integration at the interpretation stage (Creswell & Plano, 2011, p. 70-71). Here, interview audio and computer screen recordings were collected concurrently during one-on-one, in-person encounters where the participant accessed his/her Facebook profile, scrolled through and discussed engagement with cancer-related posts with the researcher. Interviews were analyzed thematically and CPSI posts were analyzed via content analysis; survey data were used to assist in the contextualization of findings. Data were analyzed
separately for each aim and method, then merged for further analyses and interpretation (see Chapters 6 & 7). Integrated findings are reported in Chapter 8.

**Participants and Recruitment**

Participants (n=20) were recruited through stratified purposeful sampling methods (Patton, 2002, p. 244). Participants were stratified by language preference (English preferred, Spanish preferred, Bilingual), as the cancer-related posts users engage with may differ by preferred language. Twenty participants were sufficient to reach theoretical saturation and provide findings with sufficient rigor to propose how preferred source and content characteristics influenced engagement with CPSI on Facebook among Latinos (Morse, 2000).

Study participants (1) self-identified as Latino/Hispanic, (2) were between 40 and 75 years of age, (3) had a Facebook account they utilized at least three times a week, (4) had no previous cancer diagnosis, and (5) knew someone who had cancer/was a cancer survivor. On this last inclusion criterion, it was anticipated that these individuals may have had a higher salience of cancer as a health concern. Salience is an important feature in understanding how individuals never diagnosed with cancer access cancer-related information (Neiderdeppe et al., 2007; Johnson, 1997). Participants were excluded if they were a cancer survivor and/or were unwilling to allow the computer screen recording of the Facebook searches conducted as part of the study.

The study was conducted in the Tampa Bay area in Florida, which has a diverse Latino population that represents the top five groups of Latinos in the U.S. (U.S. Census Bureau, 2017). Recruiting study participants from a diverse group of Latinos improves the transferability of findings to other Latino SNSs users in the U.S. (Tobin & Begley, 2004). Recruitment was conducted through several methods to ensure appropriate access to the
study population. Utilizing Facebook’s advertising feature, Facebook ads were tailored to reach audiences from June 6-27, 2018 in the following Florida counties: Hillsborough County, Pinellas County, and Sarasota County. Ad parameters included age (40-75), location, ethnic affinity (Hispanic – all languages) and gender. This method reached 653 individuals, with a click-through rate of 5%. Recruitment was also conducted by placing study flyers in areas frequented by Latinos, such as restaurants, colmados (Latino supermarkets), churches, and other common spaces. Ads and flyers contained the same information and were designed to inform audiences about the study in both English and Spanish (Appendix A). Participants also learned about the study through word-of-mouth from community leaders and advocates that were informed about the study. Interested participants contacted me via telephone or email to learn more about the study and were screened to ensure that they met inclusion criteria (Appendix B). If eligible, an appointment was set up to meet at a central location with wireless internet access within each county, inviting the individual to learn more about the study through the informed consent process. Interviews were conducted on-site upon receiving participant consent.

Data Collection

Data was collected using a newly developed method called the social media content and context (SoCo) elicitation method (See Chapter 5). The SoCo elicitation method consist of (1) a short survey and semi-structured interview collecting demographics, health-related information seeking, and Facebook utilization; (2) computer screen recordings of cancer posts on participants’ Facebook News Feed during the past 12 months; and (3) semi-structured, in-depth interviews discussing engagement with cancer posts on Facebook. All data collection tools were developed in English, translated into Spanish, and pilot tested in both languages. In-person interviews were conducted in the participant’s language of preference; the entire process lasted ~2hrs. Upon study completion, participants received a $50 gift card incentive
for their participation. The incentive included compensation for traveling to the interview site.

A) Brief survey and interview

At the beginning of the interview, participants completed a short survey collecting demographic variables, basic health-related information seeking behaviors, and Facebook utilization information (Appendix C). This survey provided descriptive insight to the uses and gratifications experienced by Latinos on Facebook (See Figure 3-1). Demographics included age, gender, household income, education level, employment status, healthcare insurance access, country of origin, U.S. or foreign born, length of time in the U.S., language preferences, acculturation, and whether they had any chronic health conditions (such as diabetes, cardiovascular disease, etc.). Participants were also asked how many friends or family members with a cancer diagnosis they knew, which may have played a role in the salience of cancer topics. Items pertaining to health-related information seeking included questions regarding where participants regularly access health information and cancer information. These were taken from NCI’s 2014 Health Information National Trends Survey (HINTS) 4 Cycle 4, a national cross-sectional survey conducted annually by NCI to assess use of cancer-related information by the general adult public in the U.S. (NCI, 2015c; 2015d). Items pertaining to Facebook utilization included total Facebook friends, total groups followed, total pages followed, and reasons to use Facebook. The list of reasons to use Facebook included categories identified by Whiting and Williams (2013) (social interaction, information seeking, passing time, entertainment, relaxation, communicatory utility, expression of opinions, convenience utility, information sharing, and surveillance/watching of others) and Radlick (2014) (advocacy and cultural identity).
B) Recording of cancer posts on Facebook

Following the survey, a brief semi-structured interview was conducted to further discuss Facebook utilization and further build rapport. Interview questions asked participants to elaborate on their regular Facebook utilization patterns, interactions, and the extent to which they encounter health information (including cancer information) on Facebook. Then, participants logged onto their Facebook account to jointly scroll through cancer-related posts they may have encountered on their Facebook News Feed. Upon logging in, we captured the total number of Facebook Friends participants had, as well as the number of cancer-related Facebook Groups and/or Pages they followed. After this step, we started recording the computer screen for data analysis using QuickTime Player version 10.4. We then entered “cancer” in the search bar and sorted content by “Most Recent” and by “Your Friends and Groups” (Figure 4-1). This elicited a chronological list of posts with the word “cancer” that participants may have been exposed to on their Facebook News Feed. We jointly scrolled through up to 12 months of data to identify

Figure 4-1. Sample Facebook posts that appear upon entering the search term “cancer”
posts recalled, as well as whether the participant engaged with the post. Scrolling through up to 12 months of posts was anticipated to yield at least five cancer posts that could still be recalled; it also accounted for seasonal cancer awareness campaigns, such as cancer prevention awareness month (February), breast cancer awareness month (October), colorectal cancer awareness month (March), and prostate cancer awareness month (September). If the post included any video or embedded link, the participant was asked if they recalled watching the video or clicking on the link. If so, these were opened to capture the full content. Information regarding each post the participant recalled and/or engaged with were documented in real-time using a checklist that captured specific features of the cancer-related content on Facebook (such as who posted the content, the type of information in the post, and the type of media shared) and engagement with cancer posts (Figure 3-1). This process was repeated with the search terms “cancer prevention” and “cancer screening” to filter through data, as many participants had copious amounts of cancer information unrelated to these topics (e.g., cancer survivor stories).

During most interviews, there were moments where participants encountered a CPSI post that was of interest to them, but they did not recall having previously seen. When this occurred, the researcher asked whether they would have engaged with the post if they had seen it on their Facebook News Feed. If participants said they would, the post was discussed and captured in the checklist with the label “attention-grabbing post.” However, these posts were not included in the analyses described in this dissertation.

C) Interviews discussing engagement with cancer posts on Facebook

In addition to capturing the cancer posts that appeared on participants’ Facebook News Feed through computer screen recordings, engagement with a post prompted the use of a semi-structured, in-depth interview guide to ask questions regarding the reasons
participants engaged with the post, as well as whether engagement triggered further action (Figure 3-1). Engagement was defined as liking, commenting, and/or sharing a post; clicking on a post link; reading an article in a post; and/or watching a video within a post. Examples of action include (but are not limited to) searching for additional cancer information or scheduling a cancer screening appointment. In-depth interviews were selected for this study as they allow for the exploration of new issues in depth and elaborate on individuals’ thoughts and behaviors (Boyce & Neale, 2006), an important facet in exploring how source and content characteristics influence engagement with CPSI on Facebook and subsequent action. Interview guide questions were informed by UGT (Rubin, 2010), CMIS (Johnson, Andrews & Allard, 2001; Johnson, 1997), and literature pertaining to cultural values important among Latinos (Abraído-Lanza et al., 2007; Torres, 1998; Marín, 1989; Mindel, 1980; Marín et al., 1989). The interview guide covered the following domains: reasons for engagement with cancer post, relationship to cancer post source (online and/or offline), roles of the cancer post source in delivering information on Facebook, perceptions about posted cancer information’s content and attributes, ways source and content credibility were assessed, and actions triggered by engagement with cancer post (Appendix D). In cases where participants recalled engaging with a post in ways other than liking, commenting, and/or sharing the post, the participant was asked to elaborate on this type of engagement. A checklist was used to collect notes regarding each post the participant recalled and/or engaged with (Appendix E).

Given the exploratory nature of this study, it was anticipated that engagement with cancer posts would vary in frequency, type, and content by participants. As such, in addition to discussing engagement with cancer-related posts that appeared on their Facebook account, all participants were asked to react to three standardized cancer posts (Figure 4-2). Exposing
Figure 4-2. English version of standardized posts shown to participants

**Post 1**

Frozen Lemon More Powerful Than Chemotherapy. It turns out that the best way to consume lemons is to first freeze them and then eat them along with their peel. How best to take advantage of this amazing fruit’s skin?

Wait until they’re completely frozen and grate the whole lemon with a regular grater. You can now add this grated lemon to whichever dish you want, sprinkle it on top your ice cream or salad or add it to your smoothies and shakes. Health experts have said that the lemon skin has an effect thousand times more powerful than chemo therapy and plus it doesn’t have any of the adverse side-effects associated with chemo.

Grated frozen lemons are super easy to combine with your food, you can add them to ice cream, salads, soups and so on and take advantage of all the benefits they hold. The best thing about frozen lemon peel is that it’s incredibly effective against all types of cancer, costs and tumors. Multiple studies on the subject have showed the powerful efffect of lemon peel against cancer cells and recommend it as a treatment.

Lemon peels have powerful antibacterial and antimicrobial effect meaning that they’re effective against bacterial and fungal infections as well. They also regulate your blood pressure, have antidepressant effects and eliminate feelings of anxiety and irritability. If this wasn’t enough, lemon peels neutralize your body and regulate the blood’s pH values, promoting optimal health. Studies have shown that lemon peels can destroy the cancer cells of 12 types of cancer among which one of the deadliest – prostate, colon, pancreatic and lung cancer.

The compounds found in lemon peels, as we already said before, are thousand times more powerful than ADAMycin, a drug commonly used in chemo but more importantly the lemon peels only act on the malignant cells, destroying them, while leaving behind the healthy cells without damaging them. Combine this with HEMP CBD OIL. For best results.

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**Post 2**

Stop being fooled by this common money-grab. Scientists confirm annual mammograms are not effective in helping prevent breast cancer and may even cause health issues of their own. Share this research with the important women in your life.

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**Post 3**

Did you know that the number one risk factor for developing colorectal cancer is age? If you are 60 or older, talk to your health provider about screening, and encourage your friends and family to get screened, too!

Learn more from the National Cancer Institute: https://www.cancer.gov/...ColorectalCancer / colorectal - prev.../ScreenFol lawe

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**Post 1**: Misinformation claiming frozen lemon peel is 100,000 times more effective against cancer than chemotherapy; **Post 2**: Information claiming mammograms are not an effective breast cancer screening tool and may cause further health problems; **Post 3**: Colorectal cancer screening information provided by NCI and disseminated through a local NCI-designated cancer center outreach program.

All participants to standardized posts allowed for an exploration of how participants would engage with identical content, as well as for a deeper understanding of message engagement.

After discussing content that appeared on their News Feed, participants were directed to a Facebook Page developed by the study team with three CPSI posts. Posts were selected from real publicly available content on Facebook to exemplify different types of cancer content Latinos may be exposed to on Facebook. Each post contained a different cancer topic, source,
message type, and level of misinformation; content was available in both English and Spanish. Participants were asked to read each post and discuss if and how they would engage with these posts through semi-structured interviews. Questions assessed participant perceptions about posted cancer information’s source, content, and attributes; ways to assess source credibility and content accuracy; whether engagement with each post would occur; and the reasons and ways engagement would (or fail to) occur.

**Data Management**

Data management procedures are described in detail in Chapter 5. First, survey responses were entered into Qualtrics and exported to an Excel spreadsheet for analysis. Second, discussed posts recorded via Quicktime were screen captured and de-identified; a checklist was used to document all decision points for each post (i.e. timestamps, content summaries, engagement type, emerging themes/codes). Finally, interview audio recordings were de-identified and transcribed verbatim for thematic analysis.

**Data Analysis**

Descriptive statistics were conducted on all survey data using Stata Version 14.1. Data collected through the recorded, one-on-one encounters were managed using MAXQDA Version 12; posts were analyzed via content analysis and interviews via thematic analysis (Table 4-1). These analytical methods are further described below.

<table>
<thead>
<tr>
<th>Study Aim</th>
<th>Analytical Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Content analysis</td>
</tr>
<tr>
<td>Aim 1 (CPSI engagement)</td>
<td>X</td>
</tr>
<tr>
<td>Aim 2 (Credibility assessments)</td>
<td>X</td>
</tr>
<tr>
<td>Aim 3 (Actions taken)</td>
<td></td>
</tr>
</tbody>
</table>
Content analysis of CPSI

A content analysis was conducted on posts participants discussed engaging with on their Facebook account. A content analysis is utilized to assess message patterns in a variety of formats, including those available on Internet platforms (Manganello & Fishbein, 2009, p.3). Prior to data collection, a preliminary coding framework was developed to include the following content areas: post features, post source, post content and post engagement type. The codebook was then expanded to include codes that emerged from the data collected on the interview checklist, as well as codes to assess the presence/absence of features that assist in verifying content, such as whether information included original sources, followed cancer prevention and screening guidelines, made sensationalist claims, and/or oversimplified claims. The initial coding framework was applied to a sample of 10 cancer posts publicly available on Facebook by me and a bilingual coder (Dr. Javier de la Maza). Discrepancies were discussed and resolved, and a final codebook was developed. A final list of codes is provided in Table 4-2 (See Appendix F for full codebook). We each then independently coded 10% of the sample, and intercoder reliability was calculated. Discrepancies were discussed until consensus was reached. A second round of coding was conducted on another 10% of the sample for topics with pooled kappa scores below 0.8. Final pooled kappa coefficients for coded topics ranged from 0.89-1.0, which is considered acceptable (Neuendorf, 2009, p. 68-69). I then coded the remaining posts. Codes for engagement type were taken directly from the interview checklist (i.e. not double coded), as this data was not always available in screen captures. Frequencies of each code were calculated upon completion of the analysis.
Table 4-2. Summary of codes for content analysis

<table>
<thead>
<tr>
<th>Content area</th>
<th>Codes&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post features</strong></td>
<td></td>
</tr>
<tr>
<td>Post type</td>
<td>Text; Image; Video; Link to external content</td>
</tr>
<tr>
<td>Post language</td>
<td>Spanish; English</td>
</tr>
<tr>
<td><strong>Post sources</strong></td>
<td></td>
</tr>
<tr>
<td>Source type</td>
<td>News agency; Health or cancer organization; Community organization/ non-profit; Blog, personal or unofficial website; Special interest Facebook Group/Page; General user; Other</td>
</tr>
<tr>
<td>Facebook poster</td>
<td>Friend (shared or reposted); Public post liked by friend; Facebook Group/Page; User-generated (friend or self); Unclear/Unknown</td>
</tr>
<tr>
<td><strong>Post content</strong></td>
<td></td>
</tr>
<tr>
<td>Post category</td>
<td>Health event; Informational&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Cancer content (general)</td>
<td>Prevention; Screening; Other cancer topic&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>CPSI sub-topic</td>
<td>Food/Diet; Alcohol; Exercise; Obesity; Tobacco / E-cig; SPF; Vaccine; General prevention/ healthy lifestyle; Natural remedy; Breast CS; Colon CS; Prostate CS; Other CS; General screening</td>
</tr>
<tr>
<td><strong>Credibility features</strong></td>
<td>Does the post lack links to the original study?</td>
</tr>
<tr>
<td></td>
<td>Is information inconsistent with the recommended cancer prevention or screening guidelines (CDC, NCI, ACS, PHSPTF)?</td>
</tr>
<tr>
<td></td>
<td>Does the post make any sensationalist claims?</td>
</tr>
<tr>
<td></td>
<td>Does it oversimplify claims?</td>
</tr>
<tr>
<td><strong>Engagement</strong></td>
<td>Like; Comment; Share; Read post; Watched video; Clicked on link; Read external content</td>
</tr>
</tbody>
</table>

<sup>a</sup>The only mutually exclusive codes were source type, Facebook poster, and post category; all other codes were not mutually exclusive;<sup>b</sup>Sub-codes listed in Appendix F; CPSI= cancer prevention & screening information; CS= cancer screening

The scientific credibility of claims made in each post (and any attached video/article) were also assessed using the Science Feedback’s claims review framework, which provides criteria to evaluate claims as having very high, high, neutral, low, or very low scientific credibility ([www.sciencefeedback.co/claim-reviews-framework](http://www.sciencefeedback.co/claim-reviews-framework)). Science Feedback is a not-for-profit, non-partisan organization that utilizes scientists with relevant expertise to verify the credibility of information that claims to be scientific ([www.sciencefeedback.co/about](http://www.sciencefeedback.co/about)). Based on their criteria to review science articles, this organization has identified dimensions of information credibility as clustering around the following categories: fact accuracy,
sufficient context for explanations to convey correct interpretation/understanding of facts, and the use of sound logic to reach conclusions. Scientists then use a scientific credibility verdict scale to rate claims (Table 4-3), which I used to assess claims within posts that participants engaged with. Any posts containing information about health events or cancer advocacy were excluded from this step, as they did not include health claims. All remaining CPSI posts were verified and coded using external 3rd party sources, which included fact-checking sites (i.e. Snopes), cancer websites (e.g., NCI, MD Anderson), and PubMed. Verdicts were discussed with Dr. Moran (co-advisor) until agreement was achieved for all posts.

Table 4-3. Scientific credibility verdicts used to rate claims in posts

<table>
<thead>
<tr>
<th>Credibility verdicts</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Very high</strong></td>
<td></td>
</tr>
<tr>
<td>Accurate</td>
<td>Describes an observation in a way that is consistent with available data and does not leave out any relevant element of context.</td>
</tr>
<tr>
<td>Correct</td>
<td>Contains a well-tested theory/hypothesis that generates expected observations that are confirmed by actual observations.</td>
</tr>
<tr>
<td><strong>High</strong></td>
<td></td>
</tr>
<tr>
<td>Mostly accurate</td>
<td>A statement of fact that needs some clarification or additional information to be fully accurate.</td>
</tr>
<tr>
<td>Mostly correct</td>
<td>A well-tested theory/hypothesis is present, but its formulation in the claim might overstate the confidence scientists actually have in the theory, or slightly distort what can be predicted based on the theory.</td>
</tr>
<tr>
<td><strong>Neutral</strong></td>
<td></td>
</tr>
<tr>
<td>Partially correct</td>
<td>Significantly overstates scientific confidence in a theory.</td>
</tr>
<tr>
<td>Imprecise</td>
<td>Uses ill-defined terms or lacks specifics so that one cannot unambiguously know what is meant without making additional unstated assumptions.</td>
</tr>
<tr>
<td>Lacks context</td>
<td>Leaves out important information or is made out of context.</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td></td>
</tr>
<tr>
<td>Misleading</td>
<td>Contains an element of truth but leaves the reader with a false understanding of reality, for instance by omitting critical background context.</td>
</tr>
<tr>
<td>Unsupported</td>
<td>Lacks backing from an adequate reference or if the available evidence does not support the statement.</td>
</tr>
<tr>
<td><strong>Very low</strong></td>
<td></td>
</tr>
<tr>
<td>Incorrect</td>
<td>Provides an explanation or a theory whose predictions have been invalidated.</td>
</tr>
<tr>
<td>Inaccurate</td>
<td>Makes a statement of fact in direct contradiction with available data.</td>
</tr>
<tr>
<td>Flawed reasoning</td>
<td>Conclusions do not follow from the premises of the claim.</td>
</tr>
</tbody>
</table>

Table adapted from Science Feedback’s claims review framework, available at: [www.sciencefeedback.co/claim-reviews-framework](http://www.sciencefeedback.co/claim-reviews-framework)
Thematic analyses

A thematic analysis was conducted on all interview transcripts to capture how multiple themes and factors work together to explain engagement with CPSI on Facebook among Latinos. This method allows for the identification, analysis, and interpretation of patterns or themes in rich interview data sets (Boyatzis, 1998; Braun & Clarke, 2006). I first coded transcripts in their original language to ensure meanings were maintained. Transcripts were preliminarily coded using inductive and deductive codes that aligned with each aim. A final coding tree was developed to outline discovered themes and concepts, discussed with team members, and applied to all transcripts. Themes were identified and refined using a constant comparison method (Dye et al., 2000). Additionally, memos were composed with exemplary quotes (Appendix G) and discussed with dissertation committee members to ensure dependability and credibility in theme development (Guba & Lincoln, 1989). Further data validation was conferred through the triangulation of the thematic analysis results with those of the content analysis (Morse, 2015).

Epistemology, Positionality and Reflexivity

Data collection and analysis were mainly informed by a constructivist approach, which considers the co-construction of realities by the researcher and those researched (Guba & Lincoln, 1994). Given this approach, my experience as a bilingual, bicultural Latina (specifically, a woman born and raised in Puerto Rico who has been living stateside for the past 18 years) is inextricable from my interpretation of these data. My lived experiences as to how our cultural values are embedded into our daily lives was instrumental in the development of data collection materials; it also allowed me to further inquire about the role of values in how participants assessed and acted upon the information with which they engaged. At the same time, my shared identity as a Spanish-speaking Latina meant that some participants assumed I understood the underlying meaning of things rooted in parts of the
Latino identity (for example, comments like “you know how we [i.e. Latinos] are”). In those scenarios, I made sure to ask for further clarification as to what was meant. Another point of constant reflection was my previous role as a cancer health educator (CHE) for the Latino community in Tampa, where these interviews were conducted. These experiences were instrumental in understanding the way participants discussed cancer, particularly in light of common questions I would get asked by members of the Latino community when I was a CHE. Given this previous role, I was able to ask for further clarification when participants mentioned something inaccurate about cancer; I was also able to expand on discussions related to cancer prevention and screening initiatives by local organizations. However, there were also moments during the interviews where participants would explicitly ask me for advice or my opinion about topics being discussed. In those moments, I would tell participants that we could further discuss these questions at the end of the interview (and referred them to their primary care provider for questions related to whether screenings were appropriate for them). This was particularly important in light of some participants perceiving me to be a content expert after quickly establishing rapport with me. I also reminded participants that there were no right or wrong answers to the questions I was asking; rather, I wanted to understand how and why they engaged with content.

Understanding these nuances inevitably informed how I approached data analysis. This analysis began during the process of the interviews, where I took note of participant body language, inflection, sayings, tone, and other details that may be difficult to pick up by a person who does not identify with the Latino culture. The totality of the encounter, therefore, was important in my interpretation of the role culture played in how participants engaged with CPSI, how they assessed its credibility, and how it influenced subsequent actions. To ensure an objective analysis, I consistently met with my advisors to discuss how I was interpreting the data. These conversations were instrumental in confirming that
interpretations accurately represented instances where cultural values, identity, and other points of cultural connection impacted engagement with cancer information (rather than important issues that are not exclusive of how Latinos engage with content on social media).

Ethics

The study protocol and study materials were approved by the Johns Hopkins Bloomberg School of Public Health’s Institutional Review Board prior to study recruitment. Given the nature of the study, potential risks include loss of privacy and/or confidentiality, as participants’ Facebook profiles and posts that appear on their News Feed would be recorded during the interaction. In order to minimize these risks, participants consented verbally to the study. In addition to receiving a copy of the consent form, participants received an information sheet that outlined privacy expectations, what data would be captured for the study, and what would and would not be done with captured data once de-identified (Appendix H). It also included images that gave an example of how discussed posts would be de-identified prior to analysis. This sheet was discussed in-person during the informed consent process and served as a useful resource to ensure participants fully understood the study methods and measures that were taken to protect the privacy of secondary user data.

Participants also logged onto their Facebook account prior to any computer screen or audio recording. A private browsing window was used to ensure that participant usernames and passwords were removed from the computer once the session had finalized. Although computer screen recordings included participants’ Facebook account name and picture, these recordings were saved in an encrypted folder on a password-protected computer and destroyed upon analysis completion. Participants were given an ID number used to identify each survey. Data was only available to research staff. Surveys were kept in an encrypted
folder on a password-protected computer. Any paper copies of study data were kept in locked filing cabinets. Identifying information about participants will not be reported in any publications or presentations.
References


Chapter 5: Capturing engagement with cancer information on Facebook through the social media content and context (SoCo) elicitation method\textsuperscript{2}

(Manuscript 1)

Abstract
Most of what is known regarding cancer information engagement on social media stems from quantitative methodologies. Public health literature often quantifies engagement by measuring likes, comments, and/or shares of posts within cancer organizations’ Facebook Pages. Yet, this content may not represent the cancer information generally available to, and consumed by, platform users. Furthermore, some individuals may prefer to engage with information without leaving digital traces researchers can quantify. This article discusses the limitations of current approaches to assess cancer information engagement on Facebook and presents the social media content and context (SoCo) elicitation method, a qualitatively-driven mixed methods approach to understanding engagement. Two case studies are presented to highlight important findings elicited through this novel approach. The SoCo elicitation method allows for a better representation of how persons engage with cancer information. This method may be applied to future studies regarding how to best communicate health information on social media.

Keywords
Mixed methods; Data collection; Online; Latino/Hispanic; Minorities; Cancer; Health disparities

\textsuperscript{2}Manuscript 1 is formatted to the specifications of \textit{Journal of Medical Internet Research.}
Introduction

Cancer is a leading cause of death in the United States (U.S.) [1], disproportionately affecting minorities and other underserved populations. As such, reducing cancer health disparities through cancer control and prevention efforts is of paramount importance to local and national cancer organizations, such as the National Cancer Institute (NCI) and the American Cancer Society (ACS) [2,3]. Reaching underserved populations through social media has become an important part of these efforts [4,5]. Social media are enticing communication platforms for multiple reasons: they have a broad reach [6], are an inexpensive way to reach target audiences, [7] and encourage participatory communication by allowing user engagement via posts, pictures, videos, and other information sharing [8]. This conceptualization of social media as participatory frames engagement as a way for health organizations to communicate with audiences directly [9] and is typically assessed by evaluating how users respond to posted content on the platform. By playing an active role in conversations about health topics, organizations can also ensure trust and credibility are established through the dissemination of accurate information [9].

Facebook is among the most popular social media platforms worldwide, with over 2.3 billion active users [10]. Second in popularity only to YouTube, 74% of U.S. Facebook users visit the platform on a daily basis [6]. Among the reasons individuals report using Facebook are entertainment, social interaction, and passing time [11]. Facebook has also been a source of health information and social support [12], making it a useful place to engage with general audiences about cancer topics. Many public health organizations have established a presence on Facebook by creating a Facebook Page, which provides a space for businesses and organizations to publicly share information with platform users. For cancer organizations in particular, Facebook Pages provide a direct way to deliver evidence-based cancer
information to Facebook users, which is of paramount importance in a social media environment with increasingly unreliable information [13].

Facebook Page administrators also have the ability to monitor social media metrics, providing a way for cancer organizations to operationalize audience engagement with posted content. Assessing engagement with health-related information on social media is of particular importance because it is a precursor to multiple outcomes, such as increased awareness, knowledge, and behavior change [14,15]. Most studies have done this by collecting and analyzing data on the likes, comments, and/or shares of posts within an organization’s Facebook Page [16-22]. For example, Strekalova and Krieger [22] reported that cancer-related posts on the National Cancer Institute’s Facebook Page had a significantly higher number of likes, comments, and shares when they contained images (versus videos, embedded links, or text). Similarly, Srivastava and colleagues [16] found that posts on the American Cancer Society’s Facebook Page were more likely to be liked or shared when they contained images or videos, while text-based posts were more likely to elicit user comments. Meanwhile, Klippert and Schaper [23] expanded their definition of engagement by also including metrics for post reach and clicks on embedded links – both of which are also available to Facebook Page administrators. Lastly, other studies have captured engagement with cancer information either publicly available on Facebook [17,18,24] or in Facebook Groups [25-28]. Facebook Groups differ from Facebook Pages in that they can be public or private, but do not offer detailed social media metrics and audience insights (although group administrators may extract raw data through Facebook’s API for analysis). In such cases, engagement has been assessed by quantifying likes, comments, and shares, as these are metrics visible to anyone with access to the posted content.
Measuring engagement with cancer-related content through these metrics is useful for organizations wanting to assess the success of a social media campaign. It can also provide insight to message factors that may enhance engagement with cancer information on social media. However, these existing metrics have important limitations. The first relates to how users are exposed to content on Facebook. In order for a post from a Facebook Page to appear on a person’s News Feed, a person must either follow the Page or have a Facebook friend who engages with a post from the Page. Additional ways users can be exposed to cancer-related content from a Facebook Page is via paid advertising or through a Facebook video recommendation, which is based on a video’s popularity or other people and Pages a person follows [29]. Even then, the appearance of this content on a person’s News Feed is influenced by Facebook’s constantly changing algorithm, which currently favors Pages that individuals engage with most often [30]. This has an impact on whether cancer information emerges on a person’s News Feed when they log onto their Facebook account. As such, engagement with content on a cancer-related Facebook Page may not be emblematic of how the general population engages with cancer information on Facebook. It is likely that many individuals following a cancer-related Facebook Page are already interested in the issue. However, there are many people who may not have an active interest in cancer information for whom this information should be relevant, such as individuals without a history of cancer who are the target audience for disseminating cancer prevention and screening information (hereafter referred to as CPSI). Furthermore, focusing on measuring engagement with evidence-based content posted by cancer organizations does not fully capture the cancer information landscape on Facebook, which includes user-generated or shared cancer information that may not come from reliable sources.

Another limitation to quantifying likes, comments, and shares is that it is a crude measure of engagement. While these metrics allow researchers to quantify how some
Facebook users visibly engage with cancer information that is publicly available or posted within a Facebook Group, they exclude individuals who do not perform these actions yet still consume cancer information on the platform [16,22]. Information consumption and lurking – generally defined as reading online posts without responding – have been seen as an active and participative form of online behavior [31]. Lurking may be due to environmental, relationship, security, and individual reasons [32]. For example, the quality of a message may be poor (environmental), the user may not feel part of the online community (relationship) or have privacy concerns (security), or the person’s needs may be satisfied by just reading a post (individual) [32]. Such may be the case with CPSI among adults without a history of cancer, as they may not be motivated to like, share, or comment on content on Facebook, but nevertheless act upon this information elsewhere. This action may be as small as discussing the information with a friend or as large as incorporating a preventive behavior into one’s lifestyle. However, these outcomes cannot be assessed by existing social media metrics.

Mixed methods approaches may provide a way to surpass the constraints of assessing engagement with CPSI in the general Facebook environment by only using currently available social media metrics. This article presents the social media content and context (SoCo) elicitation method, a novel approach that incorporates qualitative methods to better understand engagement with CPSI on Facebook, and how this may lead to subsequent action. It first discusses the SoCo elicitation method, which was developed to obtain survey data, interviews, and computer screen recordings of cancer-related posts on participants’ Facebook accounts for quantitative and qualitative analysis. Then, it presents two case studies to exemplify the additional information elicited from this methodology that is currently lacking from other approaches. Finally, it discusses how incorporating qualitative methods, such as those outlined in this article, allow for a better representation of how persons engage with CPSI in reality and provides insights for researchers interested in this type of work.
The SoCo elicitation method can provide further insight to features that affect engagement and contribute to the dissemination of accurate cancer information – particularly those conveying cancer prevention and screening recommendations. This method may also be applied to future studies regarding how to best communicate health information on these platforms, an important step towards addressing cancer health disparities.

Methods

Study Design

This mixed methods study explored how and why Latino adults age 40 to 75 without a history of cancer engage with CPSI on Facebook through a convergent parallel research design. Mixed methods research comprehensively and purposefully utilizes both qualitative and quantitative techniques to address an overarching research question that cannot be fully explored and contextualized by either strand independently [33]. For this exploratory study, 20 self-identified Latino/Hispanics ages 40-75 with no history of cancer participated in semi-structured, in-depth interviews to discuss their Facebook utilization and engagement with cancer information on the platform. This diverse population not only avidly uses Facebook, but also faces high cancer health disparities: cancer is the leading cause of death among U.S. Latinos [1] and cancer incidence rates are highest for screenable cancers linked to preventable behaviors (breast, prostate, colorectal) [3]. Data were collected concurrently during one-on-one, in-person encounters where participants accessed their Facebook accounts to scroll-through and discuss engagement with cancer information with the researcher (Figure 5-1). Data elicited included qualitative interviews for thematic analysis; captured CPSI posts for quantitative content analysis; and survey data to assist in the contextualization of findings.
Data Collection

The social media content and context (SoCo) elicitation method was developed to collect data for this study. This method elicits data concurrently during one-on-one in-person encounters where the participants access their social media profile, scroll-through relevant content, and contextualize content engagement with the researcher. For this study, SoCo elicitation consisted of three parts: (1) a short survey collecting demographics, health-related information seeking, and Facebook utilization data; (2) computer screen recording of cancer posts appearing on participants’ Facebook during the past 12 months; and (3) semi-structured, in-depth interviews discussing Facebook utilization and engagement with cancer posts on Facebook (Figure 5-1). Interviews were conducted in the participant’s language of preference by the lead researcher, who is bilingual. All interviews were conducted during the summer of 2018.
and lasted approximately 2 hours. This study was approved by the Johns Hopkins School of Public Health Institutional Review Board.

Participants consented orally before the study began. During the informed consent process, participants were given an additional information sheet summarizing the kind of Facebook information collected for the study and explaining how this information would be used for data analysis. It also included visual examples of how each post discussed would be de-identified for analysis.

Participants first completed a short survey collecting demographic variables and basic health-related information seeking and Facebook utilization information. This survey provided descriptive insight to the uses and gratifications experienced by Latinos on Facebook and other contextual factors that may impact engagement with CPSI on the platform. Following the survey, the researcher began the semi-structured interview, which was audio recorded in its entirety. Using the survey responses as a guide, the researcher asked participants to elaborate on their regular Facebook utilization patterns and interactions, the extent to which they encounter health information (including cancer information) on Facebook, and what they believed Facebook’s role is in sharing information. Afterwards, participants logged onto their Facebook account using a private browser on a research laptop and proceeded to turn off the Facebook Messenger feature to avoid being interrupted during the study. The researcher then documented the total number of Friends, Groups, and Pages participants followed, including how many of these were cancer-related Groups or Pages.

Participants then went to the search feature on Facebook, which allows Facebook users to search for content posted on the platform. This feature allows users to sort search
results by multiple filters, such as “Sort by”, “Posted by”, and “Date posted.” For this study, participants were asked to enter the term “cancer” into the search bar. Once the search results emerged, these were filtered chronologically (Sort by: Most Recent) and by Friends and Groups the participant follows on Facebook (Posted by: Your Friends and Groups). The resulting posts represent all the posts including the word “cancer” that could have potentially appeared on participants’ News Feeds when they previously logged onto Facebook, and correspond to content either posted by their Friends or Groups, or any other publicly available posts that a Friend liked or commented on. The researcher then proceeded to explain the process of jointly scrolling through the past 6 to 12 months of cancer-related posts to discuss posts they recalled seeing and engaging with. Any questions participants had about the process were discussed before beginning.

Once the participant agreed, the researcher began recording the computer screen using QuickTime Player version 10.4, which captures both audio and the computer screen. The researcher and participants jointly scrolled through the content to identify any posts the participants recalled having seen, as well as whether they engaged with the post. Engagement was defined as liking, commenting, and/or sharing a post; clicking on a post link; reading an article in a post; and/or watching a video within a post. If the post included any video or embedded link, participants were asked if they recalled watching the video or clicking on the link. If so, these were opened to capture the full content.

In addition to capturing the cancer posts that appeared on participants’ Facebook through computer screen recordings, engagement with content prompted the researcher to use a semi-structured, in-depth interview guide to ask questions regarding the reasons participants interacted with the post, as well as whether engagement triggered further action. Examples of action include (but are not limited to) searching for additional cancer
information or scheduling a cancer screening appointment. In-depth interviews were selected for this study as they allow for the exploration of new issues in depth and elaborate on individuals’ thoughts and behaviors [34], an important facet in exploring how source and content characteristics influence engagement with cancer information on Facebook and any potential subsequent action. Interview guide questions were informed by the Uses and Gratification Theory [35] and Comprehensive Model of Information Seeking [36,37]. The interview guide covered the following domains: reasons for engagement with cancer information; relationship to cancer information source; roles of the cancer information source in delivering information on Facebook, perceptions about posted cancer information content and attributes; ways source credibility and content accuracy are assessed; and actions triggered by engagement with this information. In cases where participants recalled engaging with a post in ways other than liking, commenting, and/or sharing the post, the participant was asked to elaborate on this type of engagement. The researcher also collected notes regarding each post the participant recalled and/or engaged with by using a checklist.

During most interviews, there were moments where participants encountered a CPSI post that was of interest to them, but they did not recall having previously seen. When this occurred, the researcher asked whether they would have engaged with the post if they had seen it on their Facebook News Feed. If participants said they would, the post was discussed and captured in the checklist with the label “attention-grabbing post.”

Throughout the scrolling process, many participants had copious amounts of cancer-related information emerging in their searches, most of which were not specific to prevention and screening topics (such as survivorship, cancer research, fundraising, etc.). As the purpose of this study was to understand how participants engaged with CPSI in particular, searches were refined midway through the interview. The search terms “cancer prevention” and
“cancer screening” were each entered in all interviews to narrow the search results approximately 30 minutes into the scrolling process. For each refined search term, content was scrolled through up to 12 months prior and discussed as previously stated. In several occasions, when guided by the participant and the discussion at hand, additional search terms were added to find specific CPSI they recalled engaging with. For example, one participant specifically recalled engaging with a post containing information about cancer and soursop (guanábana), a Latin American fruit commonly assumed to have curative properties. The post was elicited by searching for “cancer guanábana.” Similarly, another participant recalled a post about cancer diets and asked to search for “cancer diet.” Lastly, a final search was performed using the term “cancer” and the filter “Posted By: You.” This revealed any cancer information posted by the participant on their own Facebook Profile.

Given the exploratory nature of this study, it was anticipated that engagement with CPSI would vary in frequency, type, and content by participants. As such, all participants were asked to react to three standardized cancer posts upon completing the search process (Figure 5-2). Exposing all participants to standardized posts enabled the study team to explore how participants would engage with identical content, allowing for a deeper understanding of message engagement. After discussing cancer information that appeared on their Facebook, participants were directed to a Facebook Page developed by the study team with three CPSI posts, each selected from real publicly available content on Facebook, to exemplify different types of cancer content Latinos may be exposed to on Facebook. Each post contained a different cancer topic, source, message type, and level of misinformation; content was available in both English and Spanish. Participants were asked to read each post, and discuss if and how they would engage with these posts through semi-structured interviews. Questions assessed participant perceptions about the posted cancer information’s source, content, and attributes; ways to assess source credibility and content accuracy;
whether engagement with each post would occur; and the reasons and ways engagement would (or fail to) occur.

Figure 5-2. Standardized cancer posts shown to participants

**Post 1**

*Frozen Lemon More Powerful Than Chemotherapy?* It turns out that the best way to consume lemons is to first freeze them and then eat them along with their peel. How best to take advantage of this amazing fruit's skin?

Wait until they're completely frozen and grate the whole lemon with a regular grater. You can now add this grated lemon to whichever dish you want, sprinkle it on top your ice cream, salads or add it to your shakes and shakes. Health experts have said that the lemon skin has an effect thousand times more powerful than chemo therapy and plus it doesn't have any of the adverse side-effects associated with chemo.

Grated frozen lemons are super easy to combine with your food, you can add them to ice cream, salads, soups and so on and take advantage of all the benefits they hold. The best thing about frozen lemon peel is that it's incredibly effective against all types of cancer, cysts and tumors. Multiple studies on the subject have showed the powerful effect of lemon peel against cancer cells and recommend it as a treatment.

Lemon peels have powerful antibacterial and antimicrobial effect meaning that they're effective against bacterial and fungal infections as well. They also regulate your blood pressure, have antidepressant effects and eliminate feelings of anxiety and irritability. If this wasn't enough, lemon peels alkalize your body and regulate the blood's pH values, promoting optimal health. Studies have shown that lemon peels can destroy the cancer cells of 12 types of cancer among which one of the deadliest – prostate, colon, pancreatic and lung cancer.

The compounds found in lemon peels, as we already said before, are thousands times more powerful than ADRAMITEON, a drug commonly used in chemo but more importantly the lemon peels only act on the malignant cells, destroying them, while leaving behind the healthy cells without damaging them. Combine this with HEMP CBD OIL. For best results.

**Post 2**

*Dr. Joseph Mercola*  
*March 21*

Stop being fooled by this common money-grab. Scientists confirm annual mammograms are not effective in helping prevent breast cancer and may even cause health issues of their own. Share this research with the important women in your life.

**Post 3**

*Comunidad y Cáncer - Tampa*  
*June 15 at 12:04 AM*

Do you know that the number one risk factor for developing colorectal cancer is age? If you are 60 or older, talk to your health provider about screening, and encourage your friends and family to get screened, too. Learn more from the National Cancer Institute: [https://www.cancer.gov/...](https://www.cancer.gov/...)

After discussing the standardized posts, participants were asked wrap-up questions regarding what would make cancer information more appealing on Facebook, who they considered the most influential and trustworthy sources of cancer information among their
Facebook Friends, and whether Facebook is a source of cancer information they trust. Notes were taken throughout the interview and used to inform data management and analysis.

**Data Management**

The data collection processes described above elicited rich data: in addition to survey responses, over 20 hours of computer screen video and over 30 hours of interview audio were captured (Figure 5-1). Survey responses were entered into an Excel spreadsheet. Interview audio recordings were de-identified and transcribed verbatim. The process of capturing discussed posts and de-identifying data recorded on the computer screen is described below.

The lead researcher was responsible for managing all computer screen recordings. The first step was to develop a checklist to document all decision points for each interview video. This checklist included mapping the timestamp in the audio version of the interview with the beginning of the video recording, as well as the timestamp for each post discussed; doing so allowed the research team to map interview transcripts with the discussed posts during analysis. In addition to marking the timestamps for each post, the checklist was used to summarize the content of the post and relevant points discussed during the interview. These notes were incorporated as memos associated with each post during analysis. The checklist was also used to document any search term refinements and outline preliminary codes for subsequent codebook development.

In addition to capturing data on the checklist, each post discussed was captured via a screen grab and de-identified by cropping and/or covering any identifying images or names with white boxes and saved as a new file identified with the participant’s unique ID. Two additional files were saved in addition to post screen grabs, when applicable. First, if the post also included a video, the video was captured in its entirety in one of two ways: (1) if the
video was part of a publicly available post, the lead researcher recorded the full video by searching for the post on Facebook; or (2) if the video was no longer available on Facebook, the segment of the recorded computer screen was trimmed and cropped using iMovie to ensure the video was de-identified. Second, if a post included a link to an external website that was visited during the interview, the website was captured in one of two ways: (1) if the website link was still accessible, the lead researcher saved a web archive and PDF version of the website page; or (2) if the website link was broken or no longer accessible, the recorded segment was de-identified as described above. All de-identified files (posts, videos, web archives, surveys, and interview transcripts) were saved in a secure cloud-based file sharing and file storage service through Johns Hopkins University, as well as in an encrypted folder on a password-protected computer. De-identified data were managed using MAXQDA Version 12. 

Data Analysis

Descriptive statistics were used for all survey data. A content analysis was conducted on all CPSI posts participants engaged with on their Facebook account. Content analyses are utilized to assess message patterns in a variety of formats, including those available on Internet platforms [38]. A codebook was developed using preliminary codes documented in the checklist during the data management process described in the previous section. The initial coding framework was applied to a sample of 10 cancer posts publicly available on Facebook by the lead researcher and a second bilingual study team member. Discrepancies were discussed and resolved, and a final codebook was developed. Codes were developed for the following areas: post features, post source, post content, and credibility assessment. Two coders independently coded 10% of the sample. Intercoder reliability was calculated [39] and any discrepancies were discussed until consensus was reached. The lead researcher then
coded the remaining posts. Code frequencies were calculated upon completion (reported elsewhere).

A thematic analysis was conducted on all interview transcripts. This method allows for the identification, analysis, and interpretation of patterns or themes in rich interview data sets [40,41], allowing for a detailed description of how multiple themes and factors work together to explain engagement with cancer information. Transcriptions were analyzed in their original language to ensure that no meanings were lost in translation. Transcripts were preliminarily coded using emerging codes that aligned with the research questions. A coding tree was created to outline discovered themes and concepts. Additionally, memos were composed by the lead researcher with exemplary quotes for each theme. Exemplary quotes collected in Spanish were translated into English. Memos were discussed with the study team to ensure dependability and credibility in theme development [42]. Data were placed into larger themes and factors to comprehensively explain how the phenomena occurred. Further data validation was conferred through the triangulation of the thematic analysis results with those of the content analysis [43].

Results

Data emerging from the SoCo elicitation method demonstrated that most participants engaged with CPSI by viewing and/or reading content (73%, n=48), rather than by liking, commenting, and/or sharing (27%, n=18). Furthermore, it provided rich content regarding how Latinos engage with and act upon CPSI on Facebook. Below we explore two sample cases to illustrate how a mixed methods approach provides rich insight otherwise missed when quantitative methods are used alone. Participant names have been changed to protect their identity.
Case 1: Rogelio

Rogelio is 61-year-old, bilingual Cuban male. He has over 1,800 Facebook friends and follows 131 Facebook Groups, none of which relate to cancer. He considers himself a very active Facebook user, logging on multiple times a day and using the platform for social interactions, to search for and share information, to see what others are doing, and to maintain his cultural identity. Thirteen cancer-related posts were discussed during the interview, all of which had a video or image, for he says that “if it doesn’t enter through the eyes, it doesn’t reach you.” While he engaged with all 13 posts by reading the content, he did not like, comment, or share any of these on his profile. All but one of these posts were shared by friends in his network, the other was shared by a Facebook Group to which he belongs. Six of the posts related to natural remedies or foods with curative properties against cancer, one was about a free skin cancer screening event, and another one was about free colorectal and prostate cancer educational sessions for Latino men; remaining posts were related to cancer survivorship and prayer requests.

Although Rogelio uses his Facebook account frequently throughout the day, he explains that he rarely likes, comments, or shares content on his profile because he cannot let others know he is on Facebook during work hours. As such, instead of engaging with a post through these metrics, he sends posts of interest to himself via Facebook Messenger (the platform’s messaging tool). In this manner, he can read the post at a later point in time. He also explains how he and his wife share information related to diet and foods with preventive and/or curative properties through Facebook Messenger regularly. Many times, after discussing content either one engages with on Facebook, he decides whether they will incorporate these natural remedies into their daily lifestyle; this was done with the six posts discussed during the interview. For example, he describes how he and his wife started to eat papaya seeds after he read a post stating that “they are [sic] magical cure for gut, kidney,
liver, cancer and many other diseases” (Figure 5-3). This post describes how to consume papaya seeds and outlines eight benefits, including that papaya seeds “have agents that can stop the growth of tumors and cancer cells, [and] contain isothiocyanate, which helps with breast, colon, leukemia, lung and prostate cancer.”

Figure 5-3. Image of papaya seed post Rogelio discussed

Rogelio also states that, while Facebook is one of his main sources of information, he rarely – if ever – verifies the information he engages with on the platform. Instead, he relies on the seriousness of the people who post content on their profiles, stating that his friends from church or those above the age of 40 are serious and do not share “fake news.” He also relies on his previous knowledge about a topic and believes that posts about the curative properties of foods are more credible than other topics. For Rogelio, engaging with information through a post is sufficient for him and his wife to incorporate natural remedies into their diets, regardless of whether the post cites an information source or not.

Lastly, his cultural values and Cuban heritage come up frequently during the interview. He tends to have a fatalistic view about cancer, which emerges in multiple
discussions. For example, he recalls seeing a post pertaining to two educational events for men about colorectal and prostate cancer. When he saw it, he immediately said he never attends such events because speaking about these topics is like inviting the disease into your life: “It’s like not wanting to speak about the topic, so it doesn’t happen to me. As if talking about [colorectal or prostate cancer] puts it in my cabinet.” He believes this avoidance is a very negative Latin American custom, but that Latinos rather “look the other way” when these topics emerge.

Case 2: Luisa

Luisa is 63-year-old Puerto Rican female who prefers English. She has 370 Facebook friends and follows 268 Facebook Groups, none of which relate to cancer. She also considers herself an avid Facebook user, logging on multiple times a day and using the platform for social interactions, to search for and share information, to pass time, for entertainment, to relax, to express her opinions, to see what others are doing, for advocacy, and because it is convenient. Eleven cancer-related posts were discussed during the interview, five of which contained CPSI she engaged with. Another two posts containing CPSI were discussed because they grabbed her attention during the interview; she had not recalled seeing them before, but stated that she would have read them if she had because they were posted by a friend who she deems is a trustworthy source of health information. The remaining cancer-related posts discussed pertained to cancer survivorship and requests for prayer for cancer survivors. She shared only one post on her profile; she did not like, comment, or share any of the other posts discussed.

When discussing her Facebook utilization patterns, Luisa states that she sometimes does not engage via likes, comments or share because she’s just scrolling through her timeline and does not stop to perform these actions. However, she says this does not mean she fails to
read or watch the content. She gives an example of being at the grocery store line while she is scrolling through her Facebook: she might watch an interesting video but does not stop to share it with others. She only shares content when she is “relaxed.”

Luisa is very interested in topics pertaining to cancer prevention, particularly those related to a healthy diet. She discusses superfoods frequently and prefers natural remedies over medication. For example, when discussing a video that includes “10 alkaline foods that prevent and treat diabetes, gout, heart disease and cancer,” she states that it was the images of different superfoods that initially grabbed her attention, not the cancer prevention claims. She also mentions that repetition surrounding the benefits of superfoods confirms the credibility of this information. She gives an example of this while discussing engagement with a post about soursop, which states that it “has been used by many people to fight against cancer cells.” Luisa says that she is familiar with the curative properties of soursop because she has heard this often from friends and family in Puerto Rico. In fact, she has tried to incorporate it into her diet but has not been able to find it in any supermarket in Florida.

Throughout the interview, Luisa continuously mentions having seen a post about juicing as a way to prevent cancer. She recalls having seen the post on Facebook and having copied the recipe on her phone’s notepad application. In discussing this, she also mentions using Facebook Messenger as a way to send articles to herself. At the end of the interview, we find the post by entering the search term “cancer juice”. The post contains the claim that the super juice recipe “is designed to help us combat breast cancer, as well as helping to starve off all potential cancer cells within the body.” It also states that the juice cannot be blended because it is a “therapy tonic” that must be prepared using a juicer. The recipe calls for broccoli, kale, cauliflower, fresh ginger root, apples, and carrots. She has since incorporated this juice into her diet, asking for it to be prepared for her when she goes to the supermarket.
When asked, she said she decided to include this juice as part of her diet because she considers the friend who posted the recipe to be an extremely trustworthy source of health information. This friend actually came up four times during the interview, because she often shares information about natural remedies against many diseases on Facebook, a topic Luisa is very interested in. Because Luisa considers this person a trustworthy source of information, she says she rarely further verifies the content she posts and might instead just send her any questions through Facebook Messenger. She trusts her friend already verified all of the content shared, although all of the websites shared by her friend lack sources to evidence-based information. When she does decide to verify any information she finds on Facebook, she goes to Google and WebMD.

Discussion

This article presented a qualitatively-driven mixed methods approach to explore how individuals engage with CPSI on Facebook, and the impact engagement may have on subsequent behavior. In doing so, it expands upon what is known regarding cancer information engagement on social media, which predominantly stems from quantitative methodologies. Current literature operationalizes engagement with information on Facebook via likes, comments, and shares, with some studies further categorizing engagement into levels by type of engagement [14,16-18,23]. However, the SoCo elicitation method adds yet another layer of nuance to public health’s current conceptualization of engagement by providing insight to the different ways people may process and act upon information – particularly among individuals who rather not like, comment, or share posts they consume. As exemplified in the case studies above, individuals may choose to read, discuss, or even change their behavior based on CPSI they consume without liking, commenting, and/or sharing the information. The case studies above also show that some individuals may circumvent liking, commenting, and/or sharing by using other messaging platforms to store
or share information with others, such as Facebook Messenger and WhatsApp. These findings highlight the importance of exploring how platform interconnectivity affects health information engagement. As such, the presented methodology can assist in developing more comprehensive models describing engagement with health information on social media, responding to calls for a more thorough understanding of engagement on the social media landscape [12].

Consistent with previous literature [32], there are many reasons individuals do not engage with content in ways that are visible to others on social media. However, this decision is not indicative of lack of engagement: both cases discussed in this article demonstrate ways in which individuals engage with and even disseminate posts while circumventing likes, comments, and shares. Discounting these aspects of engagement provides a limited explanation of the impact of cancer information on the social media landscape. This is of paramount importance in the current online environment, which is increasingly bombarded with misinformation on a broad range of topics. The SoCo elicitation method is able to obtain a robust account of how individuals engage with health misinformation, what grabs their attention, how they perceive it, and how they incorporate this information into their daily lives. These insights are necessary to counteract the impact misinformation may have on uptake of cancer prevention and screening recommendations, which is a growing area of research interest [44]. This method may be of particular interest to public health efforts developing social media campaigns targeting underserved populations, or those with lower digital and/or health literacy.

The process of developing this mixed methodology led to several insights. First, it is important to have a thorough understanding of the social media platform to be explored and its features in order to maximize how data can be accessed and used for research. In the
present study, understanding the features Facebook provides when searching for content on the platform allowed for the development of a detailed process to access content alongside participants that may otherwise not be accessible. It also allowed for researchers to discuss content in person with participants chronologically, which overrides any algorithms that may impact the visibility of content, while also providing a glimpse to the overall cancer information landscape participants encounter on Facebook. This content did not only include CPSI, but also information about cancer survivorship, treatment, research, and other cancer topics. In fact, non-CPSI posts were more common than posts about CPSI. Another important observation is that research teams must adapt to the quickly-changing nature of social media platforms when embarking on such research efforts. For example, midway during data collection it was observed that Facebook added a new filter option to their search, which enables users to only look at “Posts you’ve seen.” While details on how Facebook determines which posts a person has seen are not readily available, including this filter in future research utilizing the methods described in this article would reduce potential participant recall bias [45].

There are also important ethical considerations researchers must take into account when developing new methodologies to explore content in an increasingly unreliable information landscape on social media. One of these considerations entails privacy concerns. This study took place several months after Facebook’s Cambridge Analytica scandal, where the information of 50 million American Facebook users was used to identify voters’ personalities and influence voting behaviors in the 2016 election [46]. In an extra measure of clarity, the study team developed an additional information sheet for participants that outlined privacy expectations, what data would be captured, and what would and would not be done with captured data once de-identified. It also included images that gave an example of how discussed posts would be de-identified prior to analysis. This sheet was discussed in-
person during the informed consent process and served as a useful resource to ensure participants fully understood the study methods and measures that were taken to protect the privacy of secondary data. It is thus important to be up-to-date on current events pertaining to social media platforms and issues concerning privacy and other policies that may increase perceptions of mistrust in the general public. It is also important to ensure that potential participants are extremely clear in their understanding of data safeguards in studies that use the aforementioned methods or any other mixed methodologies that capture information from a participant’s social media account(s).

The current study has several limitations. On a practical level, the method described is labor-intensive and requires a detailed data collection and data management protocol. This increases the resources needed to conduct similar research at a larger scale. This approach may also not be appropriate for more sensitive health topics, or for individuals who may find these in-depth methods too strenuous. Second, while participants accessed their Facebook accounts on a study laptop, 12 participants reported only accessing their accounts on their cell phone. The visual layout of Facebook’s website version is different to that of its mobile app. This may have impacted the ability of some participants to fully recall some posts they previously engaged with. Future studies conducting this type of methodology may want to explore using a mobile device to collect data. They may also incorporate the new “Posts you’ve seen” filter described above to minimize recall bias more generally, as self-reported recall may capture only content that people more deeply engaged with, rather than all content to which they were exposed and maybe glanced over. Finally, only posts that included the search terms somewhere in the text emerged in the search during the data collection process. This inevitably excluded posts that did not contain some kind of text feature (for example, posts with only a picture or a direct link to a video). It also excluded posts that discuss cancer-related topics but do not at minimum include the word “cancer,”
while it also included posts unrelated to the disease (such as astrology-related posts or those equating current events in Latin American politics to cancer). Future studies should ensure they have a comprehensive list of search terms that encompass multiple areas of the study topic, while understanding that an increase in search terms adds time to the interview.

Conclusions

The SoCo elicitation method shows potential for a deeper contextualization of engagement with health information on social media. Conducting interviews to complement quantitative content analysis of elicited posts allows for a deeper understanding about the reasons and ways engagement with health information on social media occurs, which cannot be done by observing online content alone [47] or by asking questions that require recall about a topic that may not be salient to most (i.e. CPSI engagement). This mixed methodology also allows for a discussion of how message engagement may be a result of offline interactions and relationships, and how these impact assessments of message credibility and accuracy. Findings provide insight to preferred source and content characteristics of information on social media that triggers engagement and subsequent action among specific groups and vulnerable populations, laying foundational work for the development of future measures and empirical research exploring innovative and participatory health communication on social media platforms. Future steps for the research described in this article include data integration and the development of a final conceptual model to help visualize the process of engagement with CPSI on Facebook among Latinos in the U.S.
References


Chapter 6: When engagement leads to action: Understanding the impact of cancer information among Latino Facebook users³

(Manuscript 2)

Abstract

Latinos – the largest minority group in the U.S. – are avid Facebook users, making this an opportune tool to educate on the uptake of cancer prevention and screening behaviors. However, there is a dearth in scholarship exploring how Latinos engage with and act upon content encountered on social media, which may be influenced by cultural values. This qualitatively-driven, mixed-methods study explores how Latinos engage with and act upon cancer prevention and screening information (CPSI) on Facebook. During one-on-one, in-depth interviews, participants (n=20) logged onto their Facebook account alongside the researcher, typed “cancer” in the search bar, and discussed cancer-related posts they engaged with during the past 12 months. Engagement prompted questions regarding the reasons for engagement, and whether engagement triggered further action. Computer screen and audio were recorded. Interviews were analyzed thematically; CPSI posts were analyzed via content analysis.

Engagement was most common when individuals had personal relationships to the poster, when posts included videos/images, and with content promoting the curative properties of popular Latin American foods. Engagement often led to information-seeking and sharing, discussing content with others, and/or changing health behaviors. Findings highlight the importance of adequately contextualizing how cultural values influence the ways in which Latinos engage with and act upon CPSI on Facebook, which may lead individuals to bypass evidence-based procedures. Multi-pronged efforts are necessary to

³Manuscript 2 is formatted to the specifications of Health Communication.
adequately leverage social media to empower Latinos to partake in behaviors that effectively reduce cancer health disparities.
Introduction

Latinos, the largest minority group in the U.S. (U.S. Census Bureau, 2019), are avid Facebook users (Smith & Anderson, 2018), making this platform an opportune tool to educate and empower this community on ways to reduce health disparities. Latinos specifically face a high burden of cancer (Murphy et al., 2016; American Cancer Society (ACS), 2018), making it important to deliver evidence-based cancer prevention and screening information (CPSI) to this group. However, there is a dearth in scholarship exploring how Latinos engage with and act upon content encountered on social media, which is increasingly inundated with potentially detrimental health misinformation (Schmidt et al., 2018; Broniatowski et al., 2018; Toeh, 2019). The Social Media Engagement Model posits that engagement with content is influenced by multiple individual and contextual factors (McCay-Peet & Quan-Haase, 2016). For Latinos, these include cultural values (i.e. *familismo*, *personalismo*, *machismo*, and *fatalismo*) that may influence how they engage with multi-lingual CPSI shared by close friends and family on Facebook. Cultural values may also influence assessments of cancer information (Murphy et al., 2015) and whether Latinos participate in cancer control and prevention efforts (Erwin, Treviño, Saad-Harfouche, Rodriguez, Gage & Jandorf, 2010). Using a qualitatively-driven, mixed-methods approach, this study explores how U.S. Latinos engage with and act upon CPSI on Facebook. We specifically explored (1) the kind of CPSI that U.S. Latinos engage with on Facebook and why they do so, (2) the sources of such CPSI and their role in engagement, and (3) if and how CPSI engagement leads to subsequent actions.

Understanding the role Facebook has in these interactions may assist in developing better ways to expose Latinos to online messages that promote cancer prevention behaviors, as well as tailoring cancer education interventions using social media to improve cancer screening rates. Exploring these interactive mechanisms may also provide insight to the
unique features of Facebook that promote Freireian principles of dialogical education and critical consciousness raising among Latinos.

**Cancer communication and social media among U.S. Latinos**

Cancer is the leading cause of death among Latinos in the U.S. (Murphy et al., 2016). In 2015, the cancers with the highest estimated incidence rates among Latinos were breast, prostate, and colorectal cancers – all screenable cancers linked to preventable behaviors (ACS, 2018). Furthermore, although Latinos have lower incidence and mortality rates for these cancers compared to non-Hispanic Whites, they are more likely to be diagnosed with advanced stages of disease (National Cancer Institute (NCI), 2012); this has been partially associated with lower screening rates (ACS, 2018). Given this unequal burden of disease, it is important to identify ways to effectively educate Latinos on how cancer prevention and screening efforts can reduce these cancer health disparities (NCI, 2015).

Social media platforms are innovative communication tools that may encourage participative communication among vulnerable communities with high cancer burden (NCI, 2018). Latinos are heavy social media users: 8 out of 10 Latinos are on at least one social media platform, and 73% of these are on Facebook (Smith & Anderson, 2018). Facebook’s popularity is not limited to younger Latino populations: 47% of Latinos 50 and older have reported using Facebook within the past 30 days (Nielsen, 2018), and 74% of Latinos age 50 to 64 with smartphones actively use Facebook’s mobile app (Nielsen, 2015). Facebook, thus, presents a way to empower Latinos to actively participate in cancer control and prevention by fostering dialogical engagement via posts, pictures, videos, and other information sharing (Chou, Prestin, Lyons & Wen, 2013). This is particularly important among Latinos age 40-75 without a history of cancer, as they are eligible to be screened for breast, prostate, and/or colorectal cancers.
Understanding how social media users engage with cancer information is important because engagement is a precursor to multiple outcomes, such as increased awareness, knowledge, and health behavior change (Neiger et al., 2013; Yang, 2017). Information is disseminated on Facebook through posts, which contain both message and source factors that may contribute to engagement (Figure 6-1). Message factors include the content within a post and the features of the post. For CPSI, post content includes specific information about prevention and/or screening (such as the risk factors and relevant screening tests for colorectal cancer); it may also include information advertising a cancer-related health event. It also includes post features, such as the language of the post and how the information is conveyed (i.e. text, video, images, links to external content). Engagement with a Facebook post can also be triggered by source factors. The source of a post can be conceptualized in two ways: the source of the content within a post (source type, such as a news agency, health
organization, or a blog), and the person or entity who created or shared a post so it appears on a user’s News Feed (Facebook poster, such as a Facebook friend, group, or page). While these sources can sometimes be the same entity (e.g., the National Cancer Institute’s Facebook Page may share information linking to an article on their website), they may also be distinct (e.g., a Facebook friend sharing cancer prevention information from a third-party source).

However, no studies to date have been found that focus specifically on how Latinos engage with cancer information on social media. In general, little research has been conducted exploring CPSI on social media – particularly among adults eligible for cancer screenings. Studies exploring cancer information on social media mainly target breast cancer survivorship via content analyses of online blogs, forums, and Facebook groups (Koskan et al., 2014), cancer information sharing on Facebook and Twitter (Justice-Gardiner et al., 2012; Allem et al., 2017; Chu et al., 2016; Adhikari et al., 2016; Gage-Bouchard et al., 2017; Kent et al., 2015; Abramson et al., 2015), and user engagement among national and state-level cancer prevention campaigns on Facebook (Strekalova & Damiani, 2016; Kapahi Theiss et al., 2016; Strekalova & Krieger, 2015). Although analyzing content generated by or for cancer organizations provides insight to certain factors that may enhance engagement with cancer information, it fails to understand how individuals engage with general cancer-related content on Facebook – such as user-generated or shared content that may not come from a reliable source. Exploring these dynamics will produce information instrumental for the development of effective cancer communication materials, particularly because there is considerable evidence that media can promote cancer prevention and increase cancer screenings among Latinos (David et al., 2015; Baezconde-Garbanati et al., 2014; Simmons et al., 2011; Baezconde-Garbanati, Murphy, Moran & Cortessis, 2013; Murphy et al., 2015).
The social media engagement model

A useful conceptual model to begin exploring how Latinos engage with CPSI on social media is McCay-Peet and Quan-Haase’s social media engagement model (2016), which explores the context of the experiences that motivate users to engage with content created, shared, or endorsed by people and organizations in their social network. This model partially stems from Uses and Gratifications Theory (UGT), which posits that individuals purposively utilize media sources to fulfill a myriad of needs that are influenced by individual, interpersonal, and social interest (Katz, Blumler & Gurevitch, 1974; Rubin, 2010). Expanding on UGT, the social media engagement model specifically posits that engagement is influenced by multiple individual and contextual factors that interplay with each other (McCay-Peet & Quan-Haase, 2016). Among the individual factors included in this model are the presentation of self to others on the platform, uses and gratifications for adopting specific social media, positive experiences when interacting with others on the platform, and the ability to act and participate on the platform. Beyond these individual factors, the model suggests that the social context of an individual’s social network within social media platforms also influences platform utilization and subsequent engagement, while a newer version of the model also acknowledges the role of platform characteristics in engagement (McCay-Peet & Quan-Haase, 2017). Examples of platform characteristics include features that enable users to communicate and share information with each other, while social context refers to social, political, personal, and economic factors influencing platform usage.

While inclusive of contextual factors, the social media engagement model stops short of outlining how social context explicitly influences engagement; it particularly fails to outline the role culture plays in one’s social context. Work by Comello (2013) highlights that identity may act as an intermediary between a message and subsequent behavior. Taking this into account, we propose that elements of Latino cultural identity may influence how Latinos
engage with CPSI on Facebook. The following section highlights the social context of such engagement, which includes cultural heritage, language, and shared cultural values that are manifested through familial, religious, educational, and other social structures.

**The role of culture in CPSI engagement among Latinos on Facebook**

Latin Americans share many cultural values that stem from a shared Spanish colonial history. Among the cultural values ascribed to many Latino communities are *machismo* (male gender identity roles fostering male superiority), *fatalismo* (beliefs that events are predetermined and cannot be prevented), *familismo* (strong familial ties), and *personalismo* (interpersonal relationships fostered by empathy, closeness, and warmth) (Abraído-Lanza et al., 2007; Flórez et al., 2009; Guilamo-Ramos et al., 2007; Marín & Triandis, 1985; Mindel, 1980; Stevens & Soler, 1974; Torres, 1998; Yañez et al., 2016). These cultural values, which have been successfully incorporated into health communication efforts as a way to promote cancer prevention and screening uptake (David et al., 2015; Baezconde-Garbanati et al., 2014; Simmons et al., 2011), may trigger Latinos to engage with CPSI on social media. Beyond cultural values, language and cultural heritage are also strong cultural connectors for Latinos in the U.S., with 72% of Latinos speaking Spanish in their households and 73% believing their cultural heritage is an important part of their identity (Nielsen, 2018). Therefore, CPSI shared on Facebook in Spanish or with content that speaks to Latino culture may also influence engagement, as these cultural connectors heavily influence digital content consumption – particularly among older generations who tend to be Spanish dominant (Nielsen, 2018). Our first research question thus asks:

**RQ1.** What kind of CPSI do U.S. Latinos engage with on Facebook and why?
Cultural values may also influence how Latinos engage with content that emerges on their Facebook News Feed, particularly if it is shared by friends and family. Specifically, *familismo* and *personalismo* place a strong weight on interpersonal values tied to notions of trust, friendship, collectivism, and interdependence (Guilamo-Ramos et al., 2007; Ayon & Aisenberg, 2010). These values may therefore influence how Latinos engage with content shared by their friends or family, as recent research has found that trusting the sharer of an article on social media had higher effects on a person’s trust and willingness to engage with it than did trusting the information source (Sterrett et al., 2018). This suggests that Latinos may place more trust in CPSI shared by Facebook friends than that shared by health organizations or outlets. As such, our second research question asks:

**RQ2. What sources of CPSI do U.S. Latinos engage with on Facebook and why?**

*The role of engagement in subsequent action*

As an important precursor to behavior change, it is important to explore cases when engagement with CPSI can lead to improved outcomes (Neiger et al., 2013; Yang, 2017). Yet, to the best of our knowledge, models exploring engagement with content fail to address how engagement can lead to subsequent actions. The closest model that provides insights to how engagement may lead to subsequent action is Johnson’s Comprehensive Model for Information Seeking (CMIS), which posits that cancer information seeking is triggered by communication channel utilities, characteristics, and individual antecedents (Johnson, Andrews & Allard, 2001; Johnson, 1997). Antecedents include demographics, salience of cancer, beliefs about cancer, and personal experiences with cancer. CMIS has been used to understand how cancer survivors actively seek cancer information through various types of media (Johnson & Meischke, 1993). It has also been used to advance understanding of how individuals never diagnosed with cancer access cancer-related information (Neiderdeppe et
al., 2007; Johnson, 1997). However, CMIS only considers factors that may lead individuals to seek further information. While encountering CPSI on Facebook may contribute to further information seeking, it may also lead to other actions, such as talking about the cancer information with a friend or scheduling a cancer screening appointment. Our final research question therefore asks:

**RQ3.** What actions does CPSI engagement lead to, if any?

**Materials and Methods**

We interviewed 20 self-identified Latino Facebook users ages 40-75 without a history of cancer during the summer of 2018 (average age=54.2, sd=7.4). This study was conducted in the Tampa Bay area in Florida, where the demographics of the Latino population are diverse and represent the top five groups of Latinos in the U.S. (U.S. Census Bureau, 2017a-b). Recruiting study participants from a diverse group of Latinos improves the transferability of findings to other U.S. Latino Facebook users (Tobin & Begley, 2004). Participants represented a myriad of Latin American sub-ethnic groups: 11 were from the Caribbean (Puerto Rico, Dominican Republic, Cuba), 7 were from Central/South America (Mexico, Venezuela, Colombia), and 2 identified as being from the U.S. with Cuban and Spanish heritage. Participants (n=11) who were born outside of the U.S. or Puerto Rico had been living in the U.S. an average 23.4 years (sd=17.4). Flyers, Facebook ads, and word-of-mouth were used to recruit participants through purposeful sampling methods (Patton, 2002, p. 244) that stratified by language preference (English preferred, Spanish preferred, Bilingual), as the cancer information that users engage with may differ by preferred language. Nine participants identified as fully bilingual, while five preferred English and six preferred Spanish.
**Data collection**

Participants began by completing a brief survey collecting demographic information, health and cancer information seeking behaviors, and Facebook utilization patterns, which was used to contextualize findings. Participants were predominantly female (75%), married (60%), employed (80%), and insured (85%). There was a broad representation of household incomes and education levels. All participants reported having ever sought health information, while 55% reported seeking cancer information for themselves in the past year. Most participants (85%) reporting checking their account at least once a day. The most common reasons to use Facebook were for social interactions (85%), to share information (75%), and to see what others were doing (60%). Participants had an average 452.5 Facebook friends (range=28-1,827) and followed 46.9 (range=1-268) Facebook groups. Only one participant followed cancer-related Facebook groups (23 total groups); this participant had a son who is a cancer survivor and described managing many “mommy cancer survivor” Facebook groups.

Participants then engaged in one-on-one, in-depth interviews (~2hr) held in their preferred language (English and/or Spanish; led by Y.R.). After first discussing general Facebook utilization, participants logged onto their Facebook account on a research laptop, typed “cancer” in the search bar, and walked-through 12 months of cancer-related posts that appeared on their News Feed (posts were sorted by “Most Recent” and posted by “Your Friends and Groups”). Engagement with a post (i.e. liking; commenting; sharing; clicking a link; reading an article; and/or watching a video) prompted questions regarding the reasons for engagement, and whether engagement triggered further action. Any embedded videos/links were viewed to discuss the content and process by which credibility was assessed. This process was repeated with the search terms “cancer prevention” and “cancer screening”; when guided by the participant, additional search terms were used to find
specific CPSI they recalled engaging with (e.g., “cancer guanábana” was used when a participant specifically recalled engaging with a post containing information about this Latin American fruit, commonly believed to have curative properties against cancer). A final search was performed using the term “cancer” and the filter “Posted By: You” to reveal any cancer information participants may have shared. A checklist was utilized during the interview to document engagement type and other features of each posts discussed. Computer screen and audio were recorded during each interview. Participants received a $50 gift card upon study completion.

**Data analysis**

Descriptive statistics were calculated for survey data using Stata version 14.2. Screen captures of posts discussed were saved and interviews were transcribed; both were de-identified prior to data analysis. MaxQDA PRO 2018.2 was utilized to manage and code captured posts and transcribed interviews.

**Content analysis of CPSI posts**

A content analysis was conducted on all cancer-related posts participants engaged with on their Facebook account (n=163). A preliminary codebook was developed with codes from literature and additional codes and sub-codes that emerged from data collection using the interview checklist. The initial coding framework was applied to a sample of 10 cancer posts publicly available on Facebook by two bilingual members of the study team (Y.R. and J.M). Discrepancies were discussed and resolved, and a final codebook was developed. A list of main codes is provided in Table 6-1 (See supplemental materials for full codebook with sub-codes and definitions).
Table 6-1. Summary of codes for content analysis of cancer prevention and screening information

<table>
<thead>
<tr>
<th>Topic</th>
<th>Codes&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engagement</strong></td>
<td>Like; Comment; Share; Read post; Watched video; Clicked on link; Read external content</td>
</tr>
<tr>
<td><strong>Post content</strong></td>
<td></td>
</tr>
<tr>
<td>Post category</td>
<td>Health event; Informational&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Cancer content (general)</td>
<td>Prevention; Screening; Other cancer topic&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>CPSI sub-topic</td>
<td>Food/Diet; Alcohol; Exercise; Obesity; Tobacco/E-cig; SPF; Vaccine; General prevention/healthy lifestyle; Natural remedy; Breast CS; Colon CS; Prostate CS; Other CS; General screening</td>
</tr>
<tr>
<td><strong>Post features</strong></td>
<td></td>
</tr>
<tr>
<td>Post type</td>
<td>Text; Image; Video; Link to external content</td>
</tr>
<tr>
<td>Post language</td>
<td>Spanish; English</td>
</tr>
<tr>
<td>Sensationalism</td>
<td>Yes; No</td>
</tr>
<tr>
<td><strong>Post sources</strong></td>
<td></td>
</tr>
<tr>
<td>Source type</td>
<td>News agency; Health or cancer organization; Community organization/non-profit; Blog, personal or unofficial website; Special interest Facebook Group/Page; General user; Other</td>
</tr>
<tr>
<td>Facebook poster</td>
<td>Friend (shared or reposted); Public post liked by friend; Facebook Group/Page; User-generated (friend or self); Unclear/Unknown</td>
</tr>
</tbody>
</table>

<sup>a</sup>The only mutually exclusive codes were source type, Facebook poster, and post category; all other codes were not mutually exclusive;<sup>b</sup>Sub-codes listed in supplemental materials; CPSI= cancer prevention & screening information; CS= cancer screening

Using the codebook, Y.R. and J.M independently coded 20% of the sample, and intercoder reliability was calculated (Neuendorf, 2009, p. 68-69). There were two sets of codes that were not double-coded. The first was engagement type, which was not always available on the screen recording (e.g., participants that watched videos only). The second was Facebook poster, as this data was removed during data de-identification to retain participant privacy. Instead, these codes were captured on a checklist by Y.R. during the process of de-identifying posts. For the remaining posts, discrepancies were discussed until consensus was reached. Final pooled kappa coefficients for coded topics ranged from 0.89-1.0.
Y.R. then proceeded to code remaining posts by first coding for cancer content and CPSI sub-topic. This coding revealed that the majority of posts (n=97) discussed cancer topics outside the scope of this study (i.e. survivorship, treatment, research, advocacy/fundraising, cancer disparities, general cancer information). The remaining 66 posts specifically related to CPSI; 18 of these posts discussed food/diet-related cancer content that either claimed natural cancer cures (e.g., soursop tea cures cancer) or attributed cancer-causing properties (e.g., arsenic in chicken causes cancer) to specific foods, and were included because participants discussed them in terms of cancer prevention. The remaining codes were applied to these 66 CPSI posts. Frequencies of each code were calculated upon completion of the analysis.

Thematic analysis of interviews

A thematic analysis was conducted on all interview transcripts to capture why participants engaged with CPSI and subsequent actions. Y.R. coded transcripts in their original language to ensure meanings were maintained. Transcripts were preliminarily coded using inductive and deductive codes that aligned with each aim. A final coding tree was developed to outline discovered themes and concepts and applied to all transcripts. Themes were identified and refined using a constant comparison method (Dye et al., 2000). Additionally, memos were composed by Y.R. with exemplary quotes for each theme. Memos were discussed with the research team to ensure dependability and credibility in theme development (Guba & Lincoln, 1989).

Results

Overall, 16 of the 20 participants interviewed reported engaging with an average 4.1 posts containing CPSI in the previous 12 months. Participants mainly engaged with CPSI content
by viewing and/or reading content (73%, n=48), rather than by liking, commenting, and/or sharing (27%, n=18). Examples of posts are provided in Figure 6-2.

**Figure 6-2. Examples of cancer prevention and screening posts that participants engaged with on Facebook**

Images of the three most common food/diet posts discussed

Examples of screening posts discussed

*Message factors contributing to CPSI engagement*

There were multiple factors related to the content and features of a post that contributed to CPSI engagement. Results of the content analysis for post content and features are listed in Table 6-2.
Table 6-2. Post content and features of cancer prevention and screening information participants (n=16) discussed having engaged with on their Facebook accounts

<table>
<thead>
<tr>
<th>Code</th>
<th>Posts (n=66)</th>
<th>%</th>
<th>Participants (n=16)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post content</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancer content*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevention</td>
<td>50</td>
<td>76%</td>
<td>15</td>
<td>94%</td>
</tr>
<tr>
<td>Screening</td>
<td>25</td>
<td>38%</td>
<td>9</td>
<td>56%</td>
</tr>
<tr>
<td><strong>Cancer sub-topic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevention-related topics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food/Diet</td>
<td>35</td>
<td>53%</td>
<td>14</td>
<td>88%</td>
</tr>
<tr>
<td>Natural remedy</td>
<td>27</td>
<td>41%</td>
<td>12</td>
<td>75%</td>
</tr>
<tr>
<td>Other prevention</td>
<td>7</td>
<td>10%</td>
<td>4</td>
<td>25%</td>
</tr>
<tr>
<td>General prevention/healthy lifestyle</td>
<td>6</td>
<td>9%</td>
<td>5</td>
<td>31%</td>
</tr>
<tr>
<td>Screening-related topics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast cancer screening</td>
<td>7</td>
<td>11%</td>
<td>7</td>
<td>44%</td>
</tr>
<tr>
<td>Colon cancer screening</td>
<td>9</td>
<td>14%</td>
<td>9</td>
<td>56%</td>
</tr>
<tr>
<td>Prostate cancer screening</td>
<td>5</td>
<td>8%</td>
<td>5</td>
<td>31%</td>
</tr>
<tr>
<td>Other cancer screening</td>
<td>9</td>
<td>14%</td>
<td>8</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Post category</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informational</td>
<td>55</td>
<td>83%</td>
<td>16</td>
<td>100%</td>
</tr>
<tr>
<td>Health event</td>
<td>11</td>
<td>17%</td>
<td>6</td>
<td>38%</td>
</tr>
<tr>
<td><strong>Post features</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post type*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual post (image and/or video)</td>
<td>60</td>
<td>91%</td>
<td>16</td>
<td>100%</td>
</tr>
<tr>
<td>Combination (e.g., text and image)</td>
<td>53</td>
<td>80%</td>
<td>16</td>
<td>100%</td>
</tr>
<tr>
<td>Post language*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>39</td>
<td>59%</td>
<td>14</td>
<td>88%</td>
</tr>
<tr>
<td>English</td>
<td>28</td>
<td>41%</td>
<td>7</td>
<td>44%</td>
</tr>
<tr>
<td>Sensationalism (n=51)*</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contains sensationalist claim/statement</td>
<td>33</td>
<td>65%</td>
<td>13</td>
<td>81%</td>
</tr>
</tbody>
</table>

*Codes in these categories were not mutually exclusive; aIncludes 18 food/diet-related cancer posts discussed by participants as prevention; bExcludes health events and advocacy/fundraising information, as these do not include claims

1) Post content

The majority of cancer prevention posts participants engaged with were about food/diet (53% or n=35); most of these (n=24) also claimed these foods/diets could cure cancer.
naturally. Many of these (n=16) also provided recipes or dietary tips/advice to prevent and/or cure cancer. There were 16 additional prevention-related posts containing information beyond food/diet, 9 of which advertised upcoming health events. Three of these posts purported non-food natural remedies with preventive properties (such as using CBD oil or supplements for cancer prevention), six shared general information about cancer prevention and healthy lifestyles, and the remainder contained specific information about HPV vaccines, alcohol, or sunscreen. Notably, participants did not report engaging with cancer prevention topics related to exercise or tobacco/e-cigarettes. Participants also engaged with screening content, but to a lesser degree (n=25, 38%). Ten of these posts were advertising health events meant to educate about and/or provide free cancer screenings to the Latino community. The remaining posts were mainly about breast or colon cancer (n=14), four of which discussed cancer advocacy (e.g., a call to contact Florida congress to support funding a breast and cervical cancer screening program).

A thematic analysis of the interviews provides insights as to why participants engaged with CPSI, and why they predominantly engaged with food/diet-related content. In most scenarios, engagement with this content was not due to a direct interest in cancer prevention; rather, content appealed to other salient topics. Emerging themes specific to engagement with food/diet posts included a general interest in prevention/healthy eating; other salient chronic conditions; and sociopolitical issues. Additional reasons for engaging with any CPSI included personal experiences related to cancer; were in a professional context where cancer topics were salient; and curiosity. Reasons for engagement with a particular post were not mutually exclusive, and most participants engaged with different content for multiple reasons. A summary of all themes by message and source factors are listed in Table 6-4.
(a) General interest in prevention and/or healthy eating. Participants commonly engaged with food/diet-related content because they saw eating healthy as preventive. As a Puerto Rican participant stated about a video describing seven foods that ‘cure cancer’: “It’s true, all these are good for your health... [they] may not be specifically good for cancer – or do anything – but if you are healthy, it contributes to getting well faster” [Puerto Rican female, 60]. This statement further illustrates how messages claiming natural cures were generally associated with prevention, rather than treatment. Multiple participants clarified that they did not inherently believe in the curative claims within engaged posts. For example, when discussing whether she believed a post claiming that beet juice kills cancer in 42 hours, a female participant stated: “No, I don’t believe in that [statement]. Does it help? It possibly helps, as prevention” [Colombian female, 45]. Similarly, a male participant who also engaged with this post stated:

“Obviously, I don’t believe in that type of message. That there is perhaps a type of variable that could help, maybe, but it would be very illusive to believe that it will end cancer in 42 hours. [...] The rest of the content might be helpful.” [Colombian male, 56]

There was also consensus around the idea that “natural doesn’t harm,” suggesting that incorporating these foods into one’s diet is not detrimental. When discussing the beet juice post, the aforementioned Colombian male participant said, “whether it works or not, it won’t hurt me in any way.” Similarly, when discussing a post describing the curative properties of lemon peel, a female participant stated:

“If it’s natural – like, things that won’t harm anything, things that you use every day when you cook, and in your food... I would try it if I don’t have a [cancer] diagnosis. If it’s about prevention – something preventive – then I would try it.” [Dominican female, 53]
Sometimes, however, participants did believe the curative claims of the posts they engaged with. For some, having an affinity towards natural remedies stemmed from a respect for their Latin American Indigenous ancestors and their views of healthy living. A native Colombian, one female participant stated: “As you can see, I have a lot of things about Indigenous peoples. I’m really interested in these cultures, in nature […] Indigenous peoples and our ancestors knew so much medicine, they really knew so much about what happens” [Colombian female, 45]. For others, religion played a strong role in why they embraced curative claims. In discussing his affinity towards natural remedies, a male participant stated:

“[W]hen God created the world, He made it perfect. And in the bible, it says that when He created the world, everything was good. So, everything [already] exists and must exist in what God created naturally, not in what man is inventing.” [Cuban male, 61]

Nonetheless, these natural remedies were predominantly viewed as complementing, rather than replacing, Western medicine. For example, when discussing the curative properties of *guanábana*, a Colombian male (age 56) stated: “I see it as a complement, right? Obviously, it can’t be a substitute to normal medicine, but it’s definitely something that should be considered.”

(b) Salient chronic conditions. Some participants stated that their interest in food/diet-related content was related to having other chronic conditions. In these cases, the cancer claims were not regarded as essential to the message. For example, a Venezuelan female participant (age 67) recalled engaging with a post about papaya “as a preventive food, [rather] than for cancer, for your digestive tract.” Later in the conversation, she also discussed a video of seven foods that ‘cure cancer,’ one of which was turmeric. She describes how she associated it with her frequent “joint” and “knee pain.” Similarly, another participant originally from Mexico
engaged with a post stating the curative properties of frozen lemon peel. However, she did so because of its claims related to diabetes, rather than cancer.

(c) Sociopolitical issues. Sociopolitical issues also emerged as reasons for engaging with content claiming curative properties. An example of this pertained the current economic crisis in Venezuela, which has made it difficult for individuals to get access to medical care and cancer treatment. As such, a recent female Venezuelan immigrant stated:

“If it’s a home remedy, it grabs my attention, because [right now] there’s nothing in Venezuela. And that’s why if there is something that can be planted and it works, then, that’s useful. [...] You know? Because there’s always – not always – but purchasing levels greatly influence health. So, there are people who could be cured or relieved with something they have at hand, while many believe that if they don’t have the money or can’t get a medicine, there is no other chance, right? So, the situation in Venezuela is that there are no medicines.” [Venezuelan female, 45]

(d) Personal experiences related to cancer. On occasion, engagement with food/diet-related content related to previous experiences participants had with cancer survivors. There were multiple instances where participants’ friends and/or family previously resorted to complementary and alternative medicine using traditional remedies from their countries of origin, making this content more salient. These individuals were more likely to consider both preventive and curative properties of the described foods. The most common example of this was guanábana, which is available in many Latin American countries. For example, although he didn’t believe the curative claims in the beet juice post, one participant explained that he sought alternative medicine for his mother when discussing engagement with a guanábana post. Similarly, another participant stated multiple times during her interview that her interest in reading about cancer (particularly natural remedies) was due to her sister’s experience with ovarian cancer. She recounted this when discussing why she engaged with
a chain message post claiming that drinking hot lemon water can prevent cancer by killing cancerous cells:

“I remember that when my sister – and I compare many [posts like this] to my sister – like 13, 14 or 15 years ago, they would send her everything. In fact, she didn’t want more chemotherapy because she already had Stage 4 (cancer)... So, we went for alternative medicine because she did not want more chemotherapy [...] [W]e started with the shark diet, the mushrooms from I-don't-know where, some powders. She was sent so many things, they all were natural products, but they were awful! They tasted horrible! [...] So, I say, there must be something natural that can somehow [help]... but I don't know how much it can actually heal...” [Venezuelan female, 67]

Some participants also engaged with screening information because of their personal experiences in dealing with cancer in their family. For example, a Venezuelan participant discussed engaging with a post about colonoscopies because this procedure helped diagnose her child with leukemia.

(e) Professional context. Most participants engaging with content unrelated to food/diet did so because they were involved in professional or volunteer roles that made cancer a salient topic. As such, there were multiple instances where they engaged with posts sharing information about upcoming health events tailored to education and free screenings for members of the Latino community. For example, one participant frequently volunteered in cancer-related initiatives led by the local cancer center – particularly those related to breast cancer prevention and screening education. Therefore, she is aware of when this content appears on her Facebook News Feed, and sometimes shares it with others. Similarly, another participant was influenced by her previous role as a cancer educator for a local cancer center. Her knowledge on the topic and continued role as a volunteer made CPSI posts salient. These participants oftentimes engaged with posts that promoted health events via a like, comment, or share as a way to show support.
f) Curiosity. Finally, there were times when participants were just curious about the content when they saw it as they leisurely scrolled through their News Feed. As one participant stated, “if there is a topic that’s of interest to me, I look at it to see what it’s about” [Colombian male, 56].

2) Post features

Regardless of the content, there were specific post features that consistently elicited more engagement. These included visual appeal, language, and sensationalist titles/statements. In most cases, these connected to cultural elements.

(a) Visual appeal. The vast majority of posts (91%) included a visual component, such as embedded images and/or videos. Participants commented on the impact of videos and images in their engagement. One participant stated, “it’s presentation more than anything else” and that “if it doesn’t enter through your eyes, you don’t get [the message].”

Visual elements appealed to culture and cultural values in different ways. Many participants commented on posts containing images or videos of foods common in Latin America, such as guanábana: “I do remember that [post] because it’s a fruit that’s very popular in Colombia. […] It’s supposed to be one of the best fruits to drink that prevents cancer. And it is a fruit from Colombia, from the Amazon” [Colombian male, 56]. Posts containing lemons/limes also garnered attention, although many commented on not knowing the purported curative claims until having read/watched them on the platform. Rather, many saw these as staples in their diet and commented on the ease of incorporating frozen lemon peel in their diet.
Other visual elements of cultural connection included the presence of flags or someone from the same country. Videos were particularly attention-grabbing for some participants, especially if there were narrative elements that shared a testimony related to curative properties of foods.

(b) Language. Another point of cultural connection was language. Although there was a similar language distribution among the posts discussed (58% were in Spanish), over half of the posts in English came from the same participant (a previous cancer educator who speaks both languages but prefers English). Instead, most participants (n=9 or 56%) only engaged with CPSI in Spanish, while 5 (31%) engaged with CPSI in either language. Although participants did not explicitly discuss the role of language in engagement, one Puerto Rican participant (age 43) commented that “it’s in Spanish, but I don’t know if it’s from Puerto Rico or Mexico or whatever,” highlighting the transnational nature of content.

(c) Sensationalism. Many posts participants engaged with contained sensationalistic titles or claims; the majority of these related to food/diet (n=30) (e.g., “Cancer dies when you eat these seven foods” and “Cancer Dies in Only 42 Hours – Miracle Juice”). These titles seemed to be the main reason some individuals initially gravitated towards food/diet content. Yet, even then, some were apprehensive of the curative claims. For example, when discussing guanábana as a cancer cure, a participant said, “Well, if it cured [cancer], then EVERYONE would eat it! It would be in great demand! But whenever I go [to the supermarket], it’s just a tiny corner with five or six fruit” [Mexican female, 52]. Others expressed concern about the impact these sensationalist claims may have on others who encounter them, but rarely did anything to correct them. This was generally due to the idea that it is not causing any harm for people to incorporate foods into their diet, so correcting the post was either futile or not in their best interest (“I don’t feel that’s my battle to fight for” [Puerto Rican female, 42]).
Some food/diet-related content with sensationalist titles also contained conspiratorial messages. These mainly supported the idea that the pharmaceutical industry does not want the general public to know that natural remedies can cure cancer for a fraction of the cost. Meanwhile, the only two screening-related posts that contained sensationalist titles were also conspiratorial. These posts contained content claiming that current cancer screening methods could either cause cancer or death (i.e. “This Causes BREAST CANCER… It’s hard to believe and it will SURPRISE YOU” and “Colonoscopy: Another Medical Scam that Does NOT Prevent Cancer BUT Can Cause Death!”). These posts appealed to fear more so than did prevention-related posts, with one participant expressing a newfound concern that mammograms may cause breast cancer:

“I have had mammograms all my life, until I [watched] one of those things. And I start to make sense of it – and it makes sense! This guy from Puerto Rico – I don’t know his name – he made a video and everything he says […] He said so many things... and I said, ‘Oh my God...!‘” [Puerto Rican female, 60]

Source factors contributing to CPSI engagement
Source factors also contributed to engagement with CPSI (Table 6-3). Most participants engaged with CPSI that was shared or reposted by a Facebook friend (n=36). Participants also engaged with posts from unofficial sources discussing health topics (i.e. blogs, personal/unofficial websites, special interest Facebook groups or pages, or a general Facebook user; n=40) more than they did with content from verifiable organizations (n=16). Notably, almost half (n=7) of the posts from these organizations were about health events, rather than educational posts. Almost all of the posts from unofficial sources were related to food/diet (n=32).
Table 6-3. Post sources of cancer prevention and screening information participants (n=16) discussed having engaged with on their Facebook accounts

<table>
<thead>
<tr>
<th>Code</th>
<th>Posts (n=66)</th>
<th>%</th>
<th>Participants (n=16)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post source</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facebook poster type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friend (shared or reposted)</td>
<td>36</td>
<td>55%</td>
<td>14</td>
<td>88%</td>
</tr>
<tr>
<td>Public post liked by friend</td>
<td>8</td>
<td>12%</td>
<td>4</td>
<td>25%</td>
</tr>
<tr>
<td>Friend (user-generated)</td>
<td>3</td>
<td>5%</td>
<td>3</td>
<td>19%</td>
</tr>
<tr>
<td>Group/Page</td>
<td>9</td>
<td>14%</td>
<td>7</td>
<td>44%</td>
</tr>
<tr>
<td>User-generated</td>
<td>3</td>
<td>5%</td>
<td>1</td>
<td>6%</td>
</tr>
<tr>
<td>Unknown</td>
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<td>11%</td>
<td>4</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Source type</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Verifiable organization</td>
<td>26</td>
<td>40%</td>
<td>7</td>
<td>44%</td>
</tr>
<tr>
<td>Potentially unreliable source</td>
<td>40</td>
<td>60%</td>
<td>13</td>
<td>81%</td>
</tr>
</tbody>
</table>

3) Post source

Participant interviews revealed that a post’s source oftentimes contributed to engagement. Reasons for this engagement included perceived topic expertise or authority, the role of interpersonal relationships, and alignment with cultural identity. These reasons were not mutually exclusive.

(a) Perceived topic expertise or authority. For several participants, perceptions of expertise or authority about the topic within a post were an important reason for engaging with content. These perceptions could be related to the Facebook poster and/or source type. For example, one participant stated that she engaged with a post about colorectal cancer screening guidelines because it was from the American Cancer Society and was shared by a friend who works at the local health department. Meanwhile, another participant engaged with two videos about colorectal cancer screening because his sister-in-law shared them and “she’s a gastro[enterologist].”
There were occasions where the source was the most important reason to engage with content. This was the case with content shared by a Venezuelan community activist who is well-known among Latinos in Tampa. This person was discussed in multiple interviews as being a trusted leader who is always present at community events and constantly shares important and relevant health information with community members. As one participant stated, “people [in the community] listen to him because he is in everything. […] The truth is that he is very efficient, very collaborative and very proactive in all these things” [Venezuelan female, 67]. As such, several participants stated that they always pay attention to content he disseminates on his Facebook profile, local Facebook groups, and alternate social media platforms (specifically, WhatsApp). Participants also commented on his interpersonal relationships (“He calls everyone, and he goes to where the people are and everyone receives him!”), which further contributed to why participants deemed him a trusted and reliable person. The role of such interpersonal dynamics in CPSI engagement is further discussed below.

(b) Role of interpersonal relationships. There were several occasions where participants’ relationships with those sharing a post contributed to engagement. These relationships were based on trust and appeared to either complement or supersede the relevance of the content within the post. This was commonly the case for a participant who generally engaged with content related to eating healthy. Most of the content discussed during her interview came from the same person – a friend she described as being “like [her], she believes in a lot of natural stuff” [Puerto Rican female, 62]. Her friend, while not formally trained in these topics, was very immersed in natural remedies. As such, she deemed her very knowledgeable and said she always engaged with whatever content she posts. Meanwhile, another participant commented on engaging with a post from a friend after they had an offline conversation discussing the topic:
“I remember [engaging with it because] we were talking about the amount of pesticides that are used in fruit and everything that, in the long run, you think will help you cure something, but on the other hand might be poisoning you, right? Then, he commented: ‘I’m going to send you a [post] that I found about things that can help you avoid cancer.’” [Venezuelan female, 45]

Another example of source superseding content occurred with a Mexican participant who noticed that a family friend posted content describing five foods that can help prevent breast cancer. She described immediately paying attention to the content because the person who posted it has a family history of breast cancer. As such, she grew immediately concerned with whether this meant someone had been diagnosed and wanted to reach out personally (not via a like or comment on the post).

(c) Alignment with identity. Finally, engagement with CPSI was at times related to the how the source aligned with aspects of participants’ identity (such as religion or country of origin). For example, one participant commented that she engaged with a breast cancer awareness video because it was shared by a religious group she follows. For others, engagement was triggered because the content was shared in a Facebook Group for people from specific countries in Latin America (e.g., a Facebook Group for Venezuelans in Tampa). Parasocial relationships with Latin American sources also contributed to CPSI engagement; these included celebrities or other influential persons. One video in particular appealed to two participants, both of whom expressed an affinity to the narrator also being Puerto Rican (“you kind of identify [with him]” [Puerto Rican female, 56]).
### Table 6-4. Summary of reasons Latinos engage with CPSI, by post factors

<table>
<thead>
<tr>
<th>Reasons for engagement</th>
<th>Reasons for engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post content</strong></td>
<td>General interest in prevention and/or healthy eating</td>
</tr>
<tr>
<td></td>
<td>Salient chronic conditions</td>
</tr>
<tr>
<td></td>
<td>Sociopolitical issues</td>
</tr>
<tr>
<td></td>
<td>Personal experiences related to cancer</td>
</tr>
<tr>
<td></td>
<td>Professional context</td>
</tr>
<tr>
<td></td>
<td>Curiosity</td>
</tr>
<tr>
<td><strong>Post features</strong></td>
<td>Visual appeal</td>
</tr>
<tr>
<td></td>
<td>Language</td>
</tr>
<tr>
<td></td>
<td>Sensationalism</td>
</tr>
<tr>
<td><strong>Post source</strong></td>
<td>Perceived topic expertise or authority</td>
</tr>
<tr>
<td></td>
<td>Role of interpersonal relationships</td>
</tr>
<tr>
<td></td>
<td>Alignment with identity</td>
</tr>
</tbody>
</table>

**Actions stemming from engagement**

Engagement with CPSI oftentimes led to varying levels of online and offline actions. Online actions included information-seeking or sharing content; offline actions included discussing content or behavior change/reinforcement. Finally, one participant discussed actively avoiding content after engaging with it.

1) **Online actions prompted by CPSI engagement**

(a) **Information-seeking.** Engaging with content most often triggered participants to search for additional cancer information about the topic on the internet. Information-seeking mainly occurred outside of Facebook, on platforms such as Google or WebMD. As one participant stated, “I think Facebook is like a ‘mouth-opener’, isn’t it? It’s obviously not going to give you everything you need, but it does wake up like a curiosity to keep investigating and keep informing yourself” [Venezuelan female, 45].
(b) Sharing content. Participants were frequently prompted to share CPSI with others in their online networks. However, although some shared content by posting it on a Facebook profile, most did so via messaging apps (i.e. Facebook Messenger and/or WhatsApp). One participant highlights how this takes place:

“So, during the day I go on [to Facebook], I look and if there is anything there, I take it and share it on my page, and as I also receive things from other pages, from other applications, I copy and send [via] WhatsApp and [Facebook] Messenger – those two.” [Puerto Rican female, 60]

Others shared information they engaged with because they saw it as a personal responsibility. A Venezuelan participant spoke of her role in disseminating as much information as possible about cancer on Facebook, as this was an important source of information for her when her son was diagnosed with cancer. She described how she managed multiple Facebook groups tailored to parents (mainly mothers) whose children have cancer, and that she constantly shared information in these groups and on her personal Facebook page. One of these posts was a link to an article claiming that colonoscopies are deadlier than colorectal cancer (available at [www.healingoracle.ch](http://www.healingoracle.ch)). She noted that she did not necessarily agree with the content – her son’s cancer was diagnosed because of a colonoscopy – but stated it was her responsibility to share information with others, regardless of her opinion about the content. It is then up to others to search for more information. In this scenario, she shared the information but added her experience with a colonoscopy being what “saved [her] son” at the top of the post. She further explained this during the interview:

“There are always two sides to a coin. [...] Yes, there are risks, I will not deny it. But, in my son’s case, that is what saved his life. So, how can I tell you that it is not effective? Every procedure has a risk. [I shared it because] I am giving you my point of view. That is, ‘ok, maybe this [article] is valid but, in my son’s case, it’s the opposite.’ So, it’s up to each person to discern [the information], you know?” [Venezuelan female, 49]
2) Offline actions prompted by CPSI engagement

(a) Discussing content. Engaging with CPSI at times triggered participants to discuss the content with others – mainly friends and family. For example, a male participant explained that he regularly discusses food/diet-related content with his wife at home. He described that she normally shares content with him, which he then reads and decides which remedies they will incorporate into their diet. Meanwhile, another participant stated discussing the video claiming mammograms cause cancer with her daughter: “We were saying, ‘how is it that something that prevents cancer will cause us cancer?’ But I won’t lie – [the video] left me with a lot of doubt…” [Puerto Rican female, 56]. These conversations appeared to clarify lingering doubt or were used to help make decisions about the content, further discussed below.

(b) Behavior change/reinforcement. Some participants discussed making decisions informed by the CPSI with which they engaged. Many times, these included implementing new (or reinforcing current) dietary behaviors espoused by the post. This was common with food/diet-related posts containing recipes or dietary advice. For example, one participant described incorporating a cancer tonic into her diet:

“Supposedly if you drink this juice every day, it cures cancer... hehe. Well, do you know I was doing it every day, every week – or once a week [...] I wrote it down on my notes [on my phone] – and every time I go to the natural food store, I say “Hey, put this stuff in it.” [...] Broccoli, ginger, apples, carrots, cauliflower and kale. And I’ll go and I juice it. [...] I know that it’s not 100% cure. I believe in prevention. I believe that – right, I don’t have cancer now – but if you start taking things that prevent it, I don’t know... haha! Something like that.” [Puerto Rican female, 62]

As exemplified above, most dietary decisions were not evidence-based, but instead relate back to the concept of general prevention and “natural doesn’t harm.” However, other behaviors participants described were potentially harmful. The most extreme example of this
was one of the participants who engaged with the video purporting mammograms cause cancer. After watching the video – which was shared by a source she deemed trustworthy – she decided to cancel her mammogram for the first time ever:

“So, [the guy in the video] is [either] a naturopath or a doctor in Ponce, and he said so many things… [...] Well, I didn't get the mammogram. It was in February – and I've [had mammograms] all my life in February, which is my birthday – and this year I didn't do it. Well, I had the date and everything, and I called and canceled. I saw the video one day, and the appointment was the following week, and I called and canceled the appointment, hahaha!” [Puerto Rican female, 60]

3) Avoidance after engagement

One participant discussed intentionally avoiding content after seeing it emerge on his News Feed. This Cuban male spoke of purposefully avoiding topics and health events related to prostate and colorectal cancer screening:

“Every time they talk to you about events and workshops... First you say: solavaya [a Cuban phrase to “chase away” death]. Prostate cancer, colon cancer. The best thing is not to know about it. Perhaps it’s a Latin American custom to avoid looking. It’s like when you were a kid and a dead man passed by and you said: "Solavaya, solavaya, never go by my house!” It's like not wanting to talk about it so it doesn’t happen to me. As if just by talking about the topic, I put it in my cupboard. And it’s a very bad Latin American custom. Very bad.” [Cuban male, 61]

Discussion

In setting out to understand how and why Latinos engage with CPSI on social media, we discovered that cultural values and other cultural connectors (e.g., language and country of origin) play a salient role in how message factors and source factors influence engagement with CPSI among Latinos. Cultural values also appear to have an impact on how Latinos choose to act upon CPSI. These findings highlight the importance of adequately contextualizing how cultural values and other elements of cultural connection influence the ways in which Latinos engage with, interpret, and act upon CPSI on Facebook.
Consistent with literature highlighting the importance of tailoring content to Latino populations (Buki, Salazar, & Pitton, 2009; Erwin et al., 2010; David et al., 2015; Baezconde-Garbanati et al., 2014; Simmons et al., 2011), participants oftentimes engaged with visually appealing posts that contained features that provided connections to cultural identity. However, rarely did these posts come from verifiable health organizations (unless they were advertising a local health event). Rather, most participants engaged with CPSI from potentially unreliable sources that contained sensationalist titles and claimed cancer cures linked to foods popular in Latin American countries; these posts were mainly shared by Facebook friends. Most importantly, the interview portion of the study allowed participants to discuss the relevance of the offline relationships they shared with these individuals, which many times contributed to why they engaged with (and trusted) the content. While the importance of trusting the source of information is not unique to Latinos, personalismo and familismo are strong cultural values that tie notions of trust to core interpersonal and familial relationships (Guilamo-Ramos et al., 2007; Ayon & Aisenberg, 2010). The presence of these values appeared to reinforce messages being shared and consumed on social media, regardless of their accuracy.

Adding another layer of complexity is that there were multiple, co-existing reasons for Latinos to engage with CPSI shared by source factors. This was the case with multiple participants who discussed information shared by a Venezuelan community leader who they deemed a knowledgeable source of cancer information, was well-regarded in the Latino community, and shared their Latino identity. These findings highlight the significance of source factors, which appear to enhance engagement with – or be more important than – culturally-relevant content, an important consideration for public health efforts geared towards curtailing the spread of health misinformation on social media (Chou, Oh, & Klein, 2018).
An interesting finding emerged when exploring the role of message factors in engagement: although most participants engaged with information related to cancer prevention, it was not due to a direct interest in cancer prevention. Rather, other salient topics – including a general interest in healthy eating and maintaining a healthy lifestyle – commonly influenced engagement. This may help explain why participants rarely engaged with prevention content beyond food/diet. It may also point to evidence-based prevention content not reaching them, as the vast majority of this content promoted natural remedies. Meanwhile, most participants who engaged with evidence-based CPSI did so because they had a role in cancer prevention/screening as an advocate, community leader, volunteer, or healthcare professional, making cancer topics generally more salient to them. Taking into consideration the role of source factors in why many participants engaged with CPSI, cancer communication interventions may benefit from leveraging trusted sources in Latino communities to adequately deliver cancer information on Facebook – an idea that supports using the well-established two-step flow of communication model in campaign and programmatic development (Katz, 1957).

This research highlights the need for more robust models that conceptualize social media engagement, particularly as it relates to issues relevant to Latino communities. While the social media engagement model acknowledges that an individual’s social context is an instrumental factor in social media engagement (McCay-Peet & Quan-Haase, 2016), its emphasis lies in outlining individual-level factors that contribute to engagement. This presents two important limitations. First, underlying the model’s focus on individual-level factors that impact usage and activity counts is the assumption that being an engaged social media user requires letting oneself be seen by others through user activities (i.e. likes, comments, and shares). This assumption inherently limits the model’s scope of engagement, thereby excluding important factors that may not be seen by others on social media, yet still
contribute to engagement. For example, 73% of the engagement reported in our study occurred by viewing or reading content, rather than liking, commenting, or sharing; this “passive” form of engagement still contributed to important actions, as was seen with the female participant who reported cancelling her mammogram after watching a culturally-relevant video. In essence, source and message factors were instrumental in why Latinos engaged with CPSI that emerged on their Facebook accounts. Such external factors should be explicitly included in this and other social media engagement models. Similarly, a second limitation is that the model provides very little guidance as to what “social context” means and how it impacts engagement. Such a broad conceptualization risks important social factors being lost when exploring engagement, especially in communities where specific cultural values and other cultural connections explicitly influenced engagement and subsequent action. While we acknowledge social contexts are fluid, the social media engagement model would benefit from a more structured way to guide empirical research and model testing.

A particular strength of this work is that it explores the implications of consuming cancer information on social media. Beyond providing further evidence that social media engagement is an important precursor to other outcomes (Neiger et al., 2013; Yang, 2017), results show that CPSI was acted upon in multiple ways. First, our findings support the notion of cancer information seeking as triggered by individual antecedents and the features of a communication channel (Johnson, Andrews & Allard, 2011; Johnson, 1997). They also suggest engagement can lead to offline behaviors, some of which were influenced by cultural values. Several participants reported discussing CPSI with other family members offline, highlighting the importance of familismo in offline interpersonal dynamics that stem from online interactions. There was also evidence consistent with previous literature that shows machismo and fatalismo can act as barriers to cancer control and prevention efforts (Powe &
Finnie, 2003; Hubbell, Chavez, Mishra & Valdez, 1996; Goldman, Díaz & Kim, 2009; Rivera-Ramos & Buki, 2011). This was best exemplified by the Cuban male participant who both spoke of his role in deciding what natural remedies he and his wife would incorporate into their diet (machismo), as well as intentionally avoiding content related to prostate and colorectal cancer out of fear that simply viewing it could bring him disease (fatalismo). Finally, not all actions were evidence-based, as demonstrated by the participant who cancelled her mammogram after watching a video on Facebook. Combined, these findings provide important insight to the ways social media can both promote or hinder health outcomes, which merit further empirical and theoretical exploration.

Several limitations must be acknowledged. First, as an exploratory study, this study focused on individuals who have never had a cancer diagnosis. As such, their reasons for engaging with and acting upon CPSI may be different from cancer survivors. The ramifications of engaging with culturally-relevant cancer content that is not evidence-based may arguably have more immediate consequences among cancer survivors. Similarly, participants were predominantly female, which may have excluded important user-related experiences predominant among Latino men from our analysis. Future research should be expanded to include these voices. Another important limitation relates to potential recall bias. Our measure for exposure relied on recognition, rather than recall. Recognition measures ask participants to indicate whether they have seen a post before by first showing it to them (Niederdeppe, 2005), while recall measures rely on verbal cues only. Compared to recall, recognition tends to produce higher exposure estimates (du Plessis, 1994), which may overestimate true engagement. However, recognition is preferred when measuring exposure after a long period of time has passed (Stapel, 1998; Singh, Rothschild & Churchill, 1988). Future studies using this method on Facebook may limit these biases by incorporating a newer search feature: “Posts seen by you.” Finally, only posts that contained search terms
within the text were elicited during interviews. This inevitably excluded any posts that did not contain any text to pull from, such as image-only posts.

Despite these limitations, this work is – to the best of our knowledge – the first to explore how cultural values influence the ways in which Latinos engage with and act upon content they encounter on social media. Furthermore, findings highlight the complex and interrelated ways in which cultural values, source factors and message factors contribute to engagement with health content on social media. These are important contributions for current debates on how to best curtail the effects of health misinformation on social media platforms, as it may be harder to correct misinformation shared by a close friend with consonant cultural values. Cancer education interventions and communication campaigns must therefore consider delivering culturally-tailored content through trusted sources within the Latino community. Doing so may ultimately enable researchers to adequately leverage social media to encourage praxis and empower Latinos to partake in behaviors that reduce cancer health disparities.
**Supplemental Materials**

Supplement A. Codebook for content analysis of cancer prevention and screening posts discussed in interviews

### POST FEATURES

<table>
<thead>
<tr>
<th>Topic</th>
<th>Codes</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post type (Select all that apply)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Text</td>
<td>Text</td>
<td>The post contains text.</td>
</tr>
<tr>
<td>Image</td>
<td>Image</td>
<td>The post contains at least one image.</td>
</tr>
<tr>
<td>Video</td>
<td>Video</td>
<td>The post contains at least one video.</td>
</tr>
<tr>
<td>External link (image)</td>
<td>External link (image)</td>
<td>The post contains a link to an outside article. The image is part of the hyperlink, not a stand-alone image. For example, it may be a link to a news article that has an image embedded.</td>
</tr>
<tr>
<td>External link (no image)</td>
<td>External link (no image)</td>
<td>The post contains a link to an outside article. The hyperlink does not contain an image.</td>
</tr>
<tr>
<td>Post language</td>
<td>Spanish</td>
<td>The post content is in Spanish.</td>
</tr>
<tr>
<td></td>
<td>English</td>
<td>The post content is in English.</td>
</tr>
<tr>
<td></td>
<td>Both</td>
<td>The post content contains both languages. This code excludes the language of any comments.</td>
</tr>
<tr>
<td>Sensationalism</td>
<td>Presence</td>
<td>The post contains sensationalist claims or titles. For example, curing cancer in 24 hours. This included any attached links or videos.</td>
</tr>
<tr>
<td></td>
<td>Absence</td>
<td>The post does not contain sensationalist claims or titles.</td>
</tr>
</tbody>
</table>

### POST SOURCE

<table>
<thead>
<tr>
<th>Topic</th>
<th>Codes</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>News agency</td>
<td>News agency</td>
<td>The post was disseminated by or from a news agency (ex. CNN, NYTimes, Fox News, local news). This would include a Facebook Page from this kind of organization.</td>
</tr>
<tr>
<td>Health or cancer organization</td>
<td>Health or cancer organization</td>
<td>The post was disseminated by or from a health or cancer organization (ex. NCI, CDC, ACS, Moffitt Cancer Center, health department, hospital). This would include a Facebook Page from this kind of organization. Posts from healthcare providers and health insurance (e.g., Medicaid) are included in this code.</td>
</tr>
<tr>
<td>Community organization/ non-profit</td>
<td>Community organization/ non-profit</td>
<td>The post was disseminated by or from a community or non-profit organization not necessarily related to cancer. This would include a Facebook Page from this kind of organization.</td>
</tr>
<tr>
<td>Blog, personal or unofficial website</td>
<td>Blog, personal or unofficial website</td>
<td>The post was disseminated by or from a blog, personal website or unofficial site claiming to be health-related. This would include a Facebook Group or Page from this kind of website, if identifiable. For example, Mercola.</td>
</tr>
</tbody>
</table>
### Facebook poster type

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special interest Facebook Group/Page</td>
<td>The post was disseminated by or from a special interest Facebook Group or Page that does not fall within the other categories. For example, a Facebook Group about health remedies that has a post that cannot be tracked to any of the other sources.</td>
</tr>
<tr>
<td>General user</td>
<td>The post was disseminated by a general Facebook user in that group.</td>
</tr>
<tr>
<td>Other</td>
<td>The source shared or reposted is other - i.e. radio, TV show.</td>
</tr>
<tr>
<td>Friend (shared or reposted)</td>
<td>The post was shared or reposted by a Friend.</td>
</tr>
<tr>
<td>Public post liked by friend</td>
<td>The post was a public post that was liked by a Friend. The original post was publicly available, which is why the post emerged in the search. This could have thus appeared on the participant’s News Feed.</td>
</tr>
<tr>
<td>Facebook Group/Page</td>
<td>The post was posted within a Facebook Group/Page the person follows. This would exclude any Facebook Group/Page posts that another person shared; those would go under “Friend (shared or reposted).”</td>
</tr>
<tr>
<td>User-generated</td>
<td>The post was created by the user or the user’s Friend.</td>
</tr>
<tr>
<td>Unclear/Unknown</td>
<td>The post source is unclear or unknown.</td>
</tr>
</tbody>
</table>

### POST CONTENT

<table>
<thead>
<tr>
<th>Topic</th>
<th>Codes</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post category</td>
<td>Informational</td>
<td>The post and/or link is providing information about a cancer topic. This doesn’t need to be accurate information; rather, it is stating what to do to prevent, screen, or treat for cancer, or any other information about a topic related to cancer. This would include news articles that are describing a new research finding, etc. This code contained sub-codes for posts containing <strong>recipe/dietary advice</strong>, <strong>chain messages</strong> (requests to share or forward the content were contained within the post), and <strong>conspiracies</strong> (posts claiming a conspiracy about current cancer best practices or other evidence-based approaches; may include comments about Big Pharma, etc). Sub-codes not mutually exclusive.</td>
</tr>
<tr>
<td>Health event</td>
<td></td>
<td>The post is sharing information about a cancer-related local health event (ex. charlas, free screenings).</td>
</tr>
<tr>
<td>Cancer content</td>
<td>Prevention</td>
<td>Post about prevention. This includes anything related to diet that claims preventive and/or curative properties, as these relate to food and were interpreted as preventive by participants.</td>
</tr>
<tr>
<td>(Select all that apply)</td>
<td>Screening</td>
<td>Post about cancer screenings.</td>
</tr>
<tr>
<td>Other cancer topics</td>
<td></td>
<td>Post about other cancer-related content. These include cancer diagnosis, treatment, survivorship, research, etc.</td>
</tr>
<tr>
<td>Prevention and screening sub-topic</td>
<td>description</td>
<td></td>
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<tr>
<td>-----------------------------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>disparities, fundraising, remembrance, and general cancer information.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food/Diet</td>
<td>Post about diet or foods that claim cancer prevention or treatment properties. Includes anything that talks about food, not just preventive foods.</td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>Post about alcohol related to cancer.</td>
<td></td>
</tr>
<tr>
<td>Exercise</td>
<td>Post about exercise related to cancer prevention.</td>
<td></td>
</tr>
<tr>
<td>Obesity</td>
<td>Post about obesity related to cancer prevention.</td>
<td></td>
</tr>
<tr>
<td>Tobacco/E-cig</td>
<td>Post about tobacco and/or e-cigarettes related to cancer prevention.</td>
<td></td>
</tr>
<tr>
<td>SPF</td>
<td>Post about using SPF to protect against skin cancer/sun exposure.</td>
<td></td>
</tr>
<tr>
<td>Vaccine</td>
<td>Post about vaccines that prevent cancer.</td>
<td></td>
</tr>
<tr>
<td>General prevention/healthy lifestyle</td>
<td>Post about prevention and healthy lifestyles that are very general, or that cover multiple prevention topics, making it difficult to discern.</td>
<td></td>
</tr>
<tr>
<td>Natural remedy/treatment</td>
<td>Post that describes a natural remedy or treatment that goes beyond just mentioning food/diet. May or may not include a food, but explicitly states that it is a remedy/treatment. Includes supplements.</td>
<td></td>
</tr>
<tr>
<td>Breast cancer screening</td>
<td>Post that discusses different types of breast cancer screening options (ex. Mammograms)</td>
<td></td>
</tr>
<tr>
<td>Colon cancer screening</td>
<td>Post that discusses different types of colorectal cancer screening options (ex. Colonoscopy)</td>
<td></td>
</tr>
<tr>
<td>Prostate cancer screening</td>
<td>Post that discusses different types of prostate cancer screening options (ex. PSA, DRE, informed decision making)</td>
<td></td>
</tr>
<tr>
<td>Other cancer screening</td>
<td>Post that discusses another type of cancer screening not listed above.</td>
<td></td>
</tr>
</tbody>
</table>
References


Chapter 7: The role of culture and cognitive heuristics in assessing the credibility of cancer (mis)information on Facebook among U.S. Latinos

(Manuscript 3)

Abstract

Objectives: To explore how U.S. Latinos assess the credibility of cancer screening and prevention information (CPSI) on Facebook, and how they act upon this (mis)information.

Methods: Participants (n=20) logged onto their Facebook account, entered the search term “cancer,” and walked-through 12 months of cancer-related posts that appeared on their News Feed. When CPSI engagement was recalled, participants were asked if/how they assessed information credibility, and if engagement triggered further action. Computer screen and audio were recorded. Interviews were analyzed thematically and CPSI content and scientific credibility of claims were assessed.

Results: Despite a high volume of misinformation, most participants only verified information when deemed important/relevant. Most relied on cognitive heuristics (interpreted through culture) to assess misinformation. Credibility assessments were not always accurate and at times led to potentially harmful actions.

Conclusions: Findings illustrate the breadth and context of misinformation encountered, indicating that users may have trouble verifying credibility. Engagement with (mis)information may lead individuals to bypass evidence-based procedures in favor of unproven approaches or due to unfounded fears. Our results have implications for social media campaigns and digital health literacy programs to counteract misinformation.

4Manuscript 3 is formatted to the specifications of American Journal of Public Health.

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Introduction

The rise of misinformation on social media\textsuperscript{1-3} has led to considerable concerns over how it may negatively impact public health outcomes.\textsuperscript{4} While work exploring this topic has mainly focused on the spread of vaccine misinformation,\textsuperscript{5-6} broader contextualizations of the impact health misinformation can have on underserved and vulnerable populations are necessary. The National Cancer Institute has thus developed a research agenda to explore cancer-related misinformation on social media.\textsuperscript{4,7} However, existing research has primarily focused on analyzing the accuracy of posts.\textsuperscript{8,9,10} Hardly any attention has been given to how users evaluate cancer-related misinformation, which may impact the uptake of cancer prevention and screening. This is particularly important on popular social media platforms like Facebook,\textsuperscript{11} where 96\% of the top 100 health articles in the U.S. were shared in 2018 – 51\% of which had neutral to poor credibility scores.\textsuperscript{10} Investigating how users assess and act upon misinformation about cancer on social media platforms is thus instrumental in furthering our knowledge about the role these messages play on shaping health outcomes, and how to develop programs and interventions that successfully combat their dissemination.

Adequately assessing the credibility of health information in the current digital environment presents unique challenges. First, while the gatekeepers of health information have traditionally been health and government organizations, established news outlets, and other health experts,\textsuperscript{12} social media now allows anyone to create and broadly disseminate content without adequate vetting or citing of this information. Furthermore, the abundance of content available on social media contributes to information overload, which can lead users to rely on cues within a post to infer content credibility.\textsuperscript{13} While these cues may relate to the content within a post (e.g., the number of likes in a post), others may rely on the credibility of the source. However, it is increasingly difficult to discern the source of a
message on social media: a friend’s trustworthiness may override an obscure information source, while user-generated content may lack appropriate source attributions.

In light of these difficulties, Metzger’s dual processing model of credibility suggests that online credibility assessments are largely triggered by cognitive heuristics \textsuperscript{13}-\textsuperscript{14} – mental “shortcuts” that reduce the cognitive load of information processing by making quick decisions about information. Sundar’s MAIN model\textsuperscript{15} further posits that these shortcuts may be triggered by cues offered through a social media platform’s unique technological attributes. On Facebook, these may include the way content is presented in a post, the person/entity posting content, or the ability to comment on a post. Notably absent from these and similar models, however, is the role of culture in the formation of heuristics. Kahan et. al\textsuperscript{16} suggests that cultural worldviews influence cognitions related to risk perceptions through cultural credibility heuristics (i.e. viewing the source of information as espousing a worldview congruent with one’s own). As such, exploring cognitive heuristics through the lens of cultural values may provide unique insights to how specific populations assess the credibility of cancer information on social media.

The present study explores these issues in the context of Latinos, the largest minority group in the U.S.\textsuperscript{17} Latinos share common cultural values,\textsuperscript{18} including *familismo* (sense of family loyalty, closeness, and interdependence) and *personalismo* (interpersonal relationships characterized by empathy, trust, closeness and warmth).\textsuperscript{19} Such cultural values may influence perceptions of credibility for cancer (mis)information encountered on social media. Latinos are avid Facebook users,\textsuperscript{11} which can be partially attributed to their use of social media as a way to keep strong family and cultural ties.\textsuperscript{20} Utilizing social media as a way to maintain multi-lingual ties influenced by cultural values may impact how Latinos assess information credibility. Beyond this, cultural values may also influence how some Latinos perceive cancer
information and whether they participate in cancer control and prevention efforts. As such, understanding how multi-lingual Latinos assess and act upon cancer (mis)information disseminated on social media is instrumental in developing culturally-tailored interventions to reduce the effects of misinformation. In light of this, we investigated (1) the scientific credibility of the cancer prevention and screening information (CPSI) U.S. Latinos engage with on Facebook, (2) if and how U.S. Latinos assess such credibility, and (3) how U.S. Latinos act upon engaged CPSI.

Methods
This qualitatively-driven, mixed-methods study explored how and why Latino adults without a history of cancer engage with CPSI on Facebook through a convergent parallel research design. We interviewed 20 Latino/Hispanic Facebook users between the ages of 40-75 during the summer of 2018 in Tampa, FL. This age range was selected because it encompasses U.S. screening guidelines for breast, prostate, and colorectal cancers. Furthermore, older Americans report being less able to distinguish fact from opinion, which may affect how they assess CPSI credibility. Participants were recruited via Facebook ads, flyers, and word-of-mouth, stratified by language preference (English-preferring, Spanish-preferring, Bilingual), and compensated $50 upon completion of data collection. All procedures were approved by the Institutional Review Board at Johns Hopkins Bloomberg School of Public Health.

Data collection
Data collection occurred via an in-person interview. Participants first completed a brief survey collecting demographic information, health and cancer information seeking behaviors, and Facebook utilization patterns. Afterwards, one-on-one, in-depth interviews (~2hr) were held with participants in their language of choice (English and/or Spanish) by
the lead researcher (Y.R.). Participants logged onto their Facebook account alongside the researcher, entered the search term “cancer,” and walked-through 12 months of cancer-related posts that appeared on their News Feed (posts sorted by “Most Recent” and posted by “Your Friends and Groups”). When participants recalled engaging with CPSI, they were asked questions regarding if/how they assessed the credibility of the information, and if engagement triggered further action. Any embedded videos/links were viewed to discuss the content and process by which credibility was assessed. This process was repeated with the search terms “cancer prevention” and “cancer screening.” Computer screen and audio were recorded for each encounter.

Upon completing this portion of the interview, participants were directed to a Facebook Page developed by the study team and asked to react to three publicly available Facebook posts containing CPSI. These posts were selected to exemplify different types of CPSI Latinos may be exposed to on Facebook in English and Spanish (see Supplement A for descriptions). Exposing participants to this standardized content allowed researchers to further explore how participants assess the credibility of identical CPSI on Facebook.

**Data analysis**

Descriptive statistics were calculated for all survey data using Stata version 14.2. Interviews were transcribed verbatim, and screen captures of posts discussed were saved. MaxQDA PRO 2018.2 was utilized to manage and code captured posts and transcribed interviews.

**Content analysis of CPSI posts**

A content analysis was conducted on all cancer-related posts with which participants engaged. Codes were developed for the following topics: post features, post source, and post content. Posts were also coded for the presence/absence of features that assist in verifying
content, such as whether information included original sources, followed cancer prevention and screening guidelines, made sensationalist claims, and/or oversimplified claims (Supplement B). Two bilingual coders (Y.R. and J.M.) independently coded 10% of the sample, and intercoder reliability was calculated. Discrepancies were discussed until consensus was reached. A second round of coding was conducted on another 10% of the sample for topics with pooled kappa scores below 0.8. Final pooled kappa coefficients for coded topics ranged from 0.89-1.0. Y.R. then coded the remaining posts.

The scientific credibility of claims made in each post (and any attached video/article) were also assessed using the Science Feedback’s claims review framework, which provides criteria to evaluate claims as having very high, high, neutral, low or very low scientific credibility (sciencefeedback.co/claim-reviews-framework; Supplement B). Posts about health events (n=11) or cancer advocacy (n=4) were excluded from this step, as they did not include health claims. The remaining 51 posts were verified and coded by Y.R. using external 3rd party sources. External sources included fact-checking sites (i.e. Snopes), cancer websites (e.g., NCI), and PubMed. Decisions were reviewed by another team member (M.M.) until agreement was achieved for all posts.

Thematic analysis of interviews
A thematic analysis was conducted on all interview transcripts to capture how participants assessed post credibility and acted upon cancer (mis)information. Y.R. coded transcripts in their original language to ensure meanings were maintained. Transcripts were preliminarily coded using inductive and deductive codes that aligned with each aim. A final coding tree was developed to outline discovered themes and concepts, discussed with team members, and applied to all transcripts. Themes were identified and refined using a constant comparison method. Additionally, memos were composed by Y.R. with exemplary quotes.
for each theme. Memos were discussed with the research team to ensure dependability and credibility in theme development.\textsuperscript{26}

**Results**

Participants (n=20) were 54 years old on average, and were predominantly female (75%), married (60%), employed (80%), and insured (85%). There was a broad representation of language preference, household incomes, education levels, and Latin American sub-ethnic groups. Most participants (90%) went to the Internet the most recent time they sought health information, and 55% sought cancer information for themselves in the past year. The majority (85%) reported checking their Facebook account at least once a day, mainly on their smartphone (95%). Most used Facebook for social interactions (85%) and discussed using it to keep in touch with family abroad.

**CPSI scientific credibility**

Of all 20 participants, 16 reported engaging with CPSI posts in the past 12 months (average CPSI posts engaged = 4.1). Table 7-1 describes the 66 CPSI-related posts participants engaged with, and the scientific credibility of claims in relevant posts (n=51). Most posts contained claims with low/very low scientific credibility (n=32); many of these claims were misleading, unsupported, and/or inaccurate. The majority lacked links to original sources, were inconsistent with cancer prevention/screening guidelines, had sensationalist titles, and oversimplified scientific claims. Most were from potentially unreliable sources (n=30) and were either liked, shared, or reposted by a Facebook friend (n=21). The majority of posts with low/very low scientific credibility were related to food/diet (n=28). Within these, 24 purported natural cancer remedies by consuming specific foods, and 16 provided recipes or dietary tips/advice to prevent and/or cure cancer. Only 11 posts had high/very high
scientific credibility and mainly contained cancer screening information (n=8). The remaining posts were neutral and lacked enough context and sources to adequately characterize claims. See Table 7-1 and Figure 7-1 for examples.

Figure 7-1. Examples of cancer prevention and screening posts with different levels of scientific credibility participants engaged with on Facebook
Table 7-1. Content analysis of cancer prevention and screening information participants (n=16) discussed having engaged with on their Facebook accounts

<table>
<thead>
<tr>
<th>Code</th>
<th>Total posts (n=66)</th>
<th>Scientific credibility(^a)</th>
<th>Total posts (n=51)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Very high/High (n=11)</td>
<td>Neutral (n=8)</td>
</tr>
<tr>
<td><strong>Post content</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancer content(^b)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevention</td>
<td>50 (76%)</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Screening</td>
<td>25 (38%)</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td><strong>Cancer sub-topic</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevention-related topics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food/Diet</td>
<td>35 (53%)</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Other cancer prevention</td>
<td>12 (18%)</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Screening-related topics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast cancer</td>
<td>7 (11%)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Colon cancer</td>
<td>9 (5%)</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Prostate cancer</td>
<td>5 (8%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other cancer</td>
<td>7 (11%)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Post category</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informational</td>
<td>51 (77%)</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Health event</td>
<td>11 (17%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Advocacy</td>
<td>4 (6%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Post features</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post type(^*)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual post (image and/or video)</td>
<td>60 (91%)</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Combination (e.g., text and image)</td>
<td>53 (80%)</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Post language(^*)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>39 (59%)</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Language</td>
<td>Posts</td>
<td>Posts by Friend (shared or reposted)</td>
<td>Posts by Public post liked by friend</td>
</tr>
<tr>
<td>--------------</td>
<td>-------</td>
<td>-------------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>English</td>
<td>28 (41%)</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>5</td>
<td>9</td>
</tr>
</tbody>
</table>

**Post source**

Post sharer on Facebook

- Friend (shared or reposted) 36 (55%)
- Public post liked by friend 8 (12%)
- Facebook Group/Page 9 (14%)
- User-generated (friend or self) 3 (5%)
- Unclear/Unknown 9 (14%)

**Information source**

- Verifiable organization 26 (40%)
- Potentially unreliable source 40 (60%)

*Codes in these categories were not mutually exclusive

*Posts that discussed health events or cancer advocacy topics were excluded from this analysis, as they did not have specific scientific claims to be assessed.

*Includes 18 additional food/diet-related cancer posts discussed by participants as prevention.

*Codes grouped into broader categories – “verifiable organization” included health/cancer organizations, news agencies, and community/religious organizations; “potentially unreliable sources” included blogs, personal/unofficial websites, special interest Facebook groups or pages, and general Facebook user.
CPSI credibility assessments by Latino Facebook users

Participants assessed CPSI credibility by using heuristics and/or verifying information (Supplement C). While some participants adequately assessed credibility (e.g., recognizing a cancer organization logo as a credible source of colorectal cancer screening recommendations), not all assessments were accurate: some participants deemed CPSI with low/very low scientific credibility as credible. Others were unsure of the credibility of the content with which they engaged.

The most common way that participants assessed content and/or source credibility was through the use of cognitive heuristics. These assessments were triggered by cues within the post (e.g., an image of fruit common in Latin America), and were oftentimes interpreted through a cultural lens informed by participants’ cultural identity. Descriptions and examples of these rationalizations are listed in Table 7-2.

Despite the volume of misinformation, most participants only described verifying information when it was important/relevant. However, some participants either did not know how to verify content online, or were unsure about where to go for accurate information. Others never verified information, using only heuristics or believing that “only serious people” post on Facebook.
Table 7-2. Rationales describing how individuals assessed information credibility through culturally-relevant, identity-related interpretations

<table>
<thead>
<tr>
<th>Identity-related rationales*</th>
<th>Description of theme</th>
<th>Exemplary quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural connection</td>
<td>Descriptions of cultural traditions, stories, foods, language and/or features from country of origin used to make inferences about credibility.</td>
<td>I do remember that [post] because it’s a fruit that’s very popular in Colombia. I brought the seed here precisely to have the fruit for – according to studies that have been done, it’s supposed to be one of the best fruits to drink that prevents cancer. And it is a fruit from Colombia, from the Amazon. (Bilingual Colombian male, 56)</td>
</tr>
<tr>
<td>Previous knowledge/ experiences</td>
<td>Descriptions of previous knowledge and/or experiences immersed in cultural values used to make inferences about credibility. Many of these were accounts of close friends or family members who relied upon complementary or alternative medicine common in Latin American countries for their cancer treatment. Among the cultural values that emerged in these rationales were familismo, respeto, and fatalismo.</td>
<td>I remember that when my sister – and I compare many [posts] to my sister – like 13, 14 or 15 years ago, they would send her everything. In fact, she didn’t want more chemotherapy because she already had Stage 4 (cancer)... So, we went for alternative medicine because she did not want more chemotherapy [...] [W]e started with the shark diet, the mushrooms from I-don’t-know where, some powders. She was sent so many things, they were all natural products, but they were awful! They tasted horrible! There was also moringa... Then her markers dropped enormously... She had stopped chemotherapy, but had also just barely stopped that [natural] treatment, which was awful as well. So, I say, there must be something natural that can somehow [help]... but I don’t know how much it can actually heal... (Bilingual Venezuelan female, 67)</td>
</tr>
<tr>
<td>Shared narratives</td>
<td>Descriptions of specific stories or experienced shared by Latin American friends or family used to make inferences about credibility. Among the cultural values that emerged in these rationales were familismo, simpatía, personalismo, and respeto.</td>
<td>Participant: My grandma always said beets raised your hemoglobin and I don't know what else. So, it's like joining one thing with the other. Grandmas used to say it and didn't know why. Now, you hear and read the article I don't know how many years later, and they keep telling you “beets,” but I think this generation truly likes to know the why behind everything, right? What it's based on... So, it's still the same beet, but [now] we know why it has that benefit.</td>
</tr>
</tbody>
</table>
Y.R.: So, the fact that it’s something you can relate to
grandmothers and those who came before you, and that you still
hear the same thing – in your mind, those things give you some
credibility?

Participant: Yes, because it’s like – before, they used to tell you so
much, and now it’s just verifying that they were right, because
now you know why, right? I think they didn’t know why either.
They simply heard it from their moms or their grandmothers and
verified that it was good because it would work [when they tried
it], but they didn’t truly know the content of these things.
(Spanish-prefering Venezuelan female, 45)

<table>
<thead>
<tr>
<th>Religion/spirituality</th>
<th>Descriptions of the role of religion/spirituality in deeming content credible. Among the cultural values that emerged in these rationales were fatalismo, machismo, and mariánismo.</th>
</tr>
</thead>
<tbody>
<tr>
<td>[...] because what happens is that, in nature – I believe a lot in this – all the herbs, all the leaves that fall from the trees, everything is for health and everything can be used for medicine. Each thing has its purpose – these things are not done haphazardly, no, no, and no! Because God doesn’t have time to make nonsense, you understand, everything God did was good. That desire – sin – ruined it, but these things still have value. So, each one has its... its function. (Spanish-prefering Puerto Rican female, 60)</td>
<td></td>
</tr>
</tbody>
</table>

*Rationales were not mutually exclusive; more than one rationale was sometimes used in describing why content was deemed credible or not. Not all heuristic assessments were informed by the identity-related rationales listed in this table.*
**Actions taken**

At times, engaging with CPSI led participants to take online and/or offline actions relevant to cancer prevention and control (Table 3). Online actions were among the most common, which included subsequent information seeking and/or sharing content with others – neither of which exclusively occurred on Facebook. Participants often described a search process that took place on other platforms (such as Google or WebMD), while others circumvented sharing CPSI on their personal Facebook page by sharing posts in private via Facebook Messenger or WhatsApp (another social media popular among Latinos\(^{11}\)).

Participants also described offline actions triggered by the CPSI they engaged with, which most often entailed discussing content with friends, family, or a healthcare provider. Some participants also discussed making decisions based on the consumed (mis)information, mainly that of implementing new (or reinforcing current) dietary behaviors (such as incorporating a specific food into their diet). Reasons to implement were not always related to cancer, but rather to other health conditions (e.g., turmeric consumption to treat arthritis). Most concerning, however, were the few cases described where participants acted upon misinformation encountered in potentially harmful ways. The most extreme example was a female participant who reported cancelling a previously scheduled mammogram after watching a video where a source indicated that mammograms cause cancer. Through the use of multiple heuristics (availability, authority), in part influenced by cultural identity (both were Puerto Rican), she deemed the source credible enough to cancel her appointment (Table 7-3).
Table 7-3. Actions taken after engaging with cancer prevention and screening information on Facebook

<table>
<thead>
<tr>
<th>Action</th>
<th>Description of theme</th>
<th>Exemplary quote</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Online actions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starting a search process</td>
<td>CPSI engagement as prompting users to search for additional cancer information about the topic on the internet (typically Google or another search engine).</td>
<td>I think Facebook is like a “mouth-opener”, isn’t it? It’s obviously not going to give you everything you need, but it does wake up like a curiosity to keep investigating and keep informing yourself. It's like a little worm that bites you and says: “Something happened here. Let's see what this is…” and you start looking. (<em>Spanish-prefering Venezuelan female, 45</em>)</td>
</tr>
<tr>
<td>Sharing with others</td>
<td>CPSI engagement as prompting users to share posts with others in their online network, both on Facebook through shares and/or posting on an individual profile, or via messaging apps (i.e. Facebook Messenger and/or WhatsApp).</td>
<td>So, during the day I go on [to Facebook], I look and if there is anything there, I take it and share it on my page, and as I also receive things from other pages, from other applications, I copy and send. [Through] WhatsApp and Messenger – those two. (<em>Spanish-prefering Puerto Rican female, 60</em>)</td>
</tr>
<tr>
<td><strong>Offline actions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discussing with others</td>
<td>CPSI engagement as prompting users to discuss content with friends, family, health care providers or others outside of Facebook or the internet.</td>
<td>And I remember that my wife and I, we discussed why [papaya] seeds were not to be crushed, but that they should be taken whole. (<em>Bilingual Cuban male, 61</em>)</td>
</tr>
<tr>
<td>Implementation/Reinforcement of dietary behaviors</td>
<td>CPI engagement as prompting users to implement a new - or reinforce a current - dietary behavior linked to cancer prevention (and/or treatment). This may include adding</td>
<td>Supposedly if you drink this juice every day, it cures cancer… hehe. Well, do you know I was doing it every day, every week – or once a week […] I wrote it down on my notes [on my phone] – and every time I go to the natural food store, I</td>
</tr>
</tbody>
</table>
a new food to one’s diet, or following a recipe. say “Hey, put this stuff in it.” [...] Broccoli, ginger, apples, carrots, cauliflower and kale. And I’ll go and I juice it. [...] I know that it’s not 100% cure. I believe in prevention. I believe that – right, I don’t have cancer now – but if you start taking things that prevent it, I don’t know… haha! Something like that. (English-preferring Puerto Rican female, 62)

Screening decisions CSI engagement as prompting users to make a decision to schedule or cancel a relevant cancer screening. I’ve had mammograms all my life, until I read one of these things ... And I started to make sense of it, and it makes sense! Actually, this guy from Puerto Rico, I don’t even know his name, he made a video and everything, everything he says – wonderful! [...] I watched the video and called and canceled the [mammogram] appointment. (Spanish-preferring Puerto Rican female, 60)

CPSI=cancer prevention and screening information; CPI=cancer prevention information; CSI=cancer screening information
Discussion

Our content analysis suggests Latino adults may be engaging with a high volume of CPSI of low/very low scientific credibility, which is shared by Facebook Friends and Groups, rather than with evidence-based CPSI from reputable sources or cancer organizations with a Facebook presence. These findings align with recent literature highlighting that both being interested in an article’s topic and trusting the sharer had higher effects on a person’s trust and willingness to engage with an article than did trusting the information source.

Notions of trust in the Latino community stem from cultural values like familismo and personalismo, both of which are associated with the sharer of information. Given the communicative value of Facebook as a way for Latinos to maintain relationships with friends and family, it is possible that trust in the sharer of CPSI has a stronger influence among Latino Facebook users than does trust in the information source. This is further supported by findings that demonstrate very little difference in levels of trust based on the source of an article (i.e. fictional vs. trustworthy). That the reputation of an information source may have lower levels of influence in sharing content on social media is concerning for cancer prevention and screening efforts, which mainly target individuals who do not have cancer and who may not be looking to actively engage with CPSI in this environment.

Our main findings are consistent with previous work supporting notions that individuals mainly use cognitive heuristics to assess source and/or content credibility. However, this study’s results also highlight the role culture plays in how Latinos assess the credibility of CPSI consumed on Facebook. Our analysis describes multiple instances where cognitive heuristics were used to interpret messages in culturally-relevant ways (see Table 7-3). These interpretations were oftentimes conveyed through stories embedded with cultural values (e.g., fatalistic views of cancer, patriarchal notions of decision making in the household, trust in/respect towards the shared experiences of friends and family) or strong
cultural identity (e.g., content explicitly tied to one’s country of origin or cultural heritage, content in Spanish). Our findings thus not only support the role of the cultural credibility heuristic in attributing credibility to sources with similar worldviews, but also suggest that one’s cultural alignment and identity impact how a myriad of heuristics are used to assess source and content credibility. Culturally-bound assessments may prove harder to correct, as they appear to be informed by deeply ingrained values. To the best of our knowledge, this is a novel contribution that may guide future research investigating the impacts of using culturally-informed heuristics to assess health misinformation.

The data presented illustrate how mixed-methods approaches move beyond traditional surface-level indicators of engagement (liking, commenting, sharing) to provide insights to actions Latino adults may take after engaging with CPSI on social media, which are largely absent from literature exploring the impact of misinformation on health outcomes. These encounters may lead individuals to bypass evidence-based procedures in favor of unproven approaches (e.g., juicing as a cancer tonic) or due to unfounded fears (e.g., mammograms squeezing cancer and making it spread). Accounts also provided examples of individuals sharing information both without verifying its content and through alternate avenues (such as Facebook Messenger and WhatsApp), contributing new evidence that misinformation cascades have the ability of circumventing efforts that do not consider the role of interplatform connectivity in how Latinos share information.

It is important to note that most engagement with misinformation did not lead to behavior change, nor were all actions taken detrimental. Some individuals were motivated to seek additional information and/or discuss content with friends/family because the information did not align with their knowledge on the topic; others decided to incorporate healthy foods into their diet as a “preventive” measure. However, such misinformed
Credibility assessments suggest individuals may lack the ability or motivation to accurately discern between accurate and inaccurate content. This may have negative consequences were persons to subsequently be diagnosed with cancer (or other chronic conditions) and encountered similar information on social media.

This study is not without limitations. Only cancer information that included our search terms within a post were obtained and discussed, thus excluding posts that did not contain some kind of text feature (i.e. image-only posts). Additionally, our sample was skewed towards females, which may exclude user-related experiences predominant among Latino men from our analysis (e.g., less engagement with specific types of CPSI). Lastly, most participants use their phones to access their Facebook account, rather than the desktop version. The difference in visual layout may have affected adequate recall of some posts. However, participants were generally able to describe engagement with CPSI in sufficient detail before in-depth discussions ensued. Facebook has since incorporated a search feature for “Posts seen by You” that may be used in future research applying similar methods to further reduce recall bias.

Public Health Implications
Curtailing the effects of health misinformation on social media will require multi-pronged interdisciplinary efforts that tackle the underlying reasons that make this content appealing and appear trustworthy. These should include developing ways to counteract and correct misinformation, improving digital health literacy, and establishing research collaborations.

Our findings present new considerations for social media interventions to adequately deliver evidence-based, culturally-tailored information to intended audiences. Narratives may be one tool to effectively counteract misinformation, as the shared experiences of others...
had a strong influence in credibility assessments among interviewed participants. These findings align with other health communication efforts that have successfully used persuasive narratives containing Latino cultural values, language, and country of origin as a way to promote cancer prevention and screening. Receiving reputable health information from trusted individuals may also counteract and dispel myths. Initiatives can leverage cultural values by embedding trusted sources in the Latino community – like promotores (community health workers) and other community leaders – into their outreach efforts. These individuals could be trained to engage with community members on social media through efforts that leverage the dialogical education enabled by platforms like Facebook, an approach that has been successful in tobacco-cessation interventions.

Programs to correct misinformation must also be developed. Although using factcheckers has been suggested as a potential solution to correct misinformation, there are mixed findings regarding its effectiveness. Given today’s increasing distrust in government agencies, other corrective mechanisms may be more appropriate. Our research complements literature suggesting social corrections from Facebook friends may be an effective way to correct misinformation on the platform, and also illustrates the necessity for such corrections to be culturally relevant. Future public health initiatives should incorporate this in the design of interventions and misinformation campaigns targeting social media users.

Efforts that tackle digital health literacy among adult populations may also be necessary to address the spread of misinformation on social media. Although our study population avidly used Facebook and reported using the Internet to seek health information, some participants expressed wanting to verify CPSI, but not knowing how to do so. Furthermore, participants stated not having sufficient time or motivation to embark in
elaborate processes of verification. This may be characteristic of engagement with misinformation on social media, as not all posts provide sufficient content to verify information without having to exit a platform. Future research should not only explore ways to teach audiences how to seek evidence-based information online, but also to effectively identify misinformation using heuristics before acting upon it.

Research to correct misinformation cannot stop at issues relevant in the U.S., particularly those impacting the Latino community. Transnational, multi-lingual initiatives are necessary to be informed on health misinformation trends happening in Latin America (and other countries) that are shared through social media. This will require international collaborations between researchers, journalists, government agencies, and non-profit organizations to share resources and best practices (see The ComProp Navigator for an example of similar efforts in political misinformation).

Finally, our findings suggest that structural interventions are imperative, as individuals may not be sufficiently motivated to verify health misinformation. In light of recent platform-led, self-regulatory initiatives to reduce the amount of misinformation pertaining to vaccines shared on social media (i.e. Pinterest banning searches; YouTube demonetizing videos; Facebook redirecting vaccine-related search results), it is crucial that scholars be involved in conversations regarding the roles and responsibilities of platforms in regulating and monitoring other health misinformation developed and disseminated on social media.
Supplemental Materials

Supplement A. English version of standardized posts shown to participants

Post 1

Frozen Lemon More Powerful Than Chemotherapy? It turns out that the best way to consume lemons is to first freeze them and then eat them along with their peel. How best to take advantage of this amazing fruit’s skin?

Wait until they’re completely frozen and grate the whole lemon with a regular grater. You can now add this grated lemon to whichever dish you want, sprinkle it on top your ice-cream or salad or add it to your smoothies and shakes. Health experts have said that the lemon skin has an effect thousand times more powerful than chemo therapy and plus it doesn’t have any of the adverse side-effects associated with chemo.

Grated frozen lemons are super easy to combine with your food, you can add them to ice cream, salads, soups and so on and take advantage of all the benefits they hold. The best thing about frozen lemon peel is that it’s incredibly effective against all types of cancer, cysts and tumors. Multiple studies on the subject have showed the powerful effect of lemon peel against cancer cells and recommend it as a treatment.

Lemon peels have powerful antibacterial and antimicrobial effect meaning that they’re effective against bacterial and fungal infections as well. They also regulate your blood pressure, have antidepressant effects and eliminate feelings of anxiety and irritability. If this wasn’t enough, lemon peels alkalize your body and regulate the blood’s pH values, promoting optimal health. Studies have shown that lemon peels can destroy the cancer cells of 12 types of cancer among which one of the deadliest – prostate, colon, pancreatic and lung cancer.

The compounds found in lemon peels, as we already said before, are thousand times more powerful than ADRIAMYCIN, a drug commonly used in chemo but more importantly the lemon peels only act on the malignant cells, destroying them, while leaving behind the healthy cells without damaging them. Combine this with HEMP CBD OIL for best results.

Post 2

Stop being fooled by this common money-grab. Scientists confirm annual mammograms are not effective in helping prevent breast cancer and may even cause health issues of their own. Share this research with the important women in your life.

Post 3

Did you know that the number one risk factor for developing colorectal cancer is age? If you are 50 or older, talk to your health provider about screening, and encourage your friends and family to get screened, too. Learn more from the National Cancer Institute: https://www.cancer.gov/

Post 1: Misinformation claiming frozen lemon peel is 100,000 times more effective against cancer than chemotherapy; Post 2: Information claiming mammograms are not an effective breast cancer screening tool and may cause further health problems; Post 3: Colorectal cancer screening information provided by NCI and disseminated through a local NCI-designated cancer center outreach program.
Supplement B. Codebook for content analysis of cancer prevention and screening posts discussed in interviews

<table>
<thead>
<tr>
<th>POST FEATURES</th>
<th>Codes</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Topic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Post type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Text</td>
<td>The post contains text.</td>
<td></td>
</tr>
<tr>
<td>Image</td>
<td>The post contains at least one image.</td>
<td></td>
</tr>
<tr>
<td>Video</td>
<td>The post contains at least one video.</td>
<td></td>
</tr>
<tr>
<td>(Select all that apply)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External link (image)</td>
<td>The post contains a link to an outside article. The image is part of the hyperlink, not a stand-alone image. For example, it may be a link to a news article that has an image embedded.</td>
<td></td>
</tr>
<tr>
<td>External link (no image)</td>
<td>The post contains a link to an outside article. The hyperlink does not contain an image.</td>
<td></td>
</tr>
<tr>
<td><strong>Post language</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>The post content is in Spanish.</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>The post content is in English.</td>
<td></td>
</tr>
<tr>
<td>Both</td>
<td>The post content contains both languages. This code excludes the language of any comments.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POST SOURCE</th>
<th>Codes</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Topic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Information source</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>News agency</td>
<td>The post was disseminated by or from a news agency (ex. CNN, NYTimes, Fox News, local news). This would include a Facebook Page from this kind of organization.</td>
<td></td>
</tr>
<tr>
<td>Health or cancer organization</td>
<td>The post was disseminated by or from a health or cancer organization (ex. NCI, CDC, ACS, Moffitt Cancer Center, health department, hospital). This would include a Facebook Page from this kind of organization. Posts from healthcare providers and health insurance (e.g., Medicaid) are included in this code.</td>
<td></td>
</tr>
<tr>
<td>Community organization/non-profit</td>
<td>The post was disseminated by or from a community or non-profit organization not necessarily related to cancer. This would include a Facebook Page from this kind of organization.</td>
<td></td>
</tr>
<tr>
<td>Blog, personal or unofficial website</td>
<td>The post was disseminated by or from a blog, personal website, or unofficial site claiming to be health-related. This would include a Facebook Group or Page from this kind of website, if identifiable. For example, Mercola.</td>
<td></td>
</tr>
<tr>
<td>Special interest Facebook Group/Page</td>
<td>The post was disseminated by or from a special interest Facebook Group or Page that does not fall within the other categories. For example, a Facebook Group about health remedies that has a post that cannot be tracked to any of the other sources.</td>
<td></td>
</tr>
<tr>
<td>General user</td>
<td>The post was disseminated by a general Facebook user in that group.</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>The source shared or reposted is other - i.e. radio, TV show.</td>
<td></td>
</tr>
<tr>
<td>Post sharer on Facebook</td>
<td>Definition</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>Friend (shared or reposted)</td>
<td>The post was shared or reposted by a Friend.</td>
<td></td>
</tr>
<tr>
<td>Public post liked by friend</td>
<td>The post was a public post that was liked by a Friend. The original post was publicly available, which is why the post emerged in the search. This could have thus appeared on the participant’s News Feed.</td>
<td></td>
</tr>
<tr>
<td>Facebook Group/Page</td>
<td>The post was posted within a Facebook Group/Page the person follows. This would exclude any Facebook Group/Page posts that another person shared; those would go under “Friend (shared or reposted).”</td>
<td></td>
</tr>
<tr>
<td>User-generated</td>
<td>The post was created by the user or the user’s Friend.</td>
<td></td>
</tr>
<tr>
<td>Unclear/Unknown</td>
<td>The post source is unclear or unknown.</td>
<td></td>
</tr>
</tbody>
</table>

### POST CONTENT

<table>
<thead>
<tr>
<th>Topic</th>
<th>Codes</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post category</td>
<td>Informational</td>
<td>The post and/or link is providing information about a cancer topic. This doesn’t need to be accurate information; rather, it is stating what to do to prevent, screen, or treat for cancer, or any other information about a topic related to cancer. This would include news articles that are describing a new research finding, etc.</td>
</tr>
<tr>
<td>Health event</td>
<td>The post is sharing information about a cancer-related local health event (ex. charlas, free screenings).</td>
<td></td>
</tr>
<tr>
<td>Advocacy</td>
<td>Post advocating for cancer issues and/or requesting funds for cancer patients/survivors or cancer initiatives/topics.</td>
<td></td>
</tr>
<tr>
<td>Cancer content (Select all that apply)</td>
<td>Prevention</td>
<td>Post about prevention. This includes anything related to diet that claims preventive and/or curative properties, as these relate to food and were interpreted as preventive by participants.</td>
</tr>
<tr>
<td>Screening</td>
<td>Post about cancer screenings.</td>
<td></td>
</tr>
<tr>
<td>Prevention and screening sub-topic (Select all that apply)</td>
<td>Food/Diet</td>
<td>Post about diet or foods that claim cancer prevention or treatment properties. Includes anything that talks about food, not just preventive foods.</td>
</tr>
<tr>
<td>Other cancer prevention</td>
<td>Post about other cancer prevention topics (i.e. alcohol, exercise, obesity, tobacco/e-cigs, SPF, vaccines, general prevention/healthy lifestyle).</td>
<td></td>
</tr>
<tr>
<td>Breast cancer screening</td>
<td>Post that discusses different types of breast cancer screening options (ex. Mammograms)</td>
<td></td>
</tr>
<tr>
<td>Colon cancer screening</td>
<td>Post that discusses different types of colorectal cancer screening options (ex. Colonoscopy)</td>
<td></td>
</tr>
<tr>
<td>Prostate cancer screening</td>
<td>Post that discusses different types of prostate cancer screening options (ex. PSA, DRE, informed decision making)</td>
<td></td>
</tr>
<tr>
<td>Other cancer screening</td>
<td>Post that discusses another type of cancer screening not listed above.</td>
<td></td>
</tr>
<tr>
<td>Credibility verdicts</td>
<td>Definition</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td><strong>Very high</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accurate</td>
<td>Describes an observation in a way that is consistent with available data and does not leave out any relevant element of context.</td>
<td></td>
</tr>
<tr>
<td>Correct</td>
<td>Contains a well-tested theory/hypothesis that generates expected observations that are confirmed by actual observations.</td>
<td></td>
</tr>
<tr>
<td><strong>High</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mostly accurate</td>
<td>A statement of fact that needs some clarification or additional information to be fully accurate.</td>
<td></td>
</tr>
<tr>
<td>Mostly correct</td>
<td>A well-tested theory/hypothesis is present, but its formulation in the claim might overstate the confidence scientists actually have in the theory, or slightly distort what can be predicted based on the theory.</td>
<td></td>
</tr>
<tr>
<td><strong>Neutral</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imprecise</td>
<td>Uses ill-defined terms or lacks specifics so that one cannot unambiguously know what is meant without making additional unstated assumptions.</td>
<td></td>
</tr>
<tr>
<td>Partially correct</td>
<td>Significantly overstates scientific confidence in a theory.</td>
<td></td>
</tr>
<tr>
<td>Lacks context</td>
<td>Leaves out important information or is made out of context.</td>
<td></td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misleading</td>
<td>Contains an element of truth but leaves the reader with a false understanding of reality, for instance by omitting critical background context.</td>
<td></td>
</tr>
<tr>
<td>Unsupported</td>
<td>Lacks backing from an adequate reference or if the available evidence does not support the statement.</td>
<td></td>
</tr>
<tr>
<td><strong>Very low</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incorrect</td>
<td>Provides an explanation or a theory whose predictions have been invalidated.</td>
<td></td>
</tr>
<tr>
<td>Inaccurate</td>
<td>Makes a statement of fact in direct contradiction with available data.</td>
<td></td>
</tr>
<tr>
<td>Flawed reasoning</td>
<td>Conclusions do not follow from the premises of the claim.</td>
<td></td>
</tr>
</tbody>
</table>
Supplement C. Examples of ways Latinos assessed the credibility of cancer prevention and screening information (CPSI) on Facebook

<table>
<thead>
<tr>
<th>Type of assessment</th>
<th>Description</th>
<th>Exemplary quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive heuristics</td>
<td>These “rules of thumb” and “mental shortcuts” are used to make decisions about content without spending too much cognitive load on the message. These were the most common way participants described assessing CPSI credibility. Many times, more than one heuristic described was used to make inferences on CPSI source and/or content credibility.</td>
<td>For example, look here. This has more than a million likes. So, yes. [...] I don't think they are going to lend themselves to post something that wasn't worth it. (F6B4) [The post] came up here, it came up in several places. We have shared it with some friends and everyone is on the water diet! [...] And there’s feedback with people. (M2B2)</td>
</tr>
<tr>
<td>Endorsement¹</td>
<td>Assessment of credibility based on perceiving information or sources as correct, and thus credible, if others do so as well. Content could be endorsed via online or offline sources.</td>
<td>[The post] came up here, it came up in several places. We have shared it with some friends and everyone is on the water diet! [...] And there’s feedback with people. (M2B2)</td>
</tr>
<tr>
<td>Consistency¹</td>
<td>Assessment of credibility based on validating content by superficially comparing to other sources for consistency. Content could be validated within Facebook, elsewhere online, or by comparing to offline sources.</td>
<td>I wouldn’t have to verify that, girl! I’m clear that [those animals] are sick, the hormones, the way they kill them, they don’t let them rest, they don’t let them eat well... forget it, you don’t have to look that up anywhere. (F11S5)</td>
</tr>
<tr>
<td>Self confirmation¹</td>
<td>Assessments of credibility based on whether content confirms preexisting beliefs or biases, regardless of actual veracity. Many were couched in statements of content credibility being “common sense” or aligning with previous experiences (of self or others).</td>
<td>Honestly, in spite of what [the doctor] might tell me [against the information that lemon can cure cancer], it won’t move me [to change my belief].</td>
</tr>
</tbody>
</table>
For example, I have personal experience. In my house, I planted five lemon seedlings that bared fruit at different times during the year, and I was the only person in Cuba who had lemon all year. I always gave children lemonade. It was always like that, and my children rarely got sick. (M2B2)

People [in the community] listen to him because he is not only… He is in everything… The truth is that he is very efficient, very collaborative and very proactive in all these things. (F5B3)

I know that [my friend] knows that it’s important to have evidence on the “Do’s and Don’ts” of colorectal cancer screening [because she works for the Department of Health]. It [also] has the logo of the American Cancer Society, the National Colorectal Cancer group, so I know – First, [my friend], she’s legit. […] and it also has the logos from two legitimate organizations. (F9E2)

It’s something that I already knew was very healthy. It is one of the healthiest vegetables there is. I make it part of my diet, and there are studies [stating] that it helps prevent or kill bad things, cancer, right? So, just keep it in your diet. (M4B3)

So, as I said, lemon does have a lot of... It’s good for health as an alternative medicine. So, it’s not that [I didn’t check because] it isn’t credible, I just wouldn’t feel like I need to double check because I already know that it is good for you,
applied to many different foods claiming curative properties, which participants generally saw as being okay to incorporate (mainly as prevention) because of the concept that something from nature (i.e. foods, herbs) is generally not harmful to consume. so it could help and it doesn’t hurt. It’s something that it’s not gonna hurt you. It’s not like, “Take this pill, it might help you.” No. If you give me a pill, I’m not gonna try it but if you give me something natural, like an herb or a plant, hey, I’ll try it ‘cause it’s not gonna hurt me. (F3B2)

Expectancy violation

Assessment of content or source as lacking credibility due to cues within a post or website. These could include poor layout and design, typos, videos with computerized voices narrating a topic (rather than a human-like voice). It could also include content that immediately discredited well-established knowledge, such as the effectiveness of mammograms to detect breast cancer. At this point, it was just so ridiculous that it says “cancer prevention” that I was just kinda like... you know, I hope people can distinguish... and maybe it helps with cancer prevention, but the data is not there yet. (F9E2)

Persuasive intent

Assessment of content or source as lacking credibility due to feelings that information may be biased; this is particularly triggered when there is unexpected advertising or other notions of manipulation or mistrust. Look, regardless of who shares it, since it has no sources, I’ll look at it, but it’s not 100% credible. (F6B4)

Cultural credibility

Assigning credibility to a source based on aligning worldviews (i.e. how society should be organized) Not sure if [the website] is recommending a product or something... [looks at article]. See, it has a shop there. I don’t see it to be, say, a beneficial public message, rather as having a personal interest. A commercial interest. (F5B3)

Content verification

Descriptions of processes individuals use to verify the content of CPSI they engaged with on Facebook. These steps were used by a minority of participants; most only discussed how they would verify information if it were important/relevant enough to them. Honestly, people who are from the church, over 40, [they] are not prone to junk or fake things, they post truly interesting things. (M2B2)
<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducting online search</td>
<td>Conducting an online search to verify the content read/watched in a Facebook post. This entailed going to Google to conduct a search on websites like PubMed, WebMD, American Cancer Society, and Wikipedia.</td>
</tr>
<tr>
<td>Verifying url</td>
<td>Visiting linked websites in a post and verifying the end of the website url to see if it came from an official information source (specifically .gov or .edu).</td>
</tr>
<tr>
<td>Verifying credentials</td>
<td>Verifying credentials on the website, Facebook group/page, or post.</td>
</tr>
<tr>
<td>Verifying links/sources</td>
<td>Visiting linked websites in a post or article, and/or verifying sources at the bottom of an article to verify content.</td>
</tr>
<tr>
<td>Unsure of how to verify</td>
<td>Accounts of participants who were unsure of how to adequately verify information, despite wanting to learn how to do so.</td>
</tr>
<tr>
<td>No verification</td>
<td>Reasons explaining why some participants never verify CPSI they engage with on Facebook.</td>
</tr>
</tbody>
</table>

I went and I tried to find peer reviewed *journals and articles* that had anything with this “copaiba” and I was like, “I can’t find anything!” (F9E2)

It’s .gov, from the government. It’s something that you know has research [backing it]. (F3B2)

I would look to see **who Joseph Mercola is and why he is saying** [that mammograms are ineffective against breast cancer]. (F10S4)

When I see an article, I **click on the links. And if it takes me to the right source, with correct information**, then I say, “Well yes, this is an article that came out of here and has a foundation.” Just because an article was written by anyone does not mean that it’s a good and valid article. (F6B4)

I would read it on Facebook and share it, **because I don’t know how else I can know if it’s real or not - if it’s true or not. [...] I’m definitely not 100% sure of what I am reading. I don’t have a way to verify.** (F7S2)

I don’t verify [content], I read, analyze for myself and share it. **I don’t verify. You analyze things by simple logic. It's just logic.** (F8S3)

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\(^1\) Metzger, Flanagin & Medders (*Journal of Communication*. 2010;60[3]:413-439)

\(^2\) Tversky & Kahneman (*Science*. 1974;185[4157]:1124-1131)

\(^3\) Kahan, Braman, Cohen, Gastil & Slovic (*Law and Human Behavior*. 2010;34[6]:501-516)
References


Chapter 8: Integrated Discussion and Conclusion

The overall goal of this dissertation was to explore how Latino adults in the U.S. engage with cancer prevention and screening information (CPSI) on Facebook, one of the most popular social media platforms among Latinos (Smith & Anderson, 2018). Specifically, it aimed to understand how and why Latinos engage with CPSI on Facebook, how they assess the credibility and accuracy of this information (if at all), and how engagement influences subsequent actions. This chapter revisits the findings and contributions of the three manuscripts discussed in Chapters 5-7, which together provide insights for research that explores the intersection of social media and public health. It will first discuss the methodological and theoretical contributions of the dissertation, in light of recent events that have made health misinformation research all-the-more relevant. This is followed by the implications of these findings for the fields of public health and health communication. It will then discuss overall limitations of this study and finalize with an agenda for future research.

Methodological Contributions

This dissertation coincided with a critical moment for research that intersects social media and public health. After the 2016 presidential election, “fake news” became a popular term used to describe (predominantly political) content created to intentionally misinform or deceive readers (Segarra, 2017). While social media’s political misinformation crisis received vast media attention, it was not until late 2018 that health misinformation research became a mainstream public health issue (Chou, Oh & Klein, 2018; Teoh, 2019). The majority of this coverage surrounded vaccine hesitancy and the anti-vaxxer movement (Sommer, 2018; Brice-Saddler, 2019), which had been amplified through platforms like Facebook, Twitter, and Pinterest (Broniatowski et al., 2018; Schmidt, Zollo, Scala, Betsch & Quattrociocchi, 2018;
Guidry, Carlyle, Messner & Jin, 2015) and contributed to an increase in measles outbreaks in 2019 (Fauci, 2019). This tangible public health crisis emphasized the relevance of research that assesses the impact of health (mis)information on public health outcomes. Specifically, it highlighted the importance of developing new methodological approaches that elicit the data necessary to explore these issues.

Research to date has predominantly used quantitative methods to identify the prevalence and trends of misinformation on social media (Del Vicario et al., 2016; Vosoughi, Roy & Aral, 2018; Waszak, Kasprzycka-Waszak & Kubanek, 2018; Sommariva et al., 2018; Törnberg, 2018). However, quantitative social media data have important limitations: (1) they are increasingly difficult to obtain (Schroepfer, 2018), (2) they do not provide important contextual information motivating engagement and dissemination among vulnerable populations with poor health outcomes, and (3) they cannot capture the effects of health (mis)information on behavior. The methodology developed for this dissertation overcame these limitations by accessing data that allowed for the:

- **Contextualization of health (mis)information engagement and how it contributes to subsequent actions.** One of the biggest contributions of the SoCo elicitation method is the ability to explore how individuals engage with information that emerges on their social media, rather than in simulated settings. This allows for research that understands the “real-world” impact engagement with health (mis)information has on individuals. It also allows for an in-depth exploration of important social factors that influence social media engagement, such as cultural values that are common among the Latin American community. Finally, the rich data elicited from each participant through this method allows for a better theoretical understanding of engagement and credibility assessments through data triangulation.
- **Inclusion of lurking behavior in research that takes into account the impact of engagement.** Another important contribution of this methodology is that it provided evidence that assessing engagement by only using standard quantitative measures (i.e. likes, comments, shares) profoundly limits the understanding of the content individuals engage with on social media platforms. This study found that 73% of CPSI engagement occurred by watching/reading content without liking, commenting, or sharing. Furthermore, expanding the definition of engagement to include lurking behaviors led to a deeper understanding of the reasons that Latinos engaged with CPSI, which many times were unrelated to cancer.

- **Understanding that not all misinformation is created equal.** Health misinformation on social media can lead to potentially harmful actions that are not always evidence-based, as was evidenced in this dissertation (Chapter 7, Table 7-3). However, this methodological approach provided insight to instances where engagement with misinformation may not be too worrisome. For example, many participants discussed engaging with posts claiming cancer cures not because of the curative claims, but because they associated specific foods (like lemon and guanábana) with prevention and healthy eating. In this scenario – where none of the participants had cancer – the incorporation of healthy foods (particularly those with cultural relevance) may not have negative health-related ramifications. This is not to say that efforts should not be taken to curtail the spread of health misinformation, especially if these could lead to ill-informed decision making in the future. Rather, using methodological approaches like the SoCo elicitation method may help identify the types of misinformation that contribute to undesirable health behaviors that public health initiatives should prioritize.
Beyond these methodological contributions, the events that took place simultaneous to this dissertation inevitably influenced aspects of data collection and analysis. Specifically, they underscored the importance of exploring both engagement and credibility assessments as influencing subsequent actions. Taking this into account, the following section describes the theoretical contributions of this dissertation for both engagement and credibility.

Theoretical Contributions

Chapters 6 and 7 explored the roles of CPSI engagement and CPSI credibility assessments in subsequent actions. To recapitulate these findings, Chapter 6 suggested that engagement was most common when individuals had personal relationships to the poster; when posts included videos/images; and with content promoting the curative properties of popular Latin American foods. Engagement often led to information-seeking and sharing, discussing content with others, and/or changing health behaviors. However, these actions were oftentimes not evidence-based. Chapter 7 then explored how Latinos assessed the credibility of the CPSI they engaged with on Facebook. These findings highlighted that, despite there being a high volume of misinformation, most participants only assessed information when deemed important/relevant. Cognitive heuristics were oftentimes used to assess CPSI; yet, these assessments were not always accurate and at times led to potentially harmful actions. Combined, these findings suggest that cultural values and other cultural connectors (e.g., language and country of origin) appear to play a salient role in how message factors and source factors influence engagement with CPSI among Latinos, as well as in how some Latinos assess the credibility of such CPSI. Furthermore, both engagement and credibility assessments – as influenced by culture – appear to impact how some Latinos choose to act upon CPSI (if at all). Taking this into account, the following theoretical insights emerged from this dissertation:
- **A more robust conceptualization of engagement is necessary.** As outlined in Chapter 6, this dissertation was only able to identify one model explicitly exploring engagement with content on social media (McCay-Peet & Quan-Haase, 2016, 2017), which places a strong emphasis on individual-level factors of engagement. By expanding the definition of engagement beyond likes, comments, and shares, this dissertation was able to explore important ways that external factors (i.e. source and message factors) also contribute to CPSI engagement among Latinos. It also provided important insights to the role of culture in the process of engagement with CPSI, which is critical to future efforts wanting to successfully promote engagement with evidence-based cancer information. Future models should explicitly incorporate factors external to the individual to better assess engagement on social media.

- **Models that explore engagement and credibility assessments as precursors to action must be developed.** Beyond providing a broader contextualization of what it means to engage with content, this dissertation highlights the importance of developing models that explore the link between engagement and subsequent action. Adequately identifying the ways in which engagement serves as a predictor to subsequent actions – particularly those that focus on behavior change – is instrumental for the successful design of interventions to minimize and halt the uptake of potentially harmful health behaviors triggered by the dissemination of health misinformation. These models should also incorporate different levels of actions, as both online and offline actions were identified in this study.

- **Engagement and credibility appear to be intertwined at the source level.** In combining findings from Chapters 6 and 7, it became evident that there is an important interplay between engagement and credibility. Specifically, the role of
source factors in both engaging with CPSI and deeming it credible (or not) became
difficult to disentangle. This could be partially due to the important role of *familismo*
and *personalismo* in why Latinos trust who is sharing content: these values may be
influencing both why a post becomes relevant enough to engage with, as well as
whether they trust that it is accurate. Nevertheless, this relationship should be further
explored, as it may provide further insights to efforts that effectively curtail the impact
of misinformation in subsequent decision making.

- **Culture influences cognitive heuristics.** An emergent finding of this dissertation was
the importance of cognitive heuristics in how Latinos assess the credibility of CPSI.
Although the dissertation’s proposed conceptual framework (Figure 3-1) correctly
suggested that source credibility plays an important role in CPSI engagement among
Latinos, it did not conceptualize this in light of dual processing models. Dual
processing models, such as the Elaboration Likelihood Model (Petty and Cacioppo,
1986) and Heuristic-Systematic Model (Chaiken, 1987), suggest that information can
be processed centrally or peripherally; the former requires high cognitive elaboration,
while the latter utilizes peripheral cues to assess information. Among the
communication models exploring how individuals assess the credibility of online
information are Metzger’s dual processing model of credibility (Metzger, 2007) and
Sundar’s MAIN model (Sundar, 2008), both of which posit that online credibility
assessments are largely triggered by cognitive heuristics – rather than through
elaborate processing pathways (Metzger & Flanagan, 2013). The MAIN model
specifically discusses heuristic assessments in light of a social media platform’s
unique technological attributes. On Facebook, these may include the way content is
presented in a post (Modality), the person/entity posting content (Agency), the ability
to comment on a post (Interactivity), or the ability to read a linked article within the
platform (Navigability). While our findings are consistent with the notion that heuristics are predominantly used to assess information credibility, they highlight the instrumental role of culture in the heuristic interpretation of source and content credibility. This presents as a novel and important contribution to misinformation research, suggesting that culture should be explicitly included in theoretical models that explore how individuals make credibility assessments online.

**Public Health Implications**

The implications of this dissertation can be grouped into two overarching categories: those related to the effective promotion and delivery of health information on social media, and those related to efforts that effectively curtail health misinformation. While these will be discussed in relation to CPSI and Latino audiences, they can also inform general public health social media initiatives.

*Promoting and delivering CPSI on social media*

As seen in Chapter 6, participants mainly engaged with visually appealing content in Spanish that claimed specific foods (many of which had a cultural connection) could cure cancer. However, reasons for engagement were rarely due to wanting to engage with cancer prevention per say. Some also engaged with content promoting local cancer-related health events tailored to the Latino community, especially if it came from trusted sources within the community or if participants themselves were involved in efforts that promote cancer awareness. Meanwhile, Chapter 7 suggests that Latinos may heavily rely on cognitive heuristics to assess the credibility of CPSI. Combined, these findings recommend that public health programs and non-profit organizations should develop social media campaigns for Latinos that include attention-grabbing images and videos of culturally-relevant content and
activate peripheral (rather than central) processing pathways. These should be available in both languages and should be disseminated through channels the community deems trustworthy. This requires partnerships with community leaders and other community organizations that have a strong social media presence and can mobilize local Latino groups. Finally, public health groups using social media to engage with Latino audiences should consider developing programs that leverage *promotores* and other local Latino leaders to engage with users on cancer prevention and screening campaigns. Seeing trusted sources interact online may promote others to do the same.

*Curtailing cancer prevention and screening misinformation*

This research also has important implications for efforts to curtail the spread of cancer misinformation among U.S. Latinos. Public health researchers and practitioners should develop multi-pronged initiatives that focus on counteracting and correcting misinformation, improving digital health literacy, and establishing collaborations with interdisciplinary researchers and social media platforms. While further detailed in Chapter 7, these initiatives generally suggest:

- Disseminating culturally-tailored narratives that counteract misinformation;
- Delivering content through *promotores* or other trustworthy figures;
- Designing interventions that promote Facebook users to correct each other;
- Developing digital literacy programs that use cognitive heuristics;
- Establishing interdisciplinary, transnational, and multilingual collaborations; and
- Research involvement in platform regulation and monitoring efforts.

On this last point, it is important to emphasize the necessary role of public health researchers and practitioners in advocating for more regulatory transparency and better
platform monitoring. As discussed at the beginning of this Chapter, vaccine misinformation disseminated through social media has influenced lower vaccine uptake and recent measles outbreaks. The 2019 public and media outcry surrounding this issue resulted in social media platforms self-regulating the dissemination of vaccine misinformation on their platforms (Caron, 2019a-b; O’Donovan, 2019). However, this reactive response leaves many questions unanswered, including what makes a public health problem “important enough” to regulate, and in what ways should this content be regulated. Not being a part of these conversations can lead to further mistrust in efforts to curtail misinformation, especially on controversial platforms like Facebook (Grothaus, 2019).

Finally, it is important to acknowledge that addressing cancer misinformation among Latinos (and in general) may prove to be an extremely challenging endeavor. Among the more significant findings of this dissertation is the notion that culturally-bound credibility assessments may be harder to correct, as they appear to be informed by deeply ingrained values. Adequately addressing this public health issue will require interdisciplinary efforts that tackle the underlying reasons that make cancer misinformation appealing, particularly in light of health topics on social media being politicized and weaponized by foreign players (as has been documented with the vaccine debate on Twitter; Broniatowski et al., 2018). These efforts must also be malleable and able to rapidly adapt to constantly-changing platforms, emphasizing the need for dedicated staff to work on social media initiatives.

Limitations

Several limitations to this dissertation must be acknowledged. On a practical level, the method developed for this study is labor-intensive, costly, and requires a detailed data collection and data management protocol. This increases the resources needed to conduct similar research at a larger scale (e.g., financial, staff, training, etc.). Furthermore, given its in-
depth approach to capturing social media data, it may not be appropriate for more sensitive health topics, or for participant populations who may find these methods too strenuous.

Another limitation relates to our sample, which was heavily skewed towards females. The initial goal of the dissertation was to recruit equal numbers of men and women; however, it was difficult to recruit men into the study. This limitation may have excluded important user-related experiences predominant among Latino men from our analysis (e.g., less engagement with specific types of CPSI, as demonstrated by one participant). Furthermore, the dissertation was interested in understanding how Latinos ages 40-75 engaged with and assessed the credibility of CPSI; this may be substantially different from younger populations, as older Americans report being less able to distinguish fact from opinion (Gottfried and Greico, 2018). Finally, by excluding cancer patients/survivors, this study may be missing important reasons that Latinos engage with CPSI and other cancer information. Despite these limitations, the sample was diverse in language preferences and Latin American sub-ethnic groups, which improves the transferability of these findings to Latino Facebook users outside of Tampa, FL (Tobin & Begley, 2004). Future research should explore these other factors to build a more robust conceptual model.

This study asked participants if they recalled seeing and engaging with CPSI that appeared using Facebook’s search feature, as posted by Friends or Groups they follow. This measure of exposure, known as recognition, asks participants to indicate whether they have seen a post before by first showing it to them (Niederdeppe, 2005). Compared to recall measures, which rely on verbal cues only, recognition measures tend to produce higher exposure estimates – particularly when a long period of time has passed (du Plessis, 1994; Stapel, 1998; Singh, Rothschild & Churchill, 1988). While using recognition measures may have reduced overall recall bias, it is important to highlight that most participants (n=12,
60%) only access their Facebook accounts on their cell phone. The visual layout of Facebook’s website version is different to that of its mobile app, which may have impacted the ability of some participants to fully recall whether they saw a post while using the study laptop. Future studies using the SoCo elicitation method may want to explore using a mobile device to collect data. They may also incorporate the newer “Posts you’ve seen” Facebook search filter to minimize recall bias more generally, as self-reported recall may capture only content that people more deeply engaged with, rather than all content to which they were exposed and maybe glanced over (Niederdeppe, 2005).

Finally, the only posts discussed with participants were those that included the search terms somewhere in the text. This inevitably excluded posts that did not contain some kind of text feature (for example, posts with only a picture or a direct link to a video). It also excluded posts that discuss cancer-related topics but do not at minimum include the word “cancer” (i.e. mammogram). However, “cancer” is a popular term that captured a large number of cancer-related posts; in fact, more narrow terms were used in all interviews to hone-in on prevention and screening content (see Chapter 5). Using this term also allowed to see how common CPSI posts were in comparison to other cancer topics (such as treatment and survivorship). Nonetheless, future studies should ensure they have a comprehensive list of search terms that encompass multiple areas of the study topic, while understanding that an increase in search terms adds time and complexity to the interview.

**Future Directions**

This dissertation sets the foundation for a research agenda that more broadly explores engagement with cancer misinformation on social media. This section outlines areas of future research that contribute to health communication theory and public health practice.
Among the main contributions of this work is an in-depth understanding of how and why Latinos without cancer engage with, assess, and act upon CPSI they encounter on Facebook, many of which appears to not be evidence based. It highlights the importance of culture in both engagement and credibility assessments, which at times may lead to subsequent actions. While most of the actions described by participants were not inherently harmful (e.g., incorporating foods into their diet), some could be detrimental (e.g., cancelling a mammogram due to misinformation about it causing breast cancer). These findings serve as an important platform for research that explores the spread and impact of cancer misinformation among Latinos – particularly among cancer survivors who may make treatment decisions based on misinformation, and caregivers or advocates who may promote advice that is not evidence based. This research should also be expanded to include younger Latino audiences and have a broader gender representation.

An ancillary finding of this dissertation was the role of WhatsApp and Facebook Messenger in sharing cancer information consumed on Facebook with others. Multiple participants highlighted using both messaging platforms as instrumental in communicating with other Latinos, many even showing examples of shared messages during the interview. In the U.S., Latinos use WhatsApp more than any other group (Smith & Anderson, 2018), in part because it facilitates communication with friends and family in Latin America by offering free wi-fi messaging services and an easy-to-use interface (Koch, 2019). Future research should look into the mechanisms and motivations for Latinos to engage with and disseminate cancer misinformation across multiple social media platforms, as repeat exposure of misinformation disseminated by close friends and family may reinforce misinformed beliefs.
This dissertation also emphasizes the importance of community leaders and trusted friends/family in why Latinos engage with CPSI, providing empirical support for interventions to integrate the use of *promotores* and other community leaders both in-person and through social media as a way to further empower and engage Latinos. As suggested in Chapter 3, this may include social media initiatives that incorporate Freireian principles of critical consciousness raising and dialogical education when communicating with Latino audiences. Furthermore, as it appears that CPSI engagement was rarely related to a specific interest in cancer prevention or screening, it may be that campaigns and interventions should be tailored and delivered to trusted opinion leaders in the Latino community, rather than to general audiences. Specifically, *promotores* and community leaders could be trained to communicate with Latino audiences online, answering questions about healthcare and cancer screening access, dispelling cancer myths, and engaging in conversations about structural and social barriers to cancer and other important health disparities.

As a nascent area of public health research, future studies should continue to develop theoretical models that better understand health misinformation engagement and its ramifications on health outcomes. Similarly, research should ensure well-established communication models explicitly incorporate the role of culture in their framework, as this appears to play an important role in how information is consumed and further disseminated in an online environment.

Finally, future research should develop theoretical models that account for both individual and structural factors influencing engagement with misinformation. While this dissertation focused on exploring the online and offline health implications of the
content individuals engage with on their social media, it did not focus on how a platform’s structure influences what is seen. Nonetheless, this did emerge in participant interview: when scrolling through content, participants frequently commented on wishing they had seen certain posts that appeared in the search, as they would have engaged with them. This signals the impact of platform infrastructure on engagement – particularly, the role of algorithms in determining what content actually appears on a person’s Facebook News Feed. Future studies may use the SoCo elicitation method to explore content that individuals did not originally see on their News Feed, as this can elicit real-time reactions to content exposure; this approach may be well-suited for studies using eye-tracking software to assess features within a social media post that contribute to engagement with health misinformation. Eliciting unseen content through this method may also help better understand how perceptions of Facebook’s algorithm impact engagement with health misinformation, as recent research suggests that an individual’s perception of how algorithms work influences their civic voice expression on Facebook (Magalhães, 2019).
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Appendices

Appendix A: Recruitment flyers
Appendix B: Screening script
Appendix C: Survey
Appendix D: Interview guide
Appendix E: Post discussion checklist
Appendix F: Full codebook for content analysis
Appendix G: Thematic analysis memos
Appendix H: Participant informational sheet

(Appendices A-D and H were also developed in Spanish)
PARTICIPATE IN A STUDY ABOUT FACEBOOK AND CANCER INFORMATION!

We are looking for participants in a study to better understand how and why Latinos in the U.S. engage with cancer information on Facebook.

Participants will discuss their engagement with cancer posts through 60-90 minute interviews.

YOU ARE ELIGIBLE TO PARTICIPATE IN THIS STUDY IF YOU:

- Self-identify as Hispanic/Latino
- Are between the ages of 40-75
- Use Facebook at least three times a week
- Do not have a history of cancer
- Know someone who had cancer or is a cancer survivor

Upon study completion, you will be compensated with a $50 VISA gift card for your time.

IF YOU WOULD LIKE TO PARTICIPATE IN THIS STUDY, PLEASE CONTACT US AT 787-529-9015 OR VIA EMAIL AT YRIVERA2@JHU.EDU
Facebook ad text

Headline: Participate in a study about Facebook and cancer information!

Destination: Facebook Page for Study Ad
*This is a requirement to set-up Facebook ads. This page will replicate the same study ad text below.

Text:

We are looking for individuals to participate in a research study to better understand how and why Latinos in the U.S. engage with cancer information on Facebook. Examples of engagement include liking a cancer post, commenting on a cancer post, and sharing a cancer post with others. Participants will discuss their engagement with cancer posts through 60-90 minute in-person interviews with a public health researcher.

You are eligible to participate in this study if you:
• Self-identify as Hispanic/Latino
• Are between the ages of 40-75
• Use Facebook at least three times a week
• Do not have a history of cancer
• Know someone who had cancer or is a cancer survivor

If you would like to participate in this study, please contact us at 787-529-9015 or via email at yrivera2@jhu.edu. Upon study completion, you will be compensated with a $50 VISA gift card for your time.
Appendix B: Screening script

Recruitment Screening Script

[Participant will initiate call – responses recorded on spreadsheet]

Hi! I am Yonaira Rivera, from Johns Hopkins Bloomberg School of Public Health. Thank you for your interest in participating in our research study to better understand how and why Latinos in the U.S. engage with cancer information on Facebook! What is your name? [Record response]. [Name], it’s a pleasure to meet you!

This is a research study that wants to learn about how Latinos learn about cancer prevention and screening information on Facebook. We want to learn how and why Latinos engage with cancer information on Facebook. We also want to learn how Latinos determine if the cancer information they read is trustworthy. We also want to know if Latinos make any decisions based on the cancer information they read on Facebook – for example, sharing the information with others, or scheduling an appointment with a doctor.

Before being able to participate, I need to ask you some questions to see if you qualify for our study.

First, can I ask you how you learned about our study? [Record response]. Thank you.

Great – now let me ask some additional questions: [Record on spreadsheet]

- What is your language preference – English, Spanish or both equally? (Recruiting up to five men and five women in each category)

If participant is ineligible because quota has been met:
At this time, you are not eligible to participate in our study because we have met our quota. Thank you for your interest, and have a lovely day.

If participant is eligible:
- Do you identify as Latino or Hispanic? (Must say yes)
- How old are you? (Must be between 40-75)
- Do you have a Facebook account? (Must say yes)
  - If yes: On average, how often do you use your Facebook account every week? (Must use FB at least three times a week)
- Have you ever been diagnosed with cancer? (Must say no)
- Do you know anyone who had cancer or is a cancer survivor? (Must say yes)

If participant is ineligible:
At this time, you are not eligible to participate in our study. Thank you for your interest, and have a lovely day.
If participant is eligible:
Great! You are eligible to participate in our study. Now, we need to set up some time to go over the consent process in person. The consent process is done to explain the study to you in more detail and answer any questions you may have before starting our research. If you agree to participate once the consent process is complete, we will then conduct the interview. This entire process will take approximately two hours.

In order to set up an appointment, I need to know where are you located – Hillsborough county or Pinellas county? (This will allow identifying the interview location)

Great. The interview would be held at [location]. What is your availability like the following dates? [Provide options].

Excellent! Just to confirm, we will be meeting on [date] at [time] at [location]. I will call you the day before our appointment to remind you. Please feel free to contact me if you have any questions before this time. Again, my name is Yonaira Rivera and my number is 787-529-9015.

Do you have any last questions before we hang up? (Address concerns, if any.)

Thank you for your time! See you on [date]. Have a lovely day!

**For any callers that are ineligible, delete name and identifying contact information from spreadsheet; replace name with “Ineligible”.

**For any callers that are eligible, delete name and identifying contact information from spreadsheet once consent/interview is conducted; replace name with participant ID.
Appendix C: Survey

Participant ID: _________________________  Date: _________________________

Please answer the following survey questions to the best of your ability.

**Demographic questions**

1. Age: __________

2. Gender:
   - □ Male
   - □ Female

3. Marital status:
   - □ Single
   - □ Married
   - □ Separated
   - □ Widowed
   - □ Divorced
   - □ Prefer not to answer

4. Total household income (before taxes) during the past 12 months:
   - □ Less than $25,000
   - □ $25,000 to $34,999
   - □ $35,000 to $49,999
   - □ $50,000 to $74,999
   - □ $75,000 to $99,999
   - □ $100,000 to $149,999
   - □ $150,000 or more
   - □ Prefer not to answer

5. What is your education level?
   - □ Less than high school
   - □ Completed some high school
   - □ High school graduate
   - □ Completed some college
   - □ Associate degree
   - □ Bachelor's degree
   - □ Completed some postgraduate
   - □ Master's degree
   - □ Ph.D., law or medical degree
   - □ Other advanced degree beyond a Master's degree
   - □ Prefer not to answer

6. Employment status:
   - □ Full-time
   - □ Part-time
   - □ Unemployed
   - □ Retired
   - □ Prefer not to answer

7. What kind of health insurance do you currently have?
   - □ Private insurance
   - □ Medicare
   - □ Medicaid
   - □ Military health care (i.e. VA)
   - □ County health program
   - □ Uninsured
   - □ Other: _________________________
   - □ Prefer not to answer

8. Where were you born?
   - □ U.S. born (includes Puerto Rico)
   - □ Born outside of U.S.: _________________________
     - Length of time in U.S.: _________________________

9. Latin American country(ies) of origin: _________________________
### Language preferences

Please circle the number which best describes your social and language preferences.

<table>
<thead>
<tr>
<th>Question</th>
<th>Only Spanish</th>
<th>Spanish better than English</th>
<th>Both equally</th>
<th>English better than Spanish</th>
<th>Only English</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. In general, what language(s) do you read and speak?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11. What was the language(s) you used as a child?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. What language(s) do you usually speak at home?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13. In which language(s) do you usually think?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14. What language(s) do you usually speak with your friends?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>15. In what language(s) are the T.V. programs you usually watch?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>16. In what language(s) are the radio programs you usually listen to?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>17. In general, in what language(s) are the movies, T.V. and radio programs you prefer to watch and listen to?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>18. Your close friends are:</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19. You prefer going to social gatherings/parties at which people are:</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20. The persons you visit or who visit you are:</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>21. If you could choose your children’s friends, you would want them to be:</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Cancer prevention and screening

22. Select all the lifestyle behaviors that apply to you:
   □ I have never smoked
   □ I quit smoking
   □ I exercise at least 150 minutes a week at moderate intensity, or 75 minutes a week at vigorous intensity
   □ I eat at least 2½ cups of vegetables and fruits each day
   □ I limit the amount of red meat and processed meats
   □ I whole grains instead of refined grain products
   □ I drink less than 1 alcoholic beverage a day (women)/2 alcoholic beverages a day (men)
   □ I use sunscreen of SPF 15 or higher regularly/when I am outdoors

   Height: ________
   Weight: ________

23. Have you ever had a screening test for any of the following cancers? Select all that apply:
   □ Breast cancer (i.e. mammogram)
   □ Colon cancer (i.e. colonoscopy, sigmoidoscopy)
   □ Prostate cancer (i.e. PSA, digital rectal exam)
   □ Cervical cancer (i.e. Pap test)

24. Do you have any chronic health conditions? Select all that apply:
   □ Diabetes
   □ High blood pressure
   □ Heart disease
   □ COPD
   □ Other: ________________

25. How many friends do you know who have had a cancer diagnosis? ________________

26. How many family members do you know who have had a cancer diagnosis? ________________

Health-related information seeking

27. Have you ever looked for information about health or medical topics from any source?
   □ Yes
   □ No

28. The most recent time you looked for information about health or medical topics, where did you go first?
   □ Books
   □ Brochures, pamphlets, etc.
   □ Cancer organization
   □ Family
   □ Friend/Co-worker
   □ Doctor or healthcare provider
   □ Internet
   □ Library
   □ Magazines
   □ Newspapers
   □ Telephone information number
   □ Complementary, alternative, or unconventional practitioner
29. The most recent time you looked for information about health or medical topics, who was it for?
   □ Myself
   □ Someone else
   □ Both myself and someone else

30. Have you ever looked for information about cancer from any source?
   □ Yes
   □ No

31. In the past 12 months, have you used the Internet to look for cancer information for yourself?
   □ Yes
   □ No

**Facebook use**

32. Where do you access your Facebook account? (Select all that apply)
   □ Computer/laptop
   □ iPad or tablet
   □ Smartphone (iPhone, Android, etc.)

33. How often do you check your Facebook account?
   □ Multiple times a day
   □ Once a day
   □ At least 3 times a week
   □ Less than 3 times a week

34. Why do you use Facebook? (Select all that apply)
   □ Social interactions
   □ To search for information
   □ To pass time/Boredom
   □ Entertainment
   □ Relaxation
   □ Communicatory utility
   □ To express opinions
   □ Convenience
   □ To share information
   □ To see what others are doing
   □ Advocacy
   □ To share/maintain my cultural identity
   □ Other: ______________________

**The following will be recorded after logging onto your Facebook account:**

35. Total Facebook friends: _________

36. Total Facebook groups followed: _________

37. Total Facebook Pages followed: _________

38. Total cancer Facebook groups followed: _________

39. Total cancer Facebook Pages followed: _________

**Semi-structured follow-up questions**
Tell me about how you use Facebook on a regular day.
• What do you normally do when you log on?

Tell me about the kind of things that you normally see on your NewsFeed.
• What kind of things do your Friends post?
• What kind of things do you see from the groups you follow?
• What kind of things do you see from the Pages you follow?

How often do you see information about health topics on your NewsFeed?
• Are there any Friends, groups or Pages that post a lot of health information?
• What kind of health information do you normally see on your NewsFeed?

How often do you see information about cancer topics on your NewsFeed?
• Are there any Friends, groups or Pages that post a lot of health information?
Appendix D: Interview guide

Semi-structured interview guide

Participant will log on to their Facebook (FB) account and enter the word “cancer” in the search bar. This will show all the posts with the word “cancer” that appeared on their NewsFeed. The following questions will be asked for all posts the participant remembers seeing within the last six months, or until they recall engaging with a minimum of five posts (whichever comes first). Main questions are listed first; probes are listed as bullet points.

Define the following terms for the participant:
- **Engagement**: To like, comment on and/or share a post; To click on the link in the post; To read an article linked to a post; To watch a video within a post
- **Action**: To do something with the cancer information you engaged with (for example, share with other friends, discuss information with a medical provider, schedule a screening exam)

**For each post:**

Do you remember seeing this post?
- If not, go to next post.

Do you remember engaging with this post?
- If not, ask why not and proceed to next post.
- If so: What do you remember doing with the post?

Tell me what you think about the message in the post.
- What do you like/dislike about the post?
- What are your favorite things about the post?
- Is there anything in particular that grabs you attention? Why?
- If the post has any links or videos:
  - Do you remember watching the video/clicking on the link to read the information?

Tell me about the person/group/Page that posted this information.
- If FB Friend:
  - How do you know this person?
  - What is your relationship like with this person on FB? Outside of FB?
  - Is this person someone you trust for information? What kind of information?
  - Does this person post a lot of information on FB in general?
  - Does this person post a lot of cancer information on FB?
  - Is this person a cancer survivor?
  - Is there anything else you would like to tell me about your relationship with this person and how you interact with them on FB?
- If FB Group:
  - What kind of FB group is this?
  - Why do you follow this FB group? What do you like about it?
  - Do you trust this FB group for information? What kind of information?
  - Does this FB group post a lot of information in general?
  - Does this FB group post a lot of cancer information?
  - Is this a FB group about cancer topics?
Is there anything else you would like to tell me about your relationship with this FB group and how you interact with it?

If FB Page:
- What kind of FB Page is this?
- Why do you follow this FB Page? What do you like about it?
- Do you trust this FB Page for information? What kind of information?
- Does this FB Page post a lot of information in general?
- Does this FB Page post a lot of cancer information?
- Is this a FB Page about cancer topics?
- Is there anything else you would like to tell me about your relationship with this FB Page and how you interact with it?

Tell me some of the reasons you decided to engage with this post.
- Why do you believe you liked/commented/shared the post?
- Why did you watch the video/read the information in the link?

Tell me about the credibility of the person/group/Page who posted the information.
- Do you consider the person/group/Page who posted the information credible? Why?
- Do you believe this post and the information in it is credible? Why?

Did you do anything to verify the information in the post is accurate? What did you do? Why?
- How do you know that the information posted on FB is accurate?

After engaging with the post, what did you do with the information?
- Did you do anything on FB to share the information with others?
- Do you remember reading any articles or joining any other FB groups or Pages because of the information?
- Did you do anything outside of FB to share the information with others?
- Did you take any actions related to the information you read in the real world?

Is there anything else you want to tell me about how and why you engaged with this post?

After completed, take the participant to the research project’s FB Page and show them three standardized cancer posts. The following questions will be asked for all three posts.

What do you like/dislike about this post?

What do you think about the person/group/Page that posted this information?

Do you consider the person/group/Page who posted the information credible? Why?

Do you believe this post and the information in it is credible? Why?

How would you verify the information in the post is accurate?

Do you believe you would engage with this post? Why or why not?
- How would you engage with this post?
### Appendix E: Post discussion checklist

| ID: Audio length: Audio=Video: Video length: |

---

**Notes during Facebook utilization discussion**

---

**Total Friends:**

**Total Groups:**

**Total Cancer Groups:**

---

**General Scrolling Notes**

---

**Scrolling term:**

**Post 1 Description:**

**Post Comments:**

**Video Timestamp:**

**Engagement type**

- Like
- Comment
- Share
- Read post
- Clicked link
- Read link content
- Watched video/image
- Saved

**Message type**

- Text
- Image
- Video
- Link
Other:

**Type of post**
Testimony
Information
Other:

**Cancer topic type**
Prevention
Screening
Other:

**Cancer topic**
Diet
Alcohol
Exercise
Obesity
Tobacco
SPF
Mammogram
Sonomammogram
Colonoscopy
Sigmoidoscopy
PSA
DRE
Informed decision making
Other:

**Language**
English
Spanish
Both

**Message source**
Friend
Group:
Page:
Friend of Friend – public post liked by friend

**Credibility verification**

**Action taken**
## Appendix F: Full codebook for content analysis

<table>
<thead>
<tr>
<th>Topic</th>
<th>Codes</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POST FEATURES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post type</td>
<td>Text</td>
<td>The post contains text.</td>
</tr>
<tr>
<td></td>
<td>Image</td>
<td>The post contains at least one image.</td>
</tr>
<tr>
<td></td>
<td>Video</td>
<td>The post contains at least one video.</td>
</tr>
<tr>
<td></td>
<td>Link to external content (image)</td>
<td>The post contains a link to an outside article. The image is part of the hyperlink, not a stand-alone image. For example, it may be a link to a news article that has an image embedded.</td>
</tr>
<tr>
<td></td>
<td>Link to external content (no image)</td>
<td>The post contains a link to an outside article. The hyperlink does not contain an image.</td>
</tr>
</tbody>
</table>
| | Combination of features* | The post contains a combination of features described above. For example, it might be a post someone shared that has an image and video, as well as user-generated text above it. **For example, if the post has text AND a video, select:**  
  - Text  
  - Video  
  - Combination of features |
<p>| <strong>Post language</strong> | Spanish | The post content is in Spanish. |
| | English | The post content is in English. |
| | Both | The post content contains both languages. This code excludes the language of any comments. |</p>
<table>
<thead>
<tr>
<th>Topic</th>
<th>Codes</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>POST SOURCE</td>
<td><strong>Source type</strong></td>
<td><strong>News agency</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The post was disseminated by or from a news agency (ex. CNN, NYTimes, Fox News, local news). This would include a Facebook Page from this kind of organization.</td>
</tr>
<tr>
<td></td>
<td><strong>Health or cancer organization</strong></td>
<td>The post was disseminated by or from a health or cancer organization (ex. NCI, CDC, ACS, Moffitt Cancer Center, health department, hospital). This would include a Facebook Page from this kind of organization. Include healthcare providers and health insurance (ex. Medicaid).</td>
</tr>
<tr>
<td></td>
<td><strong>Community organization/non-profit</strong></td>
<td>The post was disseminated by or from a community or non-profit organization not necessarily related to cancer. This would include a Facebook Page from this kind of organization.</td>
</tr>
<tr>
<td></td>
<td><strong>Blog, personal or unofficial website</strong></td>
<td>The post was disseminated by or from a blog, personal website or unofficial site claiming to be health-related. This would include a Facebook Group or Page from this kind of website, if identifiable. For example, Mercola.</td>
</tr>
<tr>
<td></td>
<td><strong>Special interest Facebook Group/Page</strong></td>
<td>The post was disseminated by or from a special interest Facebook Group or Page that does not fall within the other categories. For example, a Facebook Group about health remedies that has a post that cannot be tracked to any of the other source.</td>
</tr>
<tr>
<td></td>
<td><strong>General user</strong></td>
<td>The post was disseminated by a general Facebook user in that group.</td>
</tr>
<tr>
<td></td>
<td><strong>Other</strong></td>
<td>The source shared or reposted is other - i.e. radio, TV show.</td>
</tr>
<tr>
<td>Topic</td>
<td>Codes</td>
<td>Definition</td>
</tr>
<tr>
<td>-------</td>
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<td>------------</td>
</tr>
<tr>
<td>POST CONTENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informational</td>
<td>The post and/or link is providing information about a cancer topic. This doesn’t need to be accurate information; rather, it is stating what to do to prevent, screen, or treat for cancer, or any other information about a topic related to cancer. This would include news articles that are describing a new research finding, etc.</td>
<td></td>
</tr>
<tr>
<td>Recipe/Diet tips/Advice</td>
<td>The post is sharing a specific dietary tip, recipe or advice. Must include a description about a recipe or dietary advice, not just stating a food.</td>
<td></td>
</tr>
<tr>
<td>Chain message</td>
<td>The post is a chain message (ex. prayer chain, dietary remedy chain, etc.). Includes requests to share, post, copy/paste, etc.</td>
<td></td>
</tr>
<tr>
<td>Health event</td>
<td>The post is sharing information about a cancer-related local health event (ex. charlas, free screenings).</td>
<td></td>
</tr>
<tr>
<td>Opinion/Question</td>
<td>The post is sharing an opinion or a question about a cancer-related topic. This is different from an informational post, because you can tell that the person is giving their opinion about a topic, rather than stating information as a “fact” (regardless of its veracity).</td>
<td></td>
</tr>
<tr>
<td>Solidarity/Testimony</td>
<td>The post shares the testimony of a cancer patient/survivor or caregiver, and/or is sharing a message of solidarity with cancer patients/survivors, caregivers, or the cause. Any posts related to advocating or fundraising for cancer would fall here as solidarity with the cause.</td>
<td></td>
</tr>
<tr>
<td>Prayer/Spirituality</td>
<td>The post is sharing a prayer, asking for prayer, or alluding to spirituality.</td>
<td></td>
</tr>
<tr>
<td>Conspiracy</td>
<td>The post is claiming a conspiracy about current cancer best practices or other evidence-based approaches. May include comments about Big Pharma, etc.</td>
<td></td>
</tr>
<tr>
<td>Celebrity</td>
<td>The post highlights a celebrity advocating for cancer survivors/patients or the cancer cause, or sharing their personal story in their fight against cancer.</td>
<td></td>
</tr>
<tr>
<td>Recruitment</td>
<td>The post is recruiting participants to a cancer research study.</td>
<td></td>
</tr>
<tr>
<td>Cancer content type (general)</td>
<td>Prevention</td>
<td>Post about prevention. This includes anything related to diet that claims a preventive property. Include if the post mentions prevention, even if it mostly refers to treatment.</td>
</tr>
</tbody>
</table>
### (Select all that apply)

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening</td>
<td>Post about screenings.</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Post about cancer diagnosis.</td>
</tr>
<tr>
<td>Treatment</td>
<td>Post about treatment. This includes anything related to diet that claims a curative property. This would exclude treatments in clinical trials.</td>
</tr>
<tr>
<td>Survivorship</td>
<td>Post about survivorship, survivors. This would include any request for prayers for a survivor.</td>
</tr>
<tr>
<td>Research</td>
<td>Post about research or novel topics related to cancer. Novel screenings or treatments in clinical trials, etc. would go here.</td>
</tr>
<tr>
<td>Advocacy/Fundraising</td>
<td>Post advocating for cancer issues and/or requesting funds for cancer patients/survivors or cancer initiatives/topics.</td>
</tr>
<tr>
<td>Cancer disparities</td>
<td>Post discussing topics related to cancer health disparities. This may include lack of access to treatment or screenings, sociopolitical disparities, barriers to care, racial/ethnic disparities, etc.</td>
</tr>
<tr>
<td>General cancer information</td>
<td>Post about general cancer information that isn’t specific to the other areas coded. This would include risk factors, stats, etc.</td>
</tr>
<tr>
<td>Remembrance</td>
<td>Post about individuals who died from cancer.</td>
</tr>
</tbody>
</table>

### CPSI sub-topic (specific)

<table>
<thead>
<tr>
<th>Sub-topic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food/Diet</td>
<td>Post about diet or foods that claim cancer prevention or treatment properties. Includes anything that talks about food, not just preventive foods.</td>
</tr>
<tr>
<td>Alcohol</td>
<td>Post about alcohol related to cancer.</td>
</tr>
<tr>
<td>Exercise</td>
<td>Post about exercise related to cancer prevention.</td>
</tr>
<tr>
<td>Obesity</td>
<td>Post about obesity related to cancer prevention.</td>
</tr>
<tr>
<td>Tobacco/E-cig</td>
<td>Post about tobacco and/or e-cigarettes related to cancer prevention.</td>
</tr>
<tr>
<td>SPF</td>
<td>Post about using SPF to protect against skin cancer/sun exposure.</td>
</tr>
<tr>
<td>Vaccine</td>
<td>Post about vaccines that prevent cancer.</td>
</tr>
<tr>
<td>General prevention/healthy lifestyle</td>
<td>Post about prevention and healthy lifestyles that are very general, or that cover multiple prevention topics, making it difficult to discern.</td>
</tr>
<tr>
<td>Natural remedy/treatment</td>
<td>Post that describes a natural remedy or treatment that goes beyond just mentioning food/diet. May or may not include a food, but explicitly states that it is a remedy/treatment. Includes supplements.</td>
</tr>
<tr>
<td>Breast cancer screening</td>
<td>Post that discusses different types of breast cancer screening options (ex. Mammograms)</td>
</tr>
<tr>
<td>Colon cancer screening</td>
<td>Post that discusses different types of colorectal cancer screening options (ex. Colonoscopy)</td>
</tr>
<tr>
<td>Screening Type</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Prostate cancer</td>
<td>Post that discusses different types of prostate cancer screening options (ex. PSA, DRE, informed decision making)</td>
</tr>
<tr>
<td>Other cancer screening</td>
<td>Post that discusses another type of cancer screening (ex. Skin cancer screening, etc.)</td>
</tr>
<tr>
<td>General screening</td>
<td>Post that talks about cancer screening in general. It either doesn’t have a specific type of cancer it is referring to, OR it mentions more than one type of cancer that can be screened.</td>
</tr>
</tbody>
</table>

**CREDIBILITY ASSESSMENT**

<table>
<thead>
<tr>
<th>Question</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the post lack links to the original study?</td>
<td></td>
</tr>
<tr>
<td>Is information inconsistent with the prevention or screening guidelines recommended U.S. cancer organizations (CDC, NCI, ACS, PHSPTF)?</td>
<td></td>
</tr>
<tr>
<td>Does the post make any sensationalist claims? For example, curing cancer in 24 hours.</td>
<td></td>
</tr>
<tr>
<td>Does it oversimplify claims? For example, saying that a healthy diet is all that is required to prevent cancer; it attributes too many cures to one “miracle” food.</td>
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</tbody>
</table>
Appendix G: Thematic analysis memos

Memo 1: Emergent themes describing how individuals assess the credibility of cancer prevention and screening information (CPSI) they engage with on FB (Work-in-Progress)

These are my (messy) thoughts regarding how people assess the credibility of the cancer prevention and screening information they engage with on Facebook. I first started by coding for the ways people described assessing CPSI, then looking at which of these descriptions were about a process they actively use (if/when they do) versus when they described using cues/inferences to do so. In a gist, I’m seeing that:

- People mainly use rules of thumb to assess credibility (the vast majority of this memo relates to this)
  - Multiple heuristics were sometimes used for the same post (consistent with literature)
  - Using heuristics isn’t always a bad thing (consistent with literature)
- Only if/when important enough, do they actually verify information (consistent with literature)
- Sometimes engaging with content leads to some action

These findings line up well with literature on cognitive heuristics, although I didn’t explicitly code for different heuristics discussed in digital media literature (Chaiken, 1987; Sumar, 2008; Metzger & Flanagin, 2013). Overall, though, they could be categorized and described in that capacity (maybe in a table, or just listed and have the definitions in the codebook – see pg.4)... but I've also been thinking about them in another way that is less about what type of heuristic, and more about whether these heuristics have to do with the message, the source, and/or the audience. That's where I think it gets a little interesting and I'd like to discuss. But first, some quick information to put this into context:

- Based on my understanding the literature surrounding cognitive heuristics as applied to persuasive messages and/or online information, people use heuristics related to the source or the content to make credibility assessments. This gets a bit complicated on social media platforms, because it's not just about one source, but multiple sources that can play a role in source credibility (for example, the person posting versus the news agency sharing the information). This hasn't been really looked at from the perspective of cultural norms for sub-ethnic groups in the US, which may play a role in the way that people make credibility assessments – especially when they are consuming health information on platforms that are very popular because they are a way to keep in touch with family, identify with your culture/heritage, and stay informed on issues related to your country of origin in your language. These reasons to use platforms, as highlighted by UGT, may play a role in credibility assessments of health information. (There are also the affordances that using Facebook provides Latinos -like communicating with family outside of the country-, but these will be discussed in the other paper.)
- Anyway, all this is to say that, given there are some reasons that have nothing to do with health or cancer information that get Latinos to use Facebook (and encounter a lot of information they were not looking for on the platform), they may rely on heuristics for reasons that have less to do with content, and more to do with the source or their identity – especially if they use the platform as a way to connect with “home”.
- I'm currently looking at whether there is an important difference when looking at heuristics used to make assessments of low vs high cred
Now, when we think about the factors that are important in a persuasive message, we can think about factors related to the *message* (the actual content), factors about the *source* ("who" is sharing it), and factors about the *audience* (who is receiving it). When I think about this in the context of what I’m seeing in the data, I think there are two ways to see it: (1) heuristics as being influenced by message/source/audience factors - OR - (2) heuristics as a way to understand message/source/audience factors.

1) When you think of heuristics as being influenced by message, source and/or audience factors, it really lets you think more about where these assessments are coming from. In this scenario, when you map the ways in which people describe making credibility assessments using heuristics, most of them would fall under *audience factors* that make a message appealing. What I mean by this is that they were obviously making an assessment about the credibility of the information contained in the post (which would be the unit I consider the message – i.e. the whole post), but this assessment had to do with either previous experiences informing knowledge - or - their identity. The experiences they pulled from could either be personal (formal or informal) or based on others’ (a testimony, for example). Identity seems new, though. Haven’t seen yet in the literature. This would look something like:

There are also factors related to the source that go beyond the relationships/experiences a person may have with others (which, in this conceptualization, end up really getting to how one pulls from your previous knowledge from your own or others’ experiences). This would relate to the authority of a source (which we know is an important feature in assessing credibility). This authority can be about how a person perceives the original content source (i.e. a news agency) or a person posting it (i.e. a community leader or a doctor). However, in this case, it’s about their perceived authority in being knowledgeable about the content. Where it gets fuzzy is that a person can perceive someone as an authority source because they shared their testimony with them – so that would in a way pull from both source and audience… does that make sense?
Finally, sometimes it’s just about the message – what visual cues within a post give someone an understanding of credibility (regardless of audience or source factors). For example, if there are a lot of likes or comments, or if the content is recognizable. The struggle I’m having with this is that you could argue that even at this level, it’s about the things that an individual brings with them into that assessment… a “rule of thumb” they already learned. Similarly, it might be hard to tease out because, in this sample, most content was shared/reposted/liked by FB friends.

2) Another way to look at all of this is less from “at the end of the day, everyone uses their knowledge, so it’s mainly about audience factors” and more about “what is the reason to apply the heuristic(s) – is it putting an emphasis on the content, is it putting an emphasis on the source, or is it about how you use your identity to make sense of it?”

In this scenario, using heuristics to make sense of the message would be about what you see/read. For example, you would see repeating posts/viral posts, posts that have content that relate to your previous knowledge or posts that appeal to your logic or common sense. Repetition refers to comments where the participant says they have seen the content in that post multiple times, so it makes sense it would be credible; previous knowledge refers to using what they already know (formal or informal) to make assessments about the credibility of the message; and logic/common sense get to comments where people use their common sense to make inferences on credibility (e.g., “It makes sense that if you squeeze a breast with cancer, that it would explode and spread elsewhere”). Then, you would use heuristics to assess the credibility of that content based on your knowledge/opinion.

Second, there is using heuristics to make sense of the credibility of the source – it doesn’t so much matter the content, but that you trust who shared it that matters. This gets to the relationship layer much more than anything related to the message – it has to do with how you view the relationships you have and how these plays into credibility. This gets to how
much you trust the FB friend who posted the content, or how you pull from people’s anecdotes or shared experiences to shape how you view the credibility of the content.

Lastly, there is using heuristics that have to do with who you are as a person – things related to your identity that have a weight on things you associate to a post being credible or not. This may include making inferences on credibility because the content is related to your culture or heritage, because it aligns with your religious or spiritual beliefs, or because it is tied to personal experiences that have to do with parts of your identity. *Note: under this application of heuristics, I’m having a hard time in categorizing where a personal experience goes – does this have to do with part of your identity/sense of self, or does it have to do with how you interpret content? Or can it go under both… and does it ultimately matter?

3) Then, of course, there’s just looking at the heuristic(s) and not worrying about mapping them onto anything. These would probably look like what Metzger and Flanagin describe:

- Reputation heuristics (recognition of source; authority of source)
- Endorsement heuristics (trust because of others; social endorsement)
- Consistency heuristics (consensus; repetition; agreement elsewhere – other platforms, too)
- Self-confirmation heuristics (preexisting beliefs; opinions; attitudinal consistency; logic?)
- Expectancy violation heuristics
- Persuasive intent heuristics
- Would need to add a few things related to identity…
  - Affect heuristics… (cultural values/norms)
- Availability heuristics might also be added (Kahneman & Tversky 1982)… for stories… cultural values…
- What about relationships and the value of the closeness of an experience to someone’s testimony/anecdote?

However, I think something gets a little lost when you do this, because it removes the layer of culture/identity that I think is quite important with how Latinos talk about this kind of information. This could easily be just included in the codebook and in a table listing the types of heuristics used – although idk if it’s necessary?

Two full “heuristic models” side-by-side:
1) Heuristics as influence by message/source/audience factors:

Factors influencing one's use of heuristics to assess credibility:

- Audience factors:
  - Previous knowledge
  - Formal
  - Informal
  - Religion/Spiritual
  - Personal experience
  - Logic/Common sense
  - Others' experiences
  - Identity
  - Heritage
  - Family
  - Opinion
  - Professional
  - Community/Opinion leader
  - Others' experiences/anecdotes

- Source factors:
  - Authority
    - Formal
    - Informal
    - Professional
    - Community/Opinion leader
    - Others' experiences/anecdotes

- Message factors:
  - Virality
    - Likes, etc.
  - Presence of recognizable images
    - Logo
    - Organization
    - Image/Video
  - Repetition in seeing post
Beyond this, there are descriptions related to how individuals verify the content they are consuming, whenever they do/if at all. This includes describing a process to verify information online (but off Facebook) – such as comparing information to other sources, conducting an internet search, asking a healthcare provider or a friend, visiting medical websites, and/or verifying credentials. It may also rely on seeing cues in the content (another form of heuristics), such as recognizing the logos of credible health/cancer organizations, a credible news agency, the presence of links and original sources, and/or specific url endings (.gov, .org, .edu).

Of note is that this only happened when information was important enough to search for more. This is consistent with Johnson’s Comprehensive Model for Information Seeking, which posits that antecedents, previous knowledge and other factors influence whether a person will search for additional health information.

*Inherent trust in the system among some… doesn’t make since that someone would lie – if it’s on FB, someone must have verified it.*
Preliminary coding/theme breakdown – this aligns more with the second model. Just so you can get a sense of some of the quotes and ideas.

**Credibility assessment** (RQ 2)

**Cognitive heuristics**: Utilization of cognitive heuristics to assess the credibility of CPSI. These “rules of thumb” are used to make decisions about content without spending too much cognitive load on the message. (See Chaiken, 1987).

Many times, more than one heuristic described was used to make inferences on CPSI credibility (i.e. a person could use message and relationship heuristics to assess the credibility of the same CPSI). Example:

*F7S2*: Además, mi abuelita siempre decía que la remolacha subía la hemoglobina y no sé qué más. Entonces, es como que uniendo una cosa con la otra. Las abuelitas lo decían y no sabían el por qué. Ahora oyes y lees el artículo no sé cuantos años después y te siguen diciendo que la remolacha, pero creo que a esta generación ya le gusta saber el por qué de todo ¿no? En qué se basa... Entonces ahora sigue siendo la misma remolacha, pero ya sabemos por qué tiene ese beneficio.

*Y.R.:* So, the fact of that it can relate to your abuela and to the previous times and that today it’s still being heard, does that give it some credibility in your mind?

*F7S2*: Sí, porque eso como que - esa es como que acaban de decir que antes lo hacían porque te lo decían tanto y ahorita es verificando que tenían razón porque ya se sabe el por qué, ¿no? Yo creo que ellas tampoco sabían el por qué. Ellas simplemente lo oyeron de sus mamás o sus abuelitas y verificaron que era bueno porque les hacía el efecto; pero no sabían como tal el contenido de cada cosa.

**Content-related heuristic (message factors)**: Heuristics used to make inferences about the credibility of CPSI based on content features in post. These included repetition of similar content, consonance with previous knowledge/opinions, and logic/common sense.

**Repetition:**

*M*e entró por aquí, entró por varias partes, lo hemos compartido con algunos amigos y todo el mundo está con la dieta del agua. [...] Y hay un feedback con la gente. (M2B2)

*Sí, en ese caso, por ejemplo, mira aquí. Tiene más de un millón de likes. Entonces, sí. Es... es reconocida y no creo que se vayan a prestar a subir una cosa que no valió la pena. (F6B4)

**Previous knowledge/opinions:**

*Bueno, de pronto hay cosas que están científicamente comprobadas, que la gente dice o habla, eso es fidedigno, pero hay cosas de pronto sí, de pronto no, todas esas cosas. (F8S3)*

*Por ejemplo, los azúcares, los caramelos y todos esos, dicen que alimentan más al cáncer. (F12B5)*

*Es algo que yo sabía que era muy saludable. Es uno de los vegetales más saludables que hay. Yo lo hago parte de mi dieta y hay estudios que ayudan para prevenir o para matar las malas cosas, cáncer, ¿no? Pues que uno siga manteniéndolo en su dieta. (M4B3)*
Eso yo no lo tendría que verificar, muchacha! Yo estoy clara que [esos animales] están enfermos, las hormonas, la forma en que los matan, no los dejan descansar, no los dejan alimentarse bien… olvidate eso no hay que buscarlo en ningún sitio. (F11S5)

Logic/common sense:
Este, pues como te dije, el limón si tiene mucho... Es bueno para la salud como medicina alternativa. So, it's not que no es creíble, so I wouldn't feel like I need to double check porque I already know that it is good for you so it could help and it doesn't hurt. It something that it's not gonna hurt you. No es como que "Tomate esta pastilla, it might help you". No. Si tú me das una pastilla, I'm not gonna try it pero si tu me das algo natural, like a herb or a plant, eh, I'll try it 'cause it's not gonna hurt me. (F3B2)

Relationship-related heuristic (source factors): Heuristics used to make inferences about the credibility of CPSI based on the attributes they give information shared through trusted relationships. These included the perceived credibility of a Facebook friend and comparisons to previously shared experiences or anecdotes from others.

Credibility of Facebook friend:
[En la comunidad] le hacen caso porque él no es solamente…. Él está en todo. […] La verdad es que es muy eficiente, muy colaborador y muy proactivo en todas estas cosas. (F5B3)

Genuinamente las personas que son de la Iglesia, mayores de 40 años no son dados a la bobería ni a las cosas fake, ellos ponen cosas verdaderamente interesantes. (M2B2)

Shared experience/anecdote:
Yo me acuerdo que cuando mi hermana – y muchos los comparo con mi hermana – a ella le mandaron hace 13, 14 o 15 años, le mandaban de todo. De hecho, ella no quería más quimioterapia porque ya ella tenía un grado 4 pero lo significante… Entonces nos fuimos por la medicina alternativa porque ella no quería más quimioterapia […] [E]mpezamos a que si la dieta del tiburón, los hongos de no sé dónde, unos polvos, a ella le mandaban una cantidad de cosas que todos eran productos naturales, pero eran malísimos. En sabor eran horribos. Entonces estaba la moringa también, entonces a ella le, le bajaban los marcadores, le bajaban enormemente, ella habiendo parado la quimioterapia, pero apenas paraba ese tratamiento que era horroso también. Entonces digo yo, debe haber algo natural que de algún modo pueda, pero no sé hasta qué punto podrá curar… (F5B3)

Self-related heuristic (audience factors): Heuristics used to make inferences about the credibility of CPSI based on features related to one’s identity or personal experiences. These included the relevance of content to one’s culture/heritage, religion/spiritual identity, and previous experiences.

Culture/heritage:
Ese sí lo recuerdo porque es una fruta que se da mucho en Colombia. Yo traje la semilla precisamente con el fin de tener la fruta para- se supone, los estudios que han hecho, se supone que es una de las mejores frutas para tomar que previenen el cáncer. Y es una fruta que se da en Colombia, en el Amazonas. (M4B3)

Religion/spiritual identity:
[…] porque lo que pasa es que en la naturaleza, yo creo mucho en eso. Están todas las hierbas, todas las hojas que caen de los árboles, todo es para salud y todo se puede usar para medicina. Cada una tiene su propósito, eso no está hecha a lo loco, no, no, y no. Porque Dios
no tiene tiempo para hacer disparates, entiendes, todo lo que Dios hizo fue bueno. Que el deseo lo daño, el… el pecado, pero como quiera, todavía sigue teniendo valor. Entonces pues cada una tiene su… su función. (F11S5)

Previous experience:
Realmente a pesar de lo que [el doctor] me pueda decir [en contra de la información sobre que el limón puede curar el cáncer], no me mueve. Por ejemplo, yo tengo experiencia propia. En mi casa yo sembré cinco plantitas de limón que parían en distintos estadíos del año y yo era la única persona en Cuba que tenía limón todo el año. Siempre le daba a los niños limonada. Siempre fue así y mis hijos muy pocas veces se enfermaron. (M2B2)

Y también mucho de lo que dicen [sobre la dieta ketogénica] y los alimentos que ahí recomiendan, sé que son ricos en potasio y magnesio también. […] Bueno, a mí me funcionó. Quizás es cuestión de criterio de los demás ¿sí? Si les conviene aplicarlo a sus niños… (F12B5)

Verifying content (process): Descriptions of processes individuals use to verify the content of CPSI they engage with on Facebook. These include xxx.
If I were to outline all the sub-themes, they would include something like:
Outside verification (comparing info to other sources, doing an internet search, asking a healthcare provider or a friend, medical websites, verifying credentials)
Cues in the content (logos of credible health/cancer organizations, credible news agency, presence of links and original sources, url ending)
No verification/assessment (Does this merit being it’s own theme, or is this just part of the process that I describe in the text? In a way, there is always some assessment… but maybe it just was an “I engaged, saw, but didn’t really care much, so it was irrelevant.”)

Actions taken (RQ 3)
Online actions
Starting a search process: CPSI engagement as prompting users to search for additional cancer information about the topic on the internet (typically Google or another search engine).
Creo que Facebook es como un “abreboca”, ¿no? Tampoco es que te va a dar todo lo que necesitas, pero sí te despierta como la curiosidad para seguir investigando y seguir informándote. Es como el gusanito que te empieza a dar un mordisquito y te dice: “aquí pasó algo. Vamos a ver qué llegó” y empiezas a buscar. (Spanish-prefering Venezuelan female, 45)

Sharing with others: CPSI engagement as prompting users to share posts with others in their online network, both on Facebook through shares and/or posting on an individual profile, or via messaging apps (i.e. Facebook Messenger and/or WhatsApp).
Y pues, durante el día entro, miro y si hay otra cosita de ahí mismo, lo saco y lo comparto en mi página y mientras voy recibiendo también de otras páginas, de otras aplicaciones, lo copio y lo envío. [Por] el WhatsApp y el Messenger. Esas dos. (Spanish-prefering Puerto Rican female, 60)

I save [information] in another way; I send it to myself via Facebook Messenger, and I have 10 million things there. Honestly, I have it all saved in Messenger, [things] I send myself. […] My wife and I share information this way. (Bilingual Cuban male, 61)
Offline actions
**Discussing with others:** CPSI engagement as prompting users to discuss content with friends, family, health care providers or others outside of Facebook or the internet.

*Y me acuerdo que mi esposa, discutimos porque las semillas no se machucaron, se deben tomar asi naturales. (M2B2)*

**Implementation/Reinforcement of dietary behaviors:** CPI engagement as prompting users to implement a new or reinforce a current dietary behavior linked to cancer prevention (and/or treatment). This may include adding a new food to one’s diet, or following a recipe. Reasons to implement were not always related to cancer, but rather to other conditions (e.g., turmeric consumption due to arthritis).

*Juicing example*

**Screening decisions:** CSI engagement as prompting users to make a decision to schedule or cancel a relevant cancer screening.

*Toda mi vida me he hecho los mamogramas hasta que lei una de estas cosas… Y me pongo a darle sentido, y tiene sentido. Inclusive, un muchacho de Puerto Rico, no sé ni cómo se llama, hizo un video y todo, todo lo que dice – maravilloso. […] Vi el video y llamé y cancelé la cita. (Spanish-prefering Puerto Rican female, 60)*

*I used to get mammograms every year until I watched [the video], and it makes sense. […] He said so many things… I said, ‘Oh my God…’ […] I had an appointment and everything, and when I watched it, I called and cancelled.*

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**Memo 2:Emergent themes for the kind of CPSI Latinos engage with on FB and why (RQ1)**

In this memo, I am going to write about what people engaged with and why chronologically. First, I will write about cancer prevention – what the main topic people engaged with was and why. Then, I’ll do the same with cancer screening content. I’ll finish the section writing about the role of features in facilitating this, particularly related to the visual, sensationalist and cultural identity appeals. I will put relevant images of discussed posts in the text as well. All in all, it’s about the content and how it’s presented.

**Post content**

Most posts that participants engage with were informational (83% or n=55). Eleven additional posts (17%) were about local health events and mainly discussed cancer screening topics. This section first presents findings related to the preventive content, followed by posts containing screening content (including health events).

**Prevention posts**

The majority cancer prevention posts participants engaged with were about food/diet (53% or n=35); most of these (n=24) also claimed these foods/diets could cure cancer naturally. Many of these (n=16) also provided recipes or dietary tips/advice to prevent and/or cure cancer.
A thematic analysis of the interviews provides some important insights as to why participants predominantly engaged with content related to food/diet. In most scenarios, engagement with this information was not due to a direct interest in cancer prevention; rather, content appealed to other salient topics. Emerging themes included a general interest in prevention/healthy eating; personal experiences related to cancer; content related to other salient chronic conditions; and sociopolitical issues. Reasons for engagement with a particular post were not mutually exclusive, and most participants engaged with different content for multiple reasons.

**A general interest in prevention and/or healthy eating**
Participants commonly engaged with food/diet-related content because they saw eating healthy as preventive. As a Puerto Rican participant stated about a video describing seven foods that ‘cure cancer’: “It’s true, all these are good for your health… [they] may not be specifically good for cancer – or do anything – but if you are healthy, it contributes to getting well faster.” (F1B1) This statement further illustrates how messages claiming natural cures were generally associated with prevention, rather than treatment. Multiple participants clarified they did not inherently believe in the curative claims within engaged posts. For example, when discussing whether she believed a post claiming that beet juice kills cancer in 42 hours, a female participant stated: “No, I don’t believe in that [statement]. Does it help? It possibly helps, as prevention.” (F8S3) Similarly, a male participant who also engaged with this post stated:

“Oh, obviously, I don’t believe in that type of message. That there is perhaps a type of variable that could help, maybe, but it would be very illusive to believe that it will end cancer in 42 hours. […] The rest of the content might be helpful.” (M4B3)

There was also consensus around the idea that “natural doesn’t harm,” suggesting that incorporating these foods into one’s diet is not detrimental. When discussing the beet juice post, the aforementioned male participant said, “whether it works or not, it won’t hurt me in any way.” Similarly, when discussing a post describing the curative properties of lemon peel, a female participant stated:

“If it’s natural – like, things that won’t harm anything, things that you use every day when you cook, and in your food… I would try it if I don’t have a [cancer] diagnosis. If it’s about prevention – something preventive – then I would try it.” (F10B4)
Sometimes, however, participants did believe the curative claims of the posts they engaged with. For some, having an affinity towards natural remedies stemmed from a respect for their Latin American Indigenous ancestors and their views of healthy living. A native Colombian, one female participant stated: “As you can see, I have a lot of things about Indigenous peoples. I’m really interested in these cultures, in nature […] Indigenous peoples and our ancestors knew so much medicine, they really knew so much about what happens.” For others, religion played a strong role in why they embraced curative claims. In discussing his affinity towards natural remedies, a Cuban male participant stated:

“[W]hen God created the world, He made it perfect. And in the bible, it says that when He created the world, everything was good. So, everything [already] exists and must exist in what God created naturally, not in what man is inventing.”

Nonetheless, these natural remedies were predominantly viewed as complementing, rather than replacing, Western medicine. For example, when discussing the curative properties of guanábana, M4B3 stated: “I see it as a complement, right? Obviously, it can’t be a substitute to normal medicine, but it’s definitely something that should be considered.” He discussed this in light of his experience with his mother’s cancer, further discussed below.

**Personal experiences related to cancer**

On occasion, engagement with food/diet-related content related to previous experiences participants had with cancer survivors. There were multiple instances where participants’ friends and/or family previously resorted to complementary and alternative medicine using traditional remedies from their countries of origin, making this content more salient. These individuals were more likely to consider both preventive and curative properties of the described foods. The most common example of this was guanábana, which is available in many Latin American countries. For example, although he didn’t believe the curative claims in the beet juice post, M4B3 explained how he sought alternative medicine for his mother when discussing engagement with the aforementioned guanábana post. On this topic, he elaborated:

“On a personal level, due to my experience [with my mother’s cancer], I realize that – something that I realize about oncologists nowadays is that they are completely closed to their own knowledge. So, you have a patient and you fill her up with a bunch of pills and things, and you give them radio[therapy], all types of things they have to… And what they do is finish the person. They completely debilitate her without taking into consideration that they can do other things at the same time.”

Similarly, another participant stated multiple times during her interview that her interest in reading about cancer (particularly natural remedies) was due to her sister’s experience with ovarian cancer. She recounted this when discussing why she engaged with a chain message post claiming that drinking hot lemon water can prevent cancer by killing cancerous cells:

“I remember that when my sister – and I compare many [posts like this] to my sister – like 13, 14 or 15 years ago, they would send her everything. In fact, she didn’t want more chemotherapy because she already had Stage 4 (cancer)... So, we went for alternative medicine because she did not want more chemotherapy […] [W]e started with the shark diet, the mushrooms from I-don’t-know where, some powders. She was sent so many things, they all were natural products,
but they were awful! They tasted horrible! [...] So, I say, there must be something natural that can somehow [help]... but I don't know how much it can actually heal...” (F5B3)

**Relationship to other chronic diseases (salient health topics?)**
Half of the participants reported having one or more chronic conditions (excluding cancer), some of whom stated that their interest in food/diet-related content was related to these conditions. For example, a Venezuelan female participant recalled engaging with a post about papaya “as a preventive food, [rather] than for cancer, for your digestive tract.” (F5B3) Later in the conversation, she also discussed the video of seven foods that ‘cure cancer,’ one of which was turmeric. She describes how she associated it with her frequent “joint” and “knee pain.” Similarly, another participant originally from Mexico engaged with a post stating that curative properties of frozen lemon peel. However, she did so because of its claims related to diabetes, rather than cancer. (F2S1)

**Sociopolitical issues**
Sociopolitical issues also emerged as reasons for engaging with content claiming curative properties. An example of this pertained the current economic crisis in Venezuela, which has made it difficult for individuals to get access to medical care and cancer treatment. As such, a recent female Venezuelan immigrant stated:

“If it’s a home remedy, it grabs my attention, because [right now] there’s nothing in Venezuela. And that’s why if there is something that can be planted and it works, then, that’s useful. [...] You know? Because there’s always – not always – but purchasing levels greatly influence health. So, there are people who could be cured or relieved with something they have at hand, while many believe that if they don’t have the money or can’t get a medicine, there is no other chance, right? So, the situation in Venezuela is that there are no medicines.” (F7S2)

**Other prevention content**
There were 16 additional prevention-related posts containing information beyond food/diet, 9 of which advertised upcoming health events. Three of these posts purported non-food natural remedies with preventive properties (such as using CBD oil or supplements for cancer prevention), six shared general information about cancer prevention and healthy lifestyles, and the remainder contained specific information about HPV vaccines, alcohol, or sunscreen. Notably, participants did not report engaging with cancer prevention topics related to exercise or tobacco/e-cigarettes.

Thematic analysis revealed that most participants engaging with other prevention content did so because they were involved in professional or volunteer roles that made cancer a salient topic. For example, one participant was influenced by her previous role as a cancer educator for a local cancer center. Her knowledge on the topic and continued role as a volunteer made these posts salient. She mainly engaged with posts that promoted upcoming health events by sharing them on her timeline. This was also common with screening posts, further discussed below.

**Screening posts**
Participants also engaged with screening content, but to a lesser degree (n=25, 38%). Ten of these posts were advertising health events meant to educate about and/or provide free cancer screenings to the Latino community. The remaining posts were mainly about breast or colon cancer (n=14), four of which discussed cancer advocacy (e.g., a call to contact Florida congress to support funding a breast and cervical cancer screening program). Thematic analysis revealed
that participants who engaged with screening content (n=9) either had a personal experience related to cancer or were in a professional context where cancer topics were salient.

Personal experiences related to cancer
As was the case with food/diet content, some participants engaged with screening information because of their personal experiences in dealing with cancer in their family. This is best exemplified by a Venezuelan participant whose child survived cancer. Throughout her interview, she spoke of her role in disseminating as much information as possible about cancer on Facebook, as this was an important source of information for her when her son was diagnosed. She described how she managed multiple Facebook groups tailored to parents (mainly mothers) whose children have cancer, and that she constantly shared information in these groups and on her personal Facebook page. One of these posts was a link to an article claiming that colonoscopies are deadlier than colorectal cancer (available at www.healingoracle.ch). She noted that she did not necessarily agree with the content – her son’s cancer was diagnosed because of a colonoscopy – but stated it was her responsibility to share information with others, regardless of her opinion about the content. In this scenario, she shared the information but added her experience that a colonoscopy is what “saved [her] son” at the top of the post. She further explained this during the interview:

“There are always two sides to a coin. […] Yes, there are risks, I will not deny it. But, in my son’s case, that is what saved his life. So, how can I tell you that it is not effective? Every procedure has a risk.”

Her role in sharing this and other information on Facebook is further discussed with other actions taken by participants.

Professional context
Four female participants discussed their role as either volunteering for causes or working in environments where cancer is a salient topic. As such, there were multiple instance where they engaged with posts sharing information about upcoming health events tailored to education and free screenings for members of the Latinos community. For example, one participant frequently volunteered in cancer-related initiatives led by the local cancer center – particularly those related to breast cancer prevention and screening education. Therefore, she is aware of when this content appears on her Facebook News Feed, and sometimes shares it with others. Similarly, another participant was a nutritionist who had worked with cancer patients in the past. She was very familiar with Latino health events held by the local cancer center and oftentimes
shared this content. In different occasions, each of these participants mentioned engaging via a like, comment or share as a way to support the event.

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**Post features**

Regardless of the content, there were specific post features that consistently elicited more engagement. These included visual appeal, sensationalist titles/statements, and elements of cultural identity (such as language or other identifiers).

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**Visual appeal**

The vast majority of posts (91%) included a visual component, such as embedded images and/or videos. Participants commented on the impact of videos and images in their engagement. One participant stated, “it’s presentation more than anything else” and that “if it doesn’t enter through your eyes, you don’t get [the message].” See notes for other examples.

Visual elements – particularly those containing foods or herbs common in Latin America – appealed to culture and cultural values in different ways. Many participants commented on posts containing images or videos of *guanábana* as being popular in their country of origin:

“I do remember that [post] because it’s a fruit that’s very popular in Colombia. I brought the seed here precisely to have the fruit for – according to studies that have been done, it’s supposed to be one of the best fruits to drink that prevents cancer. And it is a fruit from Colombia, from the Amazon.” (M4B3)

Others highlighted stories of its curative properties that were shared by older generations: a Puerto Rican participant stated, “I remember that for years, my grandmother and my mother [would always say] *guanábana* tea for the stomach, *guanábana* tea for this [or that].” Posts containing lemons/limes also garnered attention, although many commented on not knowing the purported curative claims until having read/watched them on the platform. Rather, many saw these as staples in their diet and commented on the ease of incorporating frozen lemon peel in their diet:

“There are things that I already have in my diet. Lemon is one of them. I drink a lot of water with lemon. It seems very healthy to me and, so, if anything, you just look at the fact that the subject was – I think the topic there was to freeze a lemon and zest it and use it [...] include [the zest] in your diet in salads [...] or put it on top of a souffle, soup or cream, whatever you want. That’s something I didn’t do previously.” [M4B3]
Videos had particular pull for some participants, especially if there were narrative elements that shared a testimony related to curative properties of foods. [example]. One video in particular appealed to two participants, both of whom expressed an affinity to the narrator also being Puerto Rican. This video also contained sensationalistic content and is further discussed below.

Sensationalism (For this paper, I can include this code under “post features,” as this really is an important aspect of engagement that has to do with how things are said…)

Many posts participants engaged with contained sensationalistic titles or claims; the majority of these related to food/diet (n=xx) (e.g., “Cancer dies when you eat these seven foods” and “Cancer Dies in Only 42 Hours – Miracle Juice”). These titles seemed to be the main reason some individuals initially gravitated towards food/diet content. [example quote on why these things grabbed attention, then about prevention more than treatment]. However, there was apprehension at the claim of cure by some. For example, when discussing guanábana as a cancer cure, a participant said, “Well, if it cured [cancer], then EVERYONE would eat it! I would be in great demand! But whenever I go [to the supermarket], it’s just a tiny corner with five or six fruit.” [F2S1]. There were also other people who were concerned about these messages but didn’t always do something about it. This was at times weighed with the idea that it’s not really causing any harm for people to incorporate in their diet, so correcting the post wasn’t in their best interest.

While most of the food/diet-related content with sensationalist titles claimed cancer cures, a subset of these also contained conspiratorial messages. These mainly supported the idea Big Pharma and corporations do not want the general public to know that natural remedies can cure cancer for a fraction of the cost. [see how many supported this idea or brought it up, beyond the female].

Meanwhile, the only two screening-related posts that contained sensationalist titles were also conspiratorial. These posts contained content claiming that current cancer screening methods could either cause cancer or death (i.e. “This Causes BREAST CANCER… It’s hard to believe and it will SURPRISE YOU” and “Colonoscopy: Another Medical Scam that Does NOT Prevent Cancer BUT Can Cause Death!”). These posts appealed to fear and fatalistic view of cancer more so than did prevention-related posts, with one participant stating:

Cultural identity connection (after meeting with Meghan & Kate, this goes under visual)
*Not quite sure how to articulate this yet. This gets to general concepts of flag, language, someone from the same country…

Así que ya sabes: cuando vayas a hacer una presentación, ponle una bandera latina y todo mirará en seguida. M2B2
[The food I consume] is part of my culture, it is. Because I have lived it and I have seen it in family members. I have aunts living to 95 - aunts! Aunts of mine. 95?? What she does? And, I’m tellin ya.. (~47) F13E3
[Mammogram video and being Puerto Rican.]

Language
Lastly, although there was a similar language distribution among the posts discussed (58% were in Spanish), over half of the posts in English came from the same participant (a previous
cancer educator who speaks both languages but prefers English). Instead, most participants (n=9 or 56%) only engaged with CPSI in Spanish, while 5 (31%) engaged with CPSI in either language. Although participants did not explicitly discuss the role of language in engagement, one participant commented that “it’s in Spanish, but I don’t know if it’s from Puerto Rico or Mexico or whatever,” highlighting the transnational nature of content (further discussed below).

These can just be mentioned in a sentence or two:

**General curiosity**
Yo veo todo esto por curiosidad f2s1
Que uno tenga que creer todo lo que envía, pues no, tampoco, pero si hay temas que a uno le interesa, uno lo ve y mira a ver de qué se trata. M4b3

**Offline conversations that made it important**
Porque qué pasa, yo he empezado a descubrir cosas y mi esposa es la que siempre está que si esto que si aquello y que si la crema y que si pa aquí, que si pa allá, yo digo que eso es cosa de homosexuales y decimos otras palabras. Y ella me dice “No, no, no. Hay que hacer esto, hay que hacer lo otro.” Así que ahora me dice “por favor pásame la crema de aloe contra el cáncer”. (Se ríe) Yo dije, a ella yo le digo otras palabras y nos reímos, y las pasamos, pero cuando ellos van a salir a mi siempre se me olvida y mi mujer siempre está al tanto de todas estas cosas, con ella voy a disfrutar mucho.

ENTREVISTADORA: Oh ok. Ok. ¿Entonces si no hubiera sido por las conversaciones que usted ha tenido con su esposa probablemente no hubiera…?
PARTICIPANTE M2B2: No hubiera hecho eso.

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**Memo 3: Emergent themes for the CPSI sources Latinos engage with on FB and why (RQ2)**

In this memo, I am going to write about the sources of the content people engaged with and why. First, I will write about the sources they know (friends, family, etc.) and the role of cultural values in these reasons (this will go in the Discussion). Then, I’ll add context about the actual information sources and the role of authority, etc.

**Post sources**
Facebook post sources can be conceptualized in two ways: the person/entity who created or shared a post so it appears on a user’s News Feed (Facebook poster, such as a Facebook friend, group, or page), and the source of the content within a post (source type, such as a news agency, health organization, or a blog). At times, this can be the same entity; for example, the National Cancer Institute’s Facebook Page may share information linking to an article on their website.

Most participants engaged with CPSI shared or reposted by a Facebook friend (n=36). Participants also engaged with more posts from unofficial sources discussing health topics (i.e. blogs, personal/unofficial websites, special interest Facebook groups or pages, or a general Facebook user; n=40) than with content from healthcare or cancer organizations (n=16). Notably, almost half (n=7) of the posts from these organizations were advertising health events
about cancer prevention and/or screening, rather than educational posts. Almost all of the posts from unofficial sources were related to food/diet (n=32).

During the interviews, participants confirmed that a post’s source oftentimes contributed to their engagement with content. Reasons for this engagement included perceived topic expertise or authority, alignment with cultural identity, and the role of interpersonal relationships. Importantly, these reasons were not mutually exclusive; examples of their co-existence are described at the end of this section.

**Perceived topic expertise or authority**
For several participants, perceptions of expertise or authority about the topic within the post were an important reason for engaging with content. These perceptions could be related to the Facebook poster and/or source type. For example, one participant stated that she engaged with a post about colorectal cancer screening guidelines because it was posted by a friend who works at the local health department and was from the American Cancer Society. Similarly, another participant engaged with two videos about colorectal cancer screening because his sister-in-law shared them and “she’s a gastro[enterologist].” Others engaged with content because the of the entity or organization sharing CPSI or related health events, with several commenting that the local cancer center was an entity that always provided free education and screening services for the Latino community.

There were occasions where the source was the most important reasons to engage with content. This was the case with content shared by a Venezuelan community activist who is well-known among Latinos in Tampa. This person was discussed in multiple interviews as being a trusted leader who is always present at community events and constantly shares important and relevant health information with community members. As one participant stated, “people [in the community] listen to him because he is not only… He is in everything. [...] The truth is that he is very efficient, very collaborative and very proactive in all these things.” (F5B3) As such, several participants stated that they always pay attention to content he disseminates on his Facebook profile, local Facebook groups, and alternate social media platforms (specifically, WhatsApp). Participants also commented on his interpersonal relationships (“He calls everyone, and he goes to where the people are and everyone receives him!”), which further contributed to why participants deemed him a trusted and reliable person. The role of such interpersonal dynamics in CPSI engagement is further discussed below.

**Role of interpersonal relationships**
There were several occasions where participants’ relationships with those sharing a post contributed to engagement. These relationships were based on trust and appeared to either complement or supersede the relevance of the content within the post. This was commonly the case for a Puerto Rican female participant who generally engaged with content related to eating healthy. Most of the content discussed during her interview came from the same person – a friend she described as being “like [her], she believes in a lot of natural stuff.” Her friend, while not formally trained in these topics, was very immersed in natural remedies. As such, she deemed her very knowledgeable and said she always engaged with whatever content she posts. Meanwhile, another participant commented on engaging with a post from a friend after they had an offline conversation discussing the topic:

“I remember [engaging with it because] we were talking about the amount of pesticides that are used in fruit and everything that, in the long run, you think will help you cure something, but on
the other hand might be poisoning you, right? Then, he commented: ‘I'm going to send you a [post] that I found about things that can help you avoid cancer.” F7S2

Another example of source superseding content occurred with a Mexican participant who noticed that a family friend posted content describing five foods that can help prevent breast cancer. She described immediately paying attention to the content because the person who posted it has a family history of breast cancer. As such, she grew immediately concerned with whether this meant someone had been diagnosed and wanted to reach out personally (not via a like or comment on the post).

Relationships that cause you to check/concern

Alignment with identity

Radio Tiempo post related to religious source
Parasocial relationships with Latinos (celebrities, FB groups for country)

Co-existence of source reasons to engage with CPSI
Many times, the reasons to engage with content due to its source were multiple, highlighting the complexity of online and offline relationships and how they influence content engagement.

Example of mammogram video:
Although he uses the title of “Dr. Luis Rivas,” further inspection of his (now disabled) website and Facebook Page indicate
One of these posts was the aforementioned video, which presents a Puerto Rican male claiming mammograms cause breast cancer. Among the multiple flawed arguments, he makes are that xxxx. This post emerged in two participant interviews, both of whom acted upon the content discussed in different ways (see XXX).

Memo 4: Emergent themes for online and offline actions (RQ3)

In this memo, I am going to write about the sources of the content people engaged with and why. First, I will write about the sources they know (friends, family, etc.) and the role of cultural values in these reasons. Then, I'll add context about the actual information sources and the role of authority, etc. I will put relevant images of discussed posts in the text as well.

Actions
Lastly, engagement often led to varying levels of action. Online actions included information-seeking or sharing on other platforms (e.g. WhatsApp). Offline actions included discussing content or changing health behaviors. However, not all decisions were evidence-based (e.g. consuming popular “cancer-curing” foods) and some were potentially harmful (e.g. canceling mammogram after engaging with misinformation from a culturally-relevant source).

CPSI engagement as prompting users to search for additional cancer information about the topic on the internet (typically Google or another search engine).
I think Facebook is like a “mouth-opener”, isn't it? It's obviously not going to give you everything you need, but it does wake up like a curiosity to keep investigating and keep informing yourself. It's like a little worm that bites you and says: “Something happened here. Let's see what this is…” and you start looking. (Spanish-preferring Venezuelan female, 45)

CPSI engagement as prompting users to share posts with others in their online network, both on Facebook through shares and/or posting on an individual profile, or via messaging apps (i.e. Facebook Messenger and/or WhatsApp).

So, during the day I go on [to Facebook], I look and if there is anything there, I take it and share it on my page, and as I also receive things from other pages, from other applications, I copy and send. [Through] WhatsApp and Messenger – those two. (Spanish-preferring Puerto Rican female, 60)

CPSI engagement as prompting users to discuss content with friends, family, health care providers or others outside of Facebook or the internet.

And I remember that my wife and I, we discussed why [papaya] seeds were not to be crushed, but that they should be taken whole. (M2B2)

CPI engagement as prompting users to implement a new or reinforce a current dietary behavior linked to cancer prevention (and/or treatment). This may include adding a new food to one’s diet, or following a recipe.

Supposedly if you drink this juice every day, it cures cancer… hehe. Well, do you know I was doing it every day, every week – or once a week […] I wrote it down on my notes [on my phone] – and every time I go to the natural food store, I say “Hey, put this stuff in it.” […] Broccoli, ginger, apples, carrots, cauliflower and kale. And I’ll go and I juice it. […] I know that it's not 100% cure. I believe in prevention. I believe that – right, I don't have cancer now – but if you start taking things that prevent it, I don't know… haha! Something like that.

CSI engagement as prompting users to make a decision to schedule or cancel a relevant cancer screening.

I’ve had mammograms all my life, until I read one of these things … And I started to make sense of it, and it makes sense! Actually, this guy from Puerto Rico, I don't even know his name, he made a video and everything, everything he says – wonderful! […] I watched the video and called and canceled the [mammogram] appointment. (Spanish-preferring Puerto Rican female, 60)

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AVOIDANCE rather than ACTION

Lack of engagement?
Not motivated, interested, algorithms/structure
Not engaging with screening content or other evidence-based CPSI isn't necessarily bc it isn't interesting, though… it's just either not reaching them through current structures, or not appealing when compared to other stuff
Appendix H: Informational Sheet about Facebook Study Data Use

Thank you for agreeing to participate in this study about how Latinos learn about cancer prevention and screening information on Facebook. This information sheet is for you to keep. It summarizes the kind of Facebook information that will be collected for the study. It also explains how this information will be used for data analysis.

As a reminder, in this study we want to:

• Learn how and why Latinos engage with cancer information on Facebook
• Learn how Latinos determine if the cancer information they read is trustworthy
• Know if Latinos make any decisions based on the cancer information they read on Facebook

As we discussed during the consent process, the Facebook posts about cancer that have showed up on your News Feed will be recorded. These posts will be from your Facebook Friends, and any Facebook Groups or Facebook Pages you follow that posted cancer information.

Maintaining the privacy and confidentiality of all information you share with this study team is extremely important. This includes your Facebook information, as well as any information that any of your Facebook Friends shared about cancer. Please know that:

• The information you allow us to capture will only be analyzed in its de-identified form. In other words, it will not contain any information that can be used to identify you or anyone else. If a Facebook Friend posted content about cancer, it will not include their picture, name or any other information that can identify the person. Your information will also be removed. Here are some examples:
• The data you share will only be used to understand the kind of cancer information you have engaged with on Facebook. It will not be shared with anyone outside of the study team. It will not be used for anything other than the research described.

• We will not have any access to your Facebook account after the study is over. We will also not have any access to any Facebook information that was not explicitly shared with Ms. Yonaira Rivera during your interview. We will only have access to the images you let the study team record on the computer screen.

Please remember that you have control over the data you allow us to record. If there is any data that you do not want recorded or used for the study, you can let Ms. Yonaira Rivera know during your interview.

If you have any other questions about how your data will be used, you can contact a member of the study team.

• You may contact Dr. Katherine Clegg Smith at (410) 502-0025. She is the Principal Investigator for this study.

• You may contact Ms. Yonaira Rivera at (787) 529-9015. She is the researcher who will conduct your interview and all data collection.
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AWARDS & HONORS

2019 Doctoral Distinguished Research Award, Johns Hopkins Bloomberg School of Public Health
2019 Excellence in U.S. Public Health Practice Award finalist, Johns Hopkins Bloomberg School of Public Health
2018 Center for Qualitative Studies in Health and Medicine’s Dissertation Enhancement Award, Johns Hopkins Bloomberg School of Public Health
2018-2020 Ruth L. Kirschstein National Research Service Award – Individual Predoctoral Fellowship to Promote Diversity in Health-Related Research, NIH (F31 CA224615)
2018-2019 Center for Reducing Cancer Health Disparities GMaP Region 1 Research Project Support Program Award, NCI/NIH (P30 CA177558-05S3)
2017-2018 Gordis Teaching Fellow, Johns Hopkins University Public Health Program
2015-2018 Ruth L. Kirschstein NCI Predoctoral Fellow (T32 CA009314)
2014 “Best of the Best!” Best Poster Presentation Award at the 2014 International Cancer Education Conference: Building Global Bridges, Providing Quality Cancer Education
2009 Emory University’s Office of Community and Diversity 2010 “We are Emory!” 100 Community Builders
2009 Rollins School of Public Health Global Field Experience Global Frameworks Fund Recipient
2005-2006 Gamma Sigma Alpha Honors Fraternity, Rutgers University
2004 Hispanic Scholarship Fund Award
2003 National Dean’s List
2002-2006 James Dickson Carr Scholar, Rutgers University
2002-2006 Douglass Scholars Program, Rutgers University
2002-2006 Douglass Project SUPER (STEM Research Program), Rutgers University
2002-2006 Rutgers University Dean’s List (6 semesters)
2002-2006 Robert C. Byrd Scholarship Award

ADDITIONAL HEALTH COMMUNICATION EXPERTISE & TRAINING

2019-Present Health Misinformation Working Group Member, Credibility Coalition
October 2019 Digital Methods for Digital Media Research, AoIR 2019 Preconference Workshop
Fall 2018 Gordis Teaching Fellow, Johns Hopkins University Public Health Studies Program
Instructor for advanced undergraduate course titled "Social Media and Public Health"
Summer 2018 Oxford Internet Institute Summer Doctoral Programme, Oxford University
Fall 2017 Visiting PhD Student, “Digital News and the Consumption of Information Online” (COMM821), Annenberg School for Communication, University of Pennsylvania

Relevant courses

PhD: Persuasive Communication Theory; Children, Media & Health; Issues in Health Communication; Communication Network Analysis for PH Programs
MPH: Social Marketing; Public Health Communication; Effective Oral Communications

RESEARCH EXPERIENCE

Co-founder October 2017 to Present

Puerto Rico Stands, Inc. (PR Stands) – Baltimore, MD

- Co-founder of PR Stands, an interdisciplinary, Baltimore-based organization committed to the long-term recovery of Puerto Rico (PR); specific projects include linking medical and grassroots organizations in PR to communities in need; assisting with community capacity building efforts; and exploring technology solutions to help first responder and volunteer relief efforts
- Awarded $10,000 from the Bloomberg American Health Initiative (BAHI) for a one-year project to conduct a community needs assessment and capacity building workshops to build community resilience
- Established long-term partnership with community leaders in Sector Maná (Barranquitas, PR), a remote rural community impacted by the storm
- Collaborated with US and PR-based non-profit organizations to facilitate local initiatives, such as delivering free public health and mental health events for community members in Sector Maná
- Led the design and implementation of community needs assessment and capacity building workshops
• Currently developing workshop for leaders to develop a community-level disaster preparedness plan
• Lead author of all BAHI-funded project reports (community needs assessment, community project plan)

**Dissertation Research**  
*September 2016 to Present*  
*Bloomberg School of Public Health – Johns Hopkins University, Baltimore, MD*

• Designed and implemented mixed methods study to explore engagement with cancer prevention and screening (mis)information among Latinos (ages 40-75) on Facebook
• Developed a novel qualitatively-driven mixed methods protocol to understand engagement with health information on social media (social media content and context (SoCo) elicitation method)
• Developing a conceptual model explaining cancer (mis)information engagement on social media
• Received an NCI F31 Predoctoral Diversity Fellowship Ruth L. Kirschstein National Research Service Award
• Secured three competitive internal and external dissertation funding awards ($14,000 total)
• Coordinated all study logistics and managed study budget from three funding sources
• Developed study materials (consent forms, survey, interview guide, codebook) in English and Spanish
• Conducted in-depth interviews, managed audio and visual data, and conducted content and thematic analyses using MaxQDA and Stata
• Currently developing manuscripts for publication (methodological paper currently under review in *JMIR*) and presenting at communication and public health conferences (IAMCR, AoIR, APHA)

**Graduate Research Assistant**  
*Bloomberg School of Public Health – Johns Hopkins University, Baltimore, MD*

**A PRO-cision Medicine Toolkit to Address the Challenges of Personalizing Cancer Care Using Patient-Reported Outcomes** *(G-58915; PI: C. Snyder)  
*August 2017 to September 2018*

• Assisted in identifying contributors to the *Medical Care* supplement, a paper series from experts with experience developing methods for interpreting and/or acting on patient-reported outcomes (PROs) in clinical practice
• Assisted in the coordination of PRO-cision Medicine Methods Toolkit conference calls and in-person meeting to present and discuss papers included in the supplement (14 papers)
• Compiled and disseminated internal paper revisions to participating authors

**Stakeholder-Driven, Evidence-Based Standards for Presenting Patient-Reported Outcomes (PROs) in Practice** *(PCORI #3725; PI: C. Snyder)  
*September 2016 to December 2017*

• Designed, implemented and analyzed Stakeholder Advisory Board (SAB) surveys via Qualtrics
• Coordinated SAB meetings to achieve PRO consensus via a modified-Delphi approach

**Unjust Targeting: How Marketing Features Impact Consumer Response and Tobacco Use** *(K01DA037903; PI: M. Moran)  
*September 2016 to December 2017*

• Designed and developed social media recruitment advertising on Facebook and Instagram
• Designed, implemented and analyzed Snapchat food and beverage advertising survey module (manuscript currently Under Review with *Journal of Children and Media*)

**Thesis Research**

*Rollins School of Public Health – Emory University, Atlanta, GA*

- Designed and implemented qualitative thesis study to explore the reasons and ways Puerto Rican college students search for safer sex information
- Awarded funding through Emory University’s Global Field Experience Global Frameworks Fund
- Received IRB approval from Emory University and the University of Puerto Rico to conduct study at
- Recruited and interviewed 20 participants enrolled at the University of Puerto Rico – Río Piedras Campus
- Transcribed Spanish interviews, performed a thematic analysis, and published first-author manuscript

**Research Associate**

*National Association for Children of Alcoholics (NACoA) – Atlanta, GA*

- Conducted a formative evaluation of the impact of an organizational name change using the Center for Disease Control and Prevention’s framework for program evaluation
- Developed an online survey to better understand the perceptions and opinions of NACoA stakeholders regarding the potential name change
- Led focus groups to identify the general public’s perceptions and opinions surrounding potential name change

**ORISE Research Fellow**

*Food and Drug Administration – Center for Biologics Evaluation and Research, Bethesda, MD*

- Performed PCR and sequence analysis of generated random human and avian influenza libraries (H1N1, H3N2, H5N1) expressing overlapping sequences from several human and avian influenza strains
- Created H1N1 map of all known epitopes in all 11 influenza proteins through serum analysis

**Laboratory Assistant**

*UMDNJ Research Tower – Rutgers University, New Brunswick, NJ*

- Honors Program Research Project: Molecular Cloning of Fluorescently Tagged ASTR Components to be used in FRET Confocal Microscopy
- Constructed fluorescently marked genes to analyze mRNA turnover machinery in human monocytic leukemia cells

**Laboratory Assistant**

*Foran Hall, Cook College – Rutgers University, New Brunswick, NJ*

- Biotechnology Internship Research Project: Effects of β-endorphin on Rat Natural Killer Cell Cytolytic Factors and STAT3 Activation
- Studied the effects of beta-endorphins and inflammatory cytokines on the activation of STAT3 signaling pathways and apoptotic proteins (granzyme B and perforin) in natural killer cells
TEACHING EXPERIENCE

Instructor (Gordis Teaching Fellowship)  Fall 2018
Public Health Studies – Johns Hopkins University, Baltimore, MD
AS.280.441: Social Media and Public Health
  • Instructor for upper-level undergraduate course with 17 juniors and seniors that explores the growing role of social media in public health research through an interactive, seminar-format that incorporates small group activities, journal article discussions, and a class project
  • Developed course curriculum, assignments and rubrics, and identified reading materials
  • Maintained class Blackboard site (faculty and student portal)
  • Received above-average student course evaluations (4.7/5 teaching effectiveness; average courses 4/5)

Graduate Teaching Assistant  Summer 2017, Fall 2016 & 2017
Bloomberg School of Public Health – Johns Hopkins University, Baltimore, MD
PH.410.671: Introduction to Qualitative Research
PH.410.710: Concepts in Qualitative Research for Social and Behavioral Sciences
PH.410.650: Introduction to Persuasive Communications – Theories and Practice
  • Assisted in teaching graduate-level courses Qualitative Research Methods (Dr. Kate Smith) & Persuasive Communications Theories (Dr. Meghan Moran)
  • Graded student assignments and advised students on theory-driven papers and final projects
  • Maintained class CoursePlus site (faculty and student portal) and disseminated materials

Community Health Educator, PSHU-MCC Partnership (PACHE U54)  Spring 2015
Ponce Health Sciences University – Ponce, PR
MPH 6701: Principles of Health Education in Practice
  • Co-developed graduate-level elective course on principles in community health education and theory, with an active training component to teach enrolled students on how to deliver Cancer 101 cancer education curriculum to communities in Southern Puerto Rico (Instructor: Miguel E. Marrero Medina)
  • Led the cultural-adaptation the Cancer 101 curriculum (10 modules) for Puerto Rican audiences
  • Taught lectures on Cancer 101 curriculum overview, the importance of theory in health education, and delivered two-day Cancer 101 training (content, facilitation techniques, how to administer pre- and post-assessments, and how to analyze evaluation data)
  • Provided students with feedback throughout the course and graded student oral presentations and final report, which consisted of hands-on experience delivering cancer education using the curriculum in a local community setting

Adjunct Faculty – Instructor  Spring 2011
Ana G. Méndez University Systems – Tampa Bay Campus, Tampa, FL
Science 111: Physics/Chemistry
Science 112: Biology
  • Science instructor for 10 undergraduate adult students in a bilingual format
  • Facilitated activities utilizing multiple adult learning techniques (visualization, scaffolding, class discussions)
  • Graded student assignments and held open office hours for all students
  • Maintained class Blackboard sites (faculty and student portal) and disseminated materials

Graduate Teaching Assistant  Fall 2009, Spring 2010
Rollins School of Public Health – Emory University, Atlanta, GA
BSHE 500: Behavioral Sciences in the Public Health
BSHE 550R: Theory-Driven Research in the Behavioral Sciences

• Assisted Dr. Ashli Owen-Smith in teaching 57 graduate level students about Behavioral Sciences in the Public Health and Theory-Driven Research on topics including interpersonal and intrapersonal level theories, social capital, social marketing and health disparities

• Taught lectures on intrapersonal and interpersonal level theories (Social Cognitive Theory, Transtheoretical Model and Health Belief Model)

• Led group discussions and guided students in their research development

• Graded student assignments and held open office hours for all students

• Maintained class Blackboard sites (faculty and student portal) and disseminated materials

RELEVANT PROFESSIONAL EXPERIENCE

Community Health Educator, PSHU-MCC Partnership January 2013 to June 2015
Moffitt Cancer Center – Department of Health Outcomes and Behavior, Tampa, FL

• Community Health Educator (CHE) for the Moffitt Cancer Center-Ponce Health Sciences University (PSHU-MCC Partnership) through the National Cancer Institute’s (NCI) Center to Reduce Cancer Health Disparities’ (CRCHD) National Outreach Network (NON) (Outreach Core Leaders Dr. Gwendolyn Quinn, MCC and Dr. Julio Jiménez, PSM)

• Designed, coordinated and implemented NON CHE Administrative Supplement to culturally adapt the Spanish version of the Cancer 101 curriculum (successfully funded for two one-year cycles through NCI/CRCHD)

• Developed Outreach Core and CHE Administrative Supplement data collection tools and culturally appropriate cancer educational materials; conducted quantitative and qualitative data analyses; and prepared manuscripts

• Coordinated and implemented cancer educational events and symposia in Tampa, FL and Ponce, PR aimed at increasing awareness of cancer prevention, early detection, treatment programs and research for Latinos

• Developed new and expanded current partnerships with local community and faith-based organizations serving Hispanics in Tampa, FL and Ponce, PR (American Cancer Society, Health Departments, local churches)

• Led Community Advisory Panel (CAP) in Tampa, FL and Ponce, PR

Program Analyst October 2011 to December 2012
Pinellas County Government – Department of Health and Human Services, Clearwater, FL

• Senior writer and researcher for the Pinellas County Department of Health and Human Services (PCHHS), including programmatic data analysis and composition of community needs assessments, reports and memorandums to the Pinellas County Board of County Commissioners

• Developed, implemented, and monitored performance and outcome measures for PCHHS programs and services, focusing on healthcare and social services access for the indigent and homeless populations

• Member of Pinellas County’s health care delivery system redesign team

• Managed contracts and analyzed programmatic cost, process and outcomes data using Microsoft ACCESS, Excel, and SPSS 18.0

Special Projects Assistant – Pinellas County Health Program August 2010 to October 2011
Pinellas County Government – Department of Health and Human Services, Clearwater, FL
• Member of the Pinellas County Health Program (PCHP) team, which serves over 15,000 indigent county residents annually through 12 patient-centered medical homes
• Analyzed data for multiple PCHP programmatic components (primary care, prescription, specialty care, mental health, home health, and hospital services) using Microsoft ACCESS, Excel, and SPSS 18.0
• Prepared PCHP Fiscal Year 2010 and 2011 Annual Reports
• Designed and conducted PCHP All Florida Orthopedics Spinal Fusion evaluation to assess client quality of life before and after spinal surgery

Assistant Policy Analyst

Centers for Disease Control and Prevention – Office of the Director/Strategy and Innovation, Atlanta, GA

September 2008 to May 2010

• Prepared reports and presentations on wide variety of health communication and strategic planning projects (Ounce of Prevention, HHS Goal Action Plans)
• Developed and tested health communication e-materials (Top 9 “Healthiest Nation” New Year’s Resolutions for 2009) for CDC employees to promote health and disease prevention
• Researched and compiled assessment of state health reform initiatives
• Assisted in compilation of the transition briefing report for incoming CDC director, Dr. Thomas Frieden
• Edited and compiled video footage for the awareness campaign “What does health mean to you?”

PUBLICATIONS

Peer-Reviewed Articles

Published


**Under Review**


**Editorials & Commentaries**


**Book Chapters**


**Reports**


3. Pinellas County Department of Health and Human Services: Board of County Commissioners 2012 Workshop Session – Fiscal Year 2012. Pinellas County, February 2012. Senior writer for Department Director Gwendolyn Warren.


PRESENTATIONS & POSTERS (*Dissertation work; **PR Stands work)

<table>
<thead>
<tr>
<th>Date</th>
<th>Author(s)</th>
<th>Title</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 2019</td>
<td>**Pignetti, D, Potts, L, Bruns, A, Rivera, YM, Rodríguez-Díaz, C.</td>
<td>Coping with Traumatic Research Topics in Internet Research.</td>
<td>Roundtable discussion at the Association of Internet Researchers 2019 Annual Conference: Trust in the System, Brisbane, Australia.</td>
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October 2018  


October 2018  


October 2017  


November 2015  


November 2015  


November 2014  


October 2014  


October 2014  

*Different Avenues, Same Direction: Health Education at Moffitt Cancer Center*. **Invited panelist** representing Community Health Educators at Moffitt Cancer Center. 2014 International Cancer Education Conference: Building Global Bridges, Providing Quality Cancer Education Moffitt Cancer Center Tour, Tampa, FL.

Rivera, YM, McIntyre, J, Gonzalez, WE, Ramos, A, Antonia, TM, Jiménez, J, Quinn, GP. Reaching the Hispanic community via ¡Salud! Serie de charlas. Poster presentation at the 2014 Moffitt Scientific Symposium, Tampa, FL.


Rivera, YM. Identifying how and why Puerto Rican college students search for safe sexual health information. Global Field Experience Brown Bag Presentations, Global Field Experience Global Frameworks Fund. Rollins School of Public Health, Emory University. Atlanta, GA.

Rivera, YM. Effects of β-endorphin on rat Natural Killer cell cytolytic factors and STAT3 activation. International Undergraduate Research Symposium at University of São Paulo. São Paulo, Brazil.

Rivera, YM. Approach to prepare 4,5-Bis-benzothiazol-2-yl-thiazol-2-ylamine derivatives to be studied by emission spectroscopy. Summer 2004 Pre-College Research Symposium. Model Institution of Excellence (MIE) Department of Science and Technology, Metropolitan University of Puerto Rico. San Juan, PR.

**FUNDING**

**Current**

2018-2020 Exploring cancer messaging engagement among Latino adults age 40-75 on Facebook

Funding source: NCI – Ruth L. Kirschstein National Research Service Award 1 F31 CA224615-01A1

Direct costs (annual): $44,524

Role: Principal Investigator

This award supports my doctoral training in cancer health disparities and social media research. The goal of this qualitatively-driven mixed methods is to explore how and why Latino adults age 40-75 without a history of cancer engage with cancer prevention and screening (mis)information on Facebook; identify factors of engagement that contribute to further action; and understand Latino adults assess the credibility of this (mis)information.

**Complete**
2018-2019  **Exploring cancer messaging engagement among Latino adults age 40-75 on Facebook**
Funding source: NCI – CRCHD GMaP Region 1 Research Project Support Program
3 P30 CA177558-05S3
Direct costs: $9,259
Role: Pre-doctoral Principal Investigator

The NCI GMaP Region 1 North Research Project Support Program is intended to enhance diversity and support career development in cancer-related disparities research. This program supported data collection and dissemination efforts for my dissertation.

2018-2019  **Grassroots and Community Partnerships to Achieve Health Equity in Puerto Rico after Hurricane María: Community Needs Assessment and Capacity Building in Sector Maná by Puerto Rico Stands**
Funding source: Bloomberg American Health Initiative – Johns Hopkins University
Ex-SE-02-19006
Direct costs: $10,000
Role: Co-Investigator

The goal of this project was to establish a collaborative partnership with the local community that provides them with tools to tackle local public health issues three phases: a community needs assessment; capacity building workshops for capacity building and project prioritization; and implementation of infrastructure to implement the first project selected by the community.

Funding source: NCI – Administrative Supplements to Strengthen NCI-Supported Community Outreach Capacity through Community Health Educators (CHEs) of the National Outreach Network (NON)
3 U54 CA163068-03S1
Parent Program: Ponce School of Medicine – Moffitt Cancer Center Partnership (5 U54 163068 02)
Direct costs: $36,190
Role: CHE – Project Coordinator

The goal of this administrative supplement (Year 2) was to develop a Cancer 101 training program for MPH students to deliver cancer education to community members in Puerto Rico.

Funding source: NCI – Administrative Supplements to Strengthen NCI-Supported Community Outreach Capacity through CHEs of the NON
3 U54 CA153509-04S1
Parent Program: Ponce School of Medicine – Moffitt Cancer Center Partnership (5 U54 163068 02)
Direct costs: $41,627
Role: CHE – Project Coordinator

The goal of this administrative supplement (Year 1) was to culturally adapt the Spanish version of the Cancer 101 curriculum to deliver cancer education to community members in Puerto Rico.

**ADDITIONAL TEACHING & MENTORING**

**Guest Lectures**

Online course  
*Social media analysis.* PH.224.690: Qualitative Research Theory and Methods – Online Course (Dr. C. Kennedy). Department of International Health, Johns Hopkins Bloomberg School of Public Health. Baltimore, MD. (Graduate course)

February 2019  
*Document analysis & social media.* PH.224.690: Qualitative Research Theory and Methods (Dr. C. Kennedy). Department of International Health, Johns Hopkins Bloomberg School of Public Health. Baltimore, MD. (Graduate course)

January 2019  
*Theories in Public Health I & II.* AS.280.360: Clinical & Public Health Behavior Change (Dr. L. Cheskin). Department of Public Health Studies, Johns Hopkins University. Baltimore, MD. (Undergraduate course)

February 2010  
*Innovative research methods: Facebook as a recruitment tool.* BSHE 538: Qualitative Research (Dr. K. Elifson). Department of Behavioral Science and Health Education, Rollins School of Public Health, Emory University. Atlanta, GA. (Graduate course)

February 2010  
*Applying theory to a qualitative study design: Using Social Cognitive Theory as a guide.* BSHE 550R: Theory-Driven Research in the Behavioral Sciences (Dr. A. Owen-Smith). Department of Behavioral Science and Health Education, Rollins School of Public Health, Emory University. Atlanta, GA. (Graduate course)

**Mentees**

*Practicum Preceptor*

Celina Santiago (MPH, 2019 – Johns Hopkins Bloomberg School of Public Health)
Ernesto Báez Medina (MPH Epidemiology, 2016 – Ponce Health Sciences University)
Stephanie Rivera Soto (MPH Epidemiology, 2015 – Ponce Health Sciences University)

*Bloomberg School of Public Health Public Health Connection Mentoring Program (Johns Hopkins University)*

Leta Ashebo (Public Health Studies, Expected graduation 2021)
Kathryn Rees (BA Public Health Studies, 2016)

*Rollins School of Public Health Mentoring Program (Emory University)*

Rachel Kappel (Expected MPH Behavioral Sciences & Health Education, 2020)
ShaLexus Danzy (MPH Global Health, 2019)
Liz Jaramillo (MPH Global Health, 2018)
Sara Shilling (MPH Behavioral Sciences & Health Education, 2017)
Vanetta Thomas (MPH Behavioral Sciences & Health Education, 2015)
Jennifer Beaver (MPH Behavioral Sciences & Health Education, 2014)

Hispanic Scholarship Fund Second-Year Mentoring Program
Lianne Elias (BS, 2015 – Saint Leo University)

PROFESSIONAL MEMBERSHIPS

<table>
<thead>
<tr>
<th>Year</th>
<th>Organization</th>
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<tbody>
<tr>
<td>2019-Present</td>
<td>International Association of Media and Communication Research</td>
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<td>2018-Present</td>
<td>Association of Internet Researchers</td>
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<tr>
<td>2017-Present</td>
<td>International Communication Association</td>
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<tr>
<td>2017-Present</td>
<td>American Public Health Association</td>
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<tr>
<td>2016-Present</td>
<td>American Association for Cancer Research</td>
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<tr>
<td>2013-2015</td>
<td>Hispanic Professional Women’s Association of Tampa</td>
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SERVICE

Ad-hoc Peer Review
Journal of Medical Internet Research; Journal of Children and Media; Health Education Research; Ethnicity and Health; Puerto Rico Health Sciences Journal

Organizations & Leadership Activities

<table>
<thead>
<tr>
<th>Year</th>
<th>Activity</th>
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<tbody>
<tr>
<td>2017-Present</td>
<td>Co-founder, Puerto Rico Stands, Inc.</td>
</tr>
<tr>
<td></td>
<td>• Raised &gt;$5,000 via crowdsourcing and collected &gt;5,500 lbs in basic need donations</td>
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<tr>
<td></td>
<td>• Volunteered in medical and public health relief efforts</td>
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<tr>
<td></td>
<td>• Hosted seminar “Hurricane Maria: From Emergency to Catastrophe” in October 2017</td>
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<tr>
<td></td>
<td>• Panel moderator for JHU Office of Diversity and Inclusion’s Race in America forum “Six Months after Maria: Public Health Issues in Puerto Rico”</td>
</tr>
<tr>
<td>2017-2018</td>
<td>Research-in-Progress Seminar Series Co-chair, NCI Predoctoral T32 Cancer Training Program, Johns Hopkins Bloomberg School of Public Health (JHSPH)</td>
</tr>
<tr>
<td>2017-2018</td>
<td>Pre-Doctoral Mentoring Lunch Co-chair, NCI Predoctoral T32 Cancer Training Program, JHSPH</td>
</tr>
<tr>
<td>2016-2017</td>
<td>Professional Development and Networking Chair, Latino Public Health Network, JHSPH</td>
</tr>
<tr>
<td>2013-2015</td>
<td>NCI Center to Reduce Cancer Health Disparities’ National Outreach Network Workgroup member (Latino Community Health Educators, Resources, and Measures workgroups)</td>
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<tr>
<td>2009-2010</td>
<td>Co-founder &amp; Vice-President, Health Organization for Latin America, Rollins School of Public Health (RSPH)</td>
</tr>
<tr>
<td>2009-2010</td>
<td>Core Competencies Coordinator, Behavioral Scientists and Health Educators In Training, RSPH</td>
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<tr>
<td>2002-2005</td>
<td>President and Member, Rutgers Unión Estudiantil Puertorriqueña, Rutgers University</td>
</tr>
<tr>
<td>2004</td>
<td>Hispanic Alliance for Career Enhancement Leadership Development Program for Latino Student Leaders</td>
</tr>
</tbody>
</table>
Other Volunteer Activities

June 2018  Career Exploration guest speaker at the Hispanic Outreach Center’s InterCultural Advocacy Institute, Clearwater, FL
August 2014 Tampa Bay Community Cancer Network: Youth Ambassadors Reaching Out Career Day
November 2013 Moffitt Cancer Center Day of Remembrance Memorial Service
August 2009 RSPH Orientation Week Behavioral Sciences and Health Education Student Panel
March 2009, 2010 Visit Emory Behavioral Sciences and Health Education Student Panel
August 2009 RSPH Rollinsteer Day Clyde Shepard Nature Preserve Site Leader
March 2006 Common Grounds Hurricane Katrina Relief Volunteer
Spring 2005 Big Buddy Program at Lincoln Elementary School, New Brunswick, NJ
2004-2006 Rutgers University Dance Marathon

SELECTED MEDIA COVERAGE

• Contributions: Hurricane Relief in Puerto Rico – Emory Public Health Magazine, Fall 2018
• Race in America: Panel to explore public health crises in Puerto Rico – Johns Hopkins University’s The HUB Politics & Society, March 2018
• Unfamiliar homeland: In storm-battered Puerto Rico, a long, difficult road to recovery – Johns Hopkins University’s The HUB Perspectives, November 2017
• National Outreach Network’s Community Health Educators Provide Much-Needed Support to Cancer Survivors from Racially/Ethnically Diverse Communities – NCI’s CRCHD Spotlights, April 2014
• Pregúntale al médico: ¿Cuáles son algunas formas de comer saludable durante la época de fiestas? – Univisión Tampa Bay, December 2013
• Pregúntale al médico: Consejos para prevenir el cáncer – Univisión Tampa Bay, September 2013
• Poverty in Pinellas County: Video report on the findings of the Economic Impact of Poverty report submitted to the Pinellas County Board of County Commissioners – Fox News Tampa Bay, June 2012
• Dr. Jean A. Cadet and student organization Health Organization for Latin America collect $1,475 in supplies for Haiti earthquake relief – February Photo of the Month, ASPPH Friday Letter #1607, February 2010