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Improving Adherence to Colorectal Cancer Screening: A Randomized Intervention to Compare Screener vs. Survivor Narratives

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Abstract

Interventions are needed to increase colorectal cancer screening (CRCS) uptake. Narratives may have advantages over didactic information. We tested different narratives for increasing CRCS intentions and behaviors, and examined their mechanisms of influence. We randomized 477 unscreened adults 50–75 years old to one of three groups: CRCS information only (1) or CRCS information plus a photo and text narrative of a CRC survivor (2) or CRC screener who did not have cancer (3). Photos were tailored on participants' sex, age group, and race/ethnicity. Participants completed online surveys before and after intervention exposure, and one-, six-, and 12-months follow-up. Thirty percent of participants completed CRCS. Narrative conditions (vs. information only) were negatively associated with intention, but also positively influenced intentions through greater emotional engagement. Survivor (vs. screener) narratives were positively associated with CRCS, and had mixed effects on intention – positively through emotional engagement and negatively through self-referencing engagement to self-efficacy. Survivor narratives elicited more negative affect, which had positive and negative influences on intention. Continued research using path models to understand the mechanisms of narrative effects will inform theory development and message design. Additional measurement evaluation is needed to adequately capture and then compare effects of different components of narrative engagement.

Keywords

cancer screening; narratives; testimonials; persuasion

Colorectal cancer (CRC) is the second leading cause of cancer mortality in the US (American Cancer Society, 2017). Despite multiple recommended screening options that have been shown to reduce mortality (Edwards et al., 2010; Winawer et al., 1993), CRC

screening (CRCS) rates are suboptimal (<68%) (Centers for Disease Control and Prevention, 2016). Thus, more effective interventions are needed to increase CRCS.

Communication interventions can reach broad audiences and change health attitudes, intentions, and behavior (Green, 2006; U. S. Department of Health & Human Services, National Institute of Health, & National Cancer Institute, 2004). However, the public is inundated with health information from a variety of sources, and individuals often ignore or discount risk messages (Emanuel et al., 2015). Thus, it is important to identify message features that are more engaging, informative, and persuasive to impact health behaviors and health outcomes.

Narrative communications often involve personal stories or testimonials in contrast to statistical or didactic information approaches (Allen & Preiss, 1997; Perrier & Ginis, 2015; Zebregs, van den Putte, Neijens, & de Graaf, 2014). While didactic arguments favor a particular action, narrative styles use storytelling to depict events and consequences for characters (Kreuter et al., 2007). Because narratives engage audiences in stories that may not be overtly persuasive, narratives -particularly those of real-life experiences- are generally expected to reduce individuals' tendencies to respond defensively by denigrating a message or source (Dal Cin, Zanna, & Fong, 2004; Moyer-Guse, 2008; Slater & Rouner, 2002).

Many behavior change interventions have involved narrative role-model stories or testimonials (Hou, Fernandez, & Parcel, 2004; Pulley, McAlister, Kay, & O'Reilly, 1996; Slater, 1999). In fact, the use of personal narratives in interventions and their availability on the Internet (Herxheimer et al., 2000; McQueen, Arnold, & Baltes, 2015; PatientsLikeMe.com), is becoming ubiquitous and has far outpaced empirical research to assess how and for whom narratives are effective. Further, most research has compared narratives with didactic messages (Allen & Preiss, 1997; Perrier & Ginis, 2015; Shen, Sheer, & Li, 2015; Zebregs et al., 2014) while fewer studies have compared effects of different narratives (e.g., Banerjee & Greene, 2012; Chen, McGlone, & Bell, 2015; Dillard, Fagerlin, Dal Cin, Zikmund-Fisher, & Ubel, 2010; Hopfer, 2012; Jensen et al., 2014). Additionally, fewer studies using narratives have examined behavioral outcomes (e.g., Cherrington et al., 2015; Greene & Brinn, 2003; Hopfer, 2012; Jensen et al., 2014; Lemal & Van den Bulck, 2010; Murphy et al., 2015).

Social Cognitive Theory supports the importance of role models on learning and reinforcement. Individuals can anticipate positive and negative consequences of actions by observing others' behavior which affects the cognitions and motivations of the observer (Bandura, Bryant, & Zillmann, 2001). To improve future behavioral interventions that communicate health information via narratives, we need to identify the best role models to promote health behaviors and examine their potentially different mechanisms of influence. From research on motivation, role model effectiveness is based on perceived relevance, similarity, and self-efficacy that one could achieve similar results (Lockwood & Kunda, 2000). Further, attractive and credible information sources can undermine resistance and enhance agreement or compliance with a persuasive message (Moyer-Guse, 2008; Silvia, 2005).

Although fewer studies have compared narratives, differences have been reported. For example, participants who were objectively more similar (e.g., cultural background, living situation) to the character, were more transported (de Graaf, 2014; Murphy, Frank, Chatterjee, & Baezconde-Garbanati, 2013), but tailoring did not affect intention or behavior (Dillard & Main, 2013; Jensen et al., 2014). Transportation was greater for people reading more positive stories (Banerjee & Greene, 2012; Krakow, Yale, Torres, Christy, & Jensen, 2017). In one study, after reading survivor stories compared with stories in which the character dies from cervical cancer, women reported greater engagement which was positively related to screening intentions; however, the survivor story also elicited greater perceived severity of cervical cancer which decreased their screening intention (Krakow et al., 2017). These results reinforce the notion of competing influences from narratives (Moyer-Guse & Nabi, 2010; Silvia, 2005). Similarly, breast cancer survivor stories were found to positively influence women's mammography use for early detection (Erwin, Spatz, Stotts, Hollenberg, & Deloney, 1996; Kreuter et al., 2010). However, survivors' stories also raised defenses and negative affect among some healthy individuals due for screening (McQueen, Kreuter, Kalesan, & Alcaraz, 2011). In other research, distressing messages or images have been associated with lower perceived risk suggesting a back-firing effect (Brown & Smith, 2007). It is possible that interventions using narratives that focus on surviving cancer may increase engagement but also increase negative affect and undermine self-efficacy for *preventing* CRC through screening colonoscopy.

Compared to people who were diagnosed with cancer, screeners may be perceived by others as more similar and less threatening social referents. However, differences between screeners and survivors (for any cancer) have not been empirically tested. Other studies about physical activity have found that participants preferred and considered themselves more likely to become like a positive role model (people who have experienced a desirable outcome) than a negative role model (people who have experienced an undesirable outcome) (Lockwood, Chasteen, & Wong, 2005). Most people who are screened for CRC are not diagnosed with cancer and these "screeners" may be more influential role models than CRC "survivors". Being exposed to greater details of a survivor's negative experience could also elicit greater psychological distancing and victim blame (Cao & Decker, 2015).

Conceptual Model

Because there is no single theoretical approach for explaining the influence of narratives (Bekker et al., 2012; de Graaf, Hoeken, Sanders, & Beentjes, 2009; Van Laer, De Ruyter, Visconti, & Wetzels, 2014) and the inclusion and operationalizations of model constructs vary across studies, the conceptual model guiding this study (Figure 1) is based on our own work (Kreuter et al., 2008; M. W. Kreuter et al., 2007; McQueen & Kreuter, 2010; McQueen et al., 2011; Vernon & McQueen, 2010) and several relevant theories of information processing (McGuire, Lindzey, & Aronson, 1985; Petty & Cacioppo, 1986), message-effects (Cappella, 2006; Green, 2006; Larkey & Hecht, 2010; Moyer-Guse, 2008; Moyer-Guse & Nabi, 2010; Murphy et al., 2013; Quintero Johnson, Harrison, & Quick, 2013; Slater & Rouner, 2002) and health behavior (Bandura, 1991; Fishbein & Cappella, 2006).

Consistent with the literature, Figure 1 illustrates that elements of the message, especially style (narrative vs. statistical), influence readers' engagement (alternately defined as involvement, transportation, absorption, or presence). Although the specific definitions and domains vary across studies (Busselle & Bilandzic, 2009; de Graaf et al., 2009; Green, 2008), this construct is posited as a key mechanism of narratives' effects in the Transportation-Imagery Model (Green & Brock, 2000; Green & Brock, 2002) and related models (Moyer-Guse, 2008; Slater & Rouner, 2002). Narrative transportation is an affective process involving vivid imagery that bolsters the realism of the experience and allows individuals to adopt the perspective of the characters (i.e., identification) which then reduces negative scrutiny (i.e., counterarguing) of the story (Green, 2004; Green & Brock, 2000; Green et al., 2008; Moyer-Guse, 2008; Moyer-Guse & Nabi, 2010; Murphy, Frank, Moran, & Patnoe-Woodley, 2011; Van Laer et al., 2014). Meta-analysis supports the strong association between transportation and affective measures (Van Laer et al., 2014); thus their close proximity in Figure 1.

Identification is another key component of narrative effects (Slater, Buller, Waters, Archibeque, & LeBlanc, 2003), which involves both liking and perceiving oneself as similar to a character or wanting to be like the character (Dal Cin et al., 2004; Slater & Rouner, 2002). The conceptual and temporal relation between transportation and identification may overlap, and both are considered key components of engagement (de Graaf et al., 2009; Moyer-Guse & Nabi, 2010; Murphy et al., 2011). Identification may prompt more self-referencing, less reactance, and less message scrutiny, which prompt greater persuasion (Chen, Bell, & Taylor, 2017; Hoeken & Sinkeldam, 2014; Silvia, 2005). Identification may be attenuated as a character's experience or perspective is too foreign to the reader (de Graaf et al., 2009). Further, perceiving the story as realistic and relevant to one's personal experiences, enhances audience involvement in the story (Green & Brock, 2000; Quintero Johnson et al., 2013; Sood, 2002).

Narrative transportation reduces counterarguing; one of the most commonly studied types of defensive information processing. Counterarguing involves disputing or derogating the message source or content, which reduces persuasion (e.g., narrative-consistent attitudes and intentions) (Green & Brock, 2002; Slater & Rouner, 2002; Witte, 1992). Greater identification has also been associated with less counterarguing (Moyer-Guse, 2008; Silvia, 2005), whereas negative affect has been associated with greater counterarguing and less message persuasion (Busselle & Bilandzic, 2009; Dal Cin et al., 2004; de Graaf et al., 2009).

Health behavior theories identify multiple key determinants of intention and behavior (Glanz, Rimer, & Viswanath, 2008), and narratives are increasingly used in interventions designed to influence health behaviors. Thus, narrative and elaboration models of persuasion have been combined with health behavior theories (Bae, 2008; Fishbein & Cappella, 2006; Krakow et al., 2017; Slater, 2002) which posit that narratives indirectly influence attitudes, social norms (perceptions of how social referents act and judge the behavior), and self-efficacy (confidence in one's ability to perform the desired action), which predict intention as the most proximal predictor of behavior. For cancer screening behaviors, worry about developing cancer, detecting cancer through screening, and about the discomfort of the screening test itself along with fatalistic beliefs about surviving cancer are also relevant

(Consedine, Magai, Krivoshekova, Ryzewicz, & Neugut, 2004; Jones, Devers, Kuzel, & Woolf, 2010; Philip, DuHamel, & Jandorf, 2010; Powe, 1995). Although we do not provide a comprehensive review of the literature, we note that previous studies testing narratives have reported associations between: identification and risk perceptions (Chen et al., 2017; Moyer-Guse, 2008; Moyer-Guse, Chung, & Jain, 2011; Silvia, 2005) and social norms (Moran, Murphy, Frank, & Baezconde-Garbanati, 2013); affective reactions and attitudes (Busselle & Bilandzic, 2009; de Graaf et al., 2009); engagement/transportation with affect (Green, 2008; Murphy et al., 2011), defenses (Green, 2008; Moyer-Guse, 2008; Moyer-Guse et al., 2011), perceived risk (de Graaf, 2014; Dillard, Ferrer, & Welch, 2018), worry (Dillard et al., 2018), social norms (Bae, 2008), self-efficacy (Chen et al., 2015; Krakow et al., 2017) and intention (Dillard et al., 2018; Krakow et al., 2017); and counterarguing with intention (McQueen, Vernon, & Swank, 2013; Moyer-Guse & Nabi, 2010). The strength of our comprehensive model allows us to examine associations across health behavior theory constructs and determine which are affected by narrative processes, which could aid future intervention design and message development.

Objective

To improve future CRCS interventions that incorporate narratives, we sought to identify the best role model to promote CRCS and examine the potentially different mechanisms of narratives' influence. Specifically, we compared the effects of reading general information about CRC and CRCS against reading this information plus (1) a narrative from a CRC survivor or (2) a narrative from a CRC screener who did not find cancer. Previous reviews have reported a small but significant positive effect of narratives on intention and behavior; thus, we hypothesized small, but significant direct effects (Hypothesis 1) (Braddock & Dillard, 2016; Perrier & Ginis, 2015; Shen et al., 2015; Zebregs et al., 2014). Due to the scarcity of studies comparing narrative role models, we did not make a directional hypothesis when exploring potential differences in the effect of survivor vs. screener narratives on intention and behavior (Research Question 1).

To contribute to the growing literature on the message processing and persuasion effects of narratives, we sought to complement previous studies testing path models (Jensen et al., 2014; Jensen, Yale, Krakow, John, & King, 2017; Krakow et al., 2017; McQueen et al., 2011; Moyer-Guse & Nabi, 2010; Murphy et al., 2011; Quintero Johnson et al., 2013). We expected to find support for the inter-correlations between model variables and indirect effects on intention and behavior in our conceptual model. For example, based on prior studies, narrative transportation, our measure of engagement, was expected to be positively associated with affect and identification with characters, and negatively associated with counterarguing (Hypothesis 2a) (Green, 2004; Green, 2008; Green & Brock, 2000). Given the centrality of transportation in related theories, we expected it to mediate the effects of narratives on intention and behavior (Hypothesis 2b). However, due to the paucity of studies comparing mediating effects across different measures of engagement, we made no *a priori* hypotheses about the consistency or relative effects of associations across domains (e.g., distraction, emotional reaction, experience of imagery).

What this study adds to the literature (beyond the test of a more comprehensive conceptual model) is the comparison of CRCS screener vs. survivor narratives. We expected that participants may perceive CRCS screeners vs. survivors as more similar and elicit less negative affect and counterarguing (Hypothesis 3) (Hoeken & Sinkeldam, 2014; Lockwood et al., 2005; McQueen & Kreuter, 2010; Murphy et al., 2013; Silvia, 2005).

Methods

Target Population Characteristics

We recruited male and female adults aged 50–75 years old, living in the US, with access to the Internet or were living nearby and preferred to participate in person at Washington University. Adults were ineligible if they were unable to read English; had a prior diagnosis of cancer (except non-melanoma skin cancer), Crohn's disease, inflammatory bowel disease or colitis; or were already adherent to CRCS guidelines current at the time of the trial defined as a home-based stool blood test in the past year, a sigmoidoscopy in the past 5 years, or a colonoscopy in the past 10 years (U. S. Preventive Services Task Force, 2008).

Recruitment Procedures

A website was created to describe the study, provide contact information for the research team, assess eligibility, obtain informed consent from eligible individuals, and allow access to the survey and intervention materials to consenting participants. Online surveys were programmed using Qualtrics with custom javascript for tailoring the intervention.

In addition to posting the study on clinicaltrials.gov, we sent electronic invitations to prospective participants from two opt-in registries: 1) Washington University's Volunteer for Health Research Participant Registry and 2) [ResearchMatch.org](https://www.researchmatch.org) hosted by Vanderbilt University. Registry participants meeting basic inclusion criteria available in registry data (i.e., age, cancer history) were introduced to the study by email and were informed about additional eligibility criteria, and could indicate their interest in receiving more information about the study. Interested individuals were then directed to our study website to complete an eligibility screener and provide informed consent. Recruitment invitations and all study procedures and materials were approved by the Human Research Protections Office at Washington University.

Study Procedures

All participants read general information about CRC and CRCS across multiple website screens and could click on additional information, then were randomly assigned within the website program to either 1) immediately proceed to the post-intervention survey (Information-only group) or view an image and read a narrative from 2) an individual who got a colonoscopy and had CRC ("survivor") or 3) an individual who got a colonoscopy and did not have CRC ("screener"), before proceeding to the post-intervention survey. All participants who completed the post-intervention survey were contacted again to complete the one- and 12-month follow-up surveys. Only the one-month survey participants who reported being non-adherent to screening guidelines were invited to complete the six-month follow-up survey. Participation took less than 30 minutes to complete the initial surveys and

less than 10 minutes to complete each follow-up survey. Participants were paid \$20 for completing the initial surveys, \$10 for one-, \$5 for six-, and \$10 for 12-month follow-up surveys.

Intervention materials

The information only condition (Supplementary Material 1) contained general information about CRC and CRCS, screening guidelines, test options, and encouragement to talk to a doctor – consistent with what is presented in educational materials from national organizations. Narrative conditions included a first-person text narrative from a single role model (Supplementary Material 2). The role-model photo was accompanied by a name, age, and brief message to identify the role model as a screener (“I want to tell you how a colonoscopy confirmed my good health and why you should get one too!”) or survivor (“I want to tell you how a colonoscopy saved my life and why you should get one too!”). The photo was tailored to match the participant (gender, race/ethnicity, and age group (50–59, 60–69, 70–75)) based on information collected during the baseline survey. The narratives were adapted from a collection of CRCS stories found online (McQueen et al., 2015). The two narratives reflect the common differences in focus and experience between CRC survivors’ vs. screeners’ stories found online. Specifically, survivors focus more on their diagnosis and treatment. However, to better equate the two role models as asymptomatic screeners, we included details about their preparation for a screening (vs. diagnostic) colonoscopy in both narratives.

Measures

Previously validated and standard survey measures were used whenever possible to measure constructs in our conceptual model. Mean scores were created for multi-item measures.

CRCS behavior (Vernon et al., 2004) was assessed at each follow-up and responses were aggregated over time and dichotomized to reflect receipt of any CRCS test (i.e., home stool blood test, sigmoidoscopy, colonoscopy) during the 12 month follow-up (yes/no). Missing data was imputed to reflect no CRCS, following an intent-to-treat approach.

CRCS intention was measured with 3 items ($\alpha = .91$) assessed using slider bars (coded 1 (not at all) – 100 (extremely)) asking about the likelihood of being screened in the next 6 months, the importance of screening, and commitment to screening.

Engagement.—Several constructs have been examined as aspects of engaging with a narrative including transportation, identification, presence, and flow (Busselle & Bilandzic, 2009). Green and Brock’s (2000) 12-item transportation scale produced three exploratory factors cognitive, affective, and imagery but the authors reported that the subscales “did not differentially predict relevant outcomes” and they used an aggregate measure of the full scale for analysis (p. 704). Many studies have included a varying number of the items from this scale and adapted them to the narrative medium (e.g., print vs. video) (Appel, Gnambs, Richter, & Green, 2015). Sestir and Green (2010) adapted and used 8 of the items ($\alpha = .62$) and did not report any results from factor analysis. In our study, five of the 8 Sestir and Green items involved reactions to what was read and were applicable to all three study

groups, whereas three items and one we included from the Green and Brock measure specifically referred to the “story” that was read and were only completed by narrative participants. Thus, we anticipated using all items for participants in narrative conditions, and a five-item general engagement measure for all participants. However, confirmatory factor analyses did not support aggregate measures, so we considered the item content and the strength of inter-item correlations in retaining items for analysis. Responses were 1=Not at all – 7=Very much.

Two of the eight items were from Green and Brock’s affective factor “What I just read affected me emotionally” and “after reading, I found it easy to put what I read out of my mind,” but they were not strongly correlated ($r=.28$, $p<.001$) so we retained only the first item to reflect emotional engagement, which is consistent with Busselle and Bilandzic (2009) who included this item in a factor of the same name. This item was also the only emotional item retained in other short measures of transportation (Appel et al., 2015; Williams, Green, Kohler, Allison, & Houston, 2010). This item was applicable for all participants in our study and most clearly assessed emotional reactions. Of the remaining 6 Sestir and Green items, the highest correlation of items applicable to the full sample ($r=.30$, $p<.001$) was for “I found my mind wandering while reading” and “While I was reading, activity going on in the room around me was distracting.” We created a mean score for these cognitive-distraction items for all participants.

For participants assigned to either narrative condition, two items were strongly associated ($r=.68$, $p<.001$) and a mean score was created for cognitive-imagery engagement: “While I was reading the story, I could easily picture the events in it taking place” and “I had a vivid mental image of the person in the story.” The item “I could picture myself in the scene of the events described in the story” was strongly correlated with a Green and Brock item not retained in the Sestir and Green scale: “The events in the story are relevant to my life” ($r=.60$, $p<.001$); both items reflect a more personal involvement. The mean score of these two items was used to examine effects of self-referencing engagement. Other investigators have not specifically examined self-referencing engagement as a separate domain of engagement, but by doing so we could test whether different conceptualizations of engagement had consistent or unique associations with model variables. Including this aspect of engagement adds to prior work that examined different dimensions of engagement (Busselle & Bilandzic, 2009; de Graaf et al., 2009; van Leeuwen, Van Den Putte, Renes, & Leeuwis, 2017; Williams et al., 2010). Other research supports the importance of self-referencing during message processing on persuasion (Debevec & Romeo, 1992; Dunlop, Wakefield, & Kashima, 2010; de Graaf 2014).

Identification.—Participants assigned to narrative conditions were asked if they *liked* ($\alpha=.82$) and felt *similar* to the character in the story they read ($\alpha=.86$) with 3 items each with response options 1=Strongly Disagree – 5=Strongly Agree (McQueen & Kreuter, 2010).

Affect.—Using the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988), we assessed the strength of 5 positive (happy, proud, strong, inspired, hopeful; $\alpha=.88$) and 5 negative (angry, guilty, sad, nervous, afraid $\alpha=.82$) emotions felt during the assigned reading (1=Not at all – 7=Extremely).

Counterarguing was assessed with four items ($\alpha=.82$) from previously validated measures of defensive information processes related to CRCS (McQueen, Swank, & Vernon, 2014; McQueen et al., 2013). Sample items include “The medical evidence that colon cancer screening is needed for everyone over age 50 is not convincing” and “The claims that colon cancer screening can prevent cancer are exaggerated.” Response options were 1=Strongly Disagree – 7=Strongly Agree.

CRCS Determinants.—Cancer fatalism was assessed with three items ($\alpha=.84$) “Cancer will kill you no matter when it is found and how it is treated; If someone has cancer, it is already too late to do anything about it; If someone has cancer and gets treatment for it, they will probably still die from cancer” with response options 1=Strongly Disagree – 7=Strongly Agree (Powe, 1995). Absolute perceived risk was assessed with three items ($\alpha=.69$): I am at risk for developing CRC, If I do not get screened regularly, I would feel vulnerable to developing CRC, If I do not get screened regularly, it is likely that I will develop CRC (Weinstein et al., 2007). Response options were 1=Strongly Disagree – 5=Strongly Agree. Worry was assessed with four items ($\alpha=.65$) regarding worry about getting CRC, having a test that shows they have CRC, concern that CRCS will be physically uncomfortable, and concern that there could be complications from the test (Consedine et al., 2004; Vernon, Myers, & Tilley, 1997). Response options were 1=Strongly Disagree – 5=Strongly Agree. Perceived CRCS benefits (8 items; $\alpha=.87$) barriers (6 items; $\alpha=.76$), social influence (3 items reflecting friends and family, peers, and doctor influences; $\alpha=.69$) and self-efficacy (6 items; $\alpha=.90$) for completing CRCS were assessed with seven-point response scales (McQueen, Tiro, & Vernon, 2008).

Covariates assessed at baseline included standard measures of socio-demographics (age, gender, race/ethnicity, education, employment status, income, insurance type, marital status), having a regular healthcare provider, having a physician ever recommend CRCS, a family history of CRC, and any prior CRCS (National Cancer Institute, 2005; Vernon et al., 2004).

Data Analysis

Bivariate analyses examined any baseline differences between participants randomized to study conditions, between participants who did and did not complete both the post-intervention and one-month follow-up, and between those who did and did not provide CRCS status by 12-month follow-up. To assess direct effects of study condition (Hypothesis 1, Research Question 1), we conducted t-tests for CRCS intention and bivariate logistic regression for CRCS behavior. Randomization alleviated differences in potential covariates of CRCS intention and behavior between study groups and analyses including race, education, and physician recommendation for CRCS as covariates did not substantively change conclusions regarding study conditions and were not included in these results.

To examine mechanisms hypothesized in our conceptual model, we examined direct and indirect effects of study condition on multiple intermediate outcomes using path analysis in Mplus (Version 7.31). Using a structural equation modeling (SEM) approach is a more parsimonious approach to evaluating the fit of a whole model, testing multiple hypothesized mediators in a single model, and properly accounting for inter-correlations between model

variables. Separate models were run to compare narrative to non-narrative conditions and to compare screener vs. survivor narratives because some variables were only assessed of narrative participants (e.g., perceived similarity to the character). We tested a saturated model then removed non-significant paths. We used WLSMV model estimation and report standardized path estimates. We used multiple fit indices to evaluate overall model fit including the comparative fit index (CFI) and Root Mean Square Error of Approximation (RMSEA). CFI values between 0.90 – 0.95 or above suggest adequate to good fit (Hu & Bentler, 1995, 1999) and RMSEA values <.06 suggest good model fit (Hu & Bentler, 1995).

Tests of indirect effects were computed using bias corrected bootstrapping with 2000 iterations to identify statistically significant mediators in the model. We report unstandardized point estimates and 95% confidence intervals of significant indirect effects.

Results

Sample Participation

Figure 2 shows the CONSORT flowchart of participation from study invitation to the final 12-month follow-up survey. We determined using follow-up data that 19 participants were ineligible because they were already adherent to CRCS guidelines at baseline, and they were removed from analysis. Analysis included the 473 participants who completed the baseline and post-intervention surveys. Retention at 12-month follow-up was 82%.

Sample Characteristics

Most participants were female (70.0%), white (78.9%) and had education post-high school (90.3%). The average age was 57.4 (SD=6.2). Few participants had previously been screened for CRC (32.3%) or had a family history of CRC (6.5%). Most said they had a regular doctor (72.7%) and had ever received a recommendation for CRCS by a doctor (58%); few (9.1%) had no health insurance. No baseline differences were found between participants randomized to the three study groups (Table 1). Those who started the baseline but did not complete post-intervention and one-month surveys (n=59) were more likely to be non-white ($p<0.001$), have less education ($p=.02$), and no recommendation for CRCS from a doctor ($p=.003$). Participants who never provided screening status information during follow-up and were imputed as non-adherent (n=91) were less likely to be white (OR=0.57; $p=.029$) or have screening recommended by a doctor (OR=0.58; $p=.019$).

Direct effects

By the 12-month follow-up survey, a total of 143 (30.3%) participants reported being screened. No significant differences in intention and behavior were observed when comparing information plus a narrative conditions to the information only group (Table 2). However, when we compared within narrative conditions, participants exposed to the survivor narrative had higher odds of being screened than those who read the screener narrative, despite no differences in intention. Bivariate analyses did not support hypothesis 1 for significant effects of study condition (information plus a narrative vs. information only); however, our comparison by type of narrative role model showed a small but significant difference for CRCS (Research Question 1).

Structural Models

Comparing information plus a narrative to the information only condition, the saturated model was just-identified as expected and a series of steps removed non-significant structural paths. The trimmed model was a good fit to the data, $\chi^2(44)=53.68$, $p=.15$; CFI=.992; RMSEA = .022 (<.001-.039) and explained 60.3% of the variance associated with CRCS intention post-intervention, and 16.3% of CRCS by 12 month follow-up.

Examining indirect effects to understand potential mechanisms, we found that reading CRC information plus a narrative vs. information only was related to greater emotional engagement while reading, which was positively associated with perceived risk, benefits, norms and intention to get screened. However, the small negative effect of reading information plus a narrative vs. information only on intentions remained, illustrating the mixed effects of study condition. Figure 3 includes standardized path coefficients of the final model and Table 3 reports inter-correlations between model variables not shown in Figure 3. Being distracted while reading was related to greater counterarguing and perceived barriers, and less perceived benefits, norms, and self-efficacy for CRCS. Positive affect while reading was related to less defenses and perceived barriers, and greater perceived risk, benefits, norms and self-efficacy. Negative affect while reading was related to more worry and perceived barriers for CRCS. Intention post-intervention was also negatively associated with counterarguing, and positively associated with worry, norms, and self-efficacy. Intention was the only predictor of CRCS by 12-month follow-up. Although not consistent for both measures of engagement, findings support expected associations of engagement with affect and counterarguing (Hypothesis 2a). Further, affect and engagement influenced many of the CRCS determinants from health behavior theories, supporting the inclusion of behavioral determinants in our conceptual model.

Comparing survivor vs. screener narratives, the saturated model was a perfect fit to the data. Non-significant structural paths were removed and the model provided a good fit to the data, $\chi^2(74)=82.67$, $p=.22$; CFI=.993; RMSEA=.019 (<.001-.039) and explained 63.7% of the variance associated with CRCS intention post-intervention and 28.3% of CRCS by 12 month follow-up.

Compared with reading a screener narrative, reading a survivor narrative was directly associated with more emotional engagement, less self-referencing engagement, more negative affect, and greater CRCS by 12 months follow up. Standardized path estimates and p-values for the final model are shown in Figure 4. Greater cognitive imagery engagement while reading was related to less cancer fatalism, worry, and perceived barriers, whereas greater self-referencing engagement was related to less counterarguing and cancer fatalism, and greater perceived benefits, norms and self-efficacy for CRCS. Being more distracted while reading was positively associated with counterarguing and perceived barriers, and negatively associated with getting CRCS. Greater emotional engagement while reading was associated with greater perceived risk and worry for CRC, and greater intention to get screened. Table 4 reports inter-correlations among model variables not shown in Figure 4. Although there was not consistency across all measures of engagement, there was general support for expected associations between engagement and affect and identification with

characters. These results along with the observed associations with counterarguing shown in Figure 4 support Hypothesis 2a.

Positive affect was related to greater perceived risk, benefits, and self-efficacy and fewer perceived barriers, whereas negative affect was positively associated with worry and perceived barriers to CRCS, and negatively associated with self-efficacy (Figure 4). Liking the narrative protagonist was associated with less worry and more perceived benefits and self-efficacy for CRCS. Feeling similar to the narrative protagonist was associated with greater perceived risk for CRC, worry, cancer fatalism, and norms for CRCS. Hypothesis 3 posited that participants exposed to the screener vs. survivor narrative may report greater similarity, and less negative affect and counterarguing. Notably, feeling similar to the protagonist was strongly positively associated with self-referencing engagement, which was strongly negatively associated with counterarguing (Table 4). The initial negative association ($r = -.13$, $p < .05$) between survivor vs. screener narrative condition and perceived similarity to the protagonist was not significant in the final structural model. Thus, the only clear partial support for Hypothesis 3 is that survivor narratives elicited more negative affect.

Screening intentions post-intervention were positively associated with emotional engagement while reading, worry, norms, and self-efficacy, and negatively associated with counterarguing. CRCS behavior was predicted by reading a survivor vs. screener narrative, reporting less distraction while reading intervention materials, and greater CRCS intention post-intervention. Thus, our research question regarding whether survivor vs. screener narratives would produce different effects suggests that survivor stories had a direct effect on behavior and positive influences on intention through greater emotional engagement. However, survivor narratives elicited less self-referencing engagement and more negative affect, both of which affected CRCS determinants (i.e., self-efficacy) that impacted intention and behavior. Cumulatively, these results illustrate the competing effects of specific role models promoting CRCS.

Indirect effects tests.

Study condition (information plus a narrative vs. information only) had a *direct* effect on intention in the SEM analysis. Despite indirect effects of study condition, no significant mediators were identified.

When comparing survivor vs. screener narratives, study condition influenced post-intervention intention through emotional engagement (1.65, $p = .039$; 95% CI: 0.33, 3.73) and through negative affect to worry (0.58, $p = .025$; 95% CI: .15, 1.49) and negative affect to self-efficacy (−1.38, $p = .009$; 95% CI: −2.65, −.53). Study condition was directly and indirectly related to CRCS behavior through the path from negative affect to worry (.01, $p = .033$; 95% CI: .002, .026) and negative affect to self-efficacy (−.02, $p = .011$; 95% CI: −.05, −.01) to intention. One of four measures of engagement was a significant mediator of narrative effects, which is consistent with but not highly supportive of Hypothesis 2b that transportation is a key mediator.

Discussion

Our results provided modest support for theoretical frameworks that highlight the superior *engagement* of narratives compared to information-only communication approaches (Green & Brock, 2000; Moyer-Guse, 2008; Slater & Rouner, 2002). Exploring the mechanisms of effect and differences by narrative role model expanded our understanding of the mixed effects of information plus a narrative vs. information alone. Hypothesis 1 was based on previous meta-analyses that concluded that narratives promoting health screening behaviors have a small but significant *positive* effect on persuasion compared to non-narratives (Shen et al., 2015), and may have a greater influence on intentions than statistics (Zebregs et al., 2014). Bivariate analyses showed null effects and SEM results showed a small but significant *negative* association between information plus a narrative vs. information only with CRCS intentions, which fail to support Hypothesis 1. This is not the first narrative study with unexpected findings (e.g., Jensen et al., 2017; Nyhan, Reifler, Richey, & Freed, 2014). Consistent with prior reviews, we found small effect sizes, which may have limited the statistical differences found with our sample. In a larger population trial with small effect sizes (McGregor et al., 2016), narratives had a significant influence on intentions through greater positive beliefs about CRCS. Hypothesis 2 addressed associations with engagement and its role as a mediator, which were partially supported. As we discuss later, there is room for improvement in measures of engagement, and many existing measures are specific to reactions to stories and characters and cannot be applied to informational messages making direct comparisons difficult. Further, all participants read the information messages, which may have overshadowed the impact of brief narratives.

Our study contributed to a small, but growing literature, showing that not all role models are the same. Most previous studies have compared narratives to information-only approaches, whereas we also compared the effects of different narrative role models. Our findings support propositions of the entertainment overcoming resistance model (Moyer-Guse & Nabi, 2010), which recognizes that different features of the character and message will influence different information processing and persuasive outcomes. The extant literature did not support a hypothesis for how CRC survivor vs. screener stories might differently influence intentions and behavior. Our results favored the survivor narrative for its direct effect on behavior. However, there were interesting indirect effects on intention that illustrate competing effects of narratives. Our results showed that survivor vs. screener narratives elicited greater emotional engagement and negative affect, which both increased worry and had positive effects on intention to screen; however, greater negative affect was also associated with *less* self-efficacy, which is a strong predictor of intention to screen. It was screener stories that prompted more self-referencing engagement, which reduced counterarguing which helped temper its negative influence on intentions to screen. More experimental research is warranted to tease out the different mediating pathways or competing effects of message features. Previous research has shown that participants are more likely to identify with “positive” role models that act responsibly (Chen et al., 2017; Tal-or & Cohen, 2010), and be more fearful and motivated by a narrative highlighting negative consequences (Cox & Cox, 2001). Thus, cancer survivor narratives may evoke sufficient fear and motivation to avoid a similar fate that may prompt greater action than

screeners narratives, but only when participants can sufficiently identify with the role model. Future experiments could test different narratives to identify the optimal ingredients that influence selective mediating pathways to produce maximum persuasion. Due to practical limitations in participant recruitment and the number of externally-valid variations of narratives that can be efficiently studied, future studies may benefit from fractional factorial designs (Collins, 2018).

Using a SEM approach allowed us to test a comprehensive conceptual model that extends previous studies that have focused on more proximal outcomes such as persuasion, risk perception, and intention in separate analyses that ignore correlations between outcomes. Results supported the overall fit of the model to the data. Our results, along with a growing number of previous studies examining path models, show complex indirect and moderated effects of narratives on various outcomes. Continued research to better understand the mechanisms of narrative effects will inform future theory development and message design. Different operationalizations of engagement (cognitive, emotional, and self-referencing) influenced different endogenous model variables, but greater engagement was always desirable. Beyond engagement, our results also support the independent examination of emotions as important proximal message targets, but more research on the different effects emotions can produce is needed (Evans et al., 2018; Yoo, Kreuter, Lai, & Fu, 2015).

Fewer studies about narratives have examined behavioral outcomes. A previous study showed that reading an informational pamphlet that included a narrative about a CRC survivor vs. information only was positively related with later CRCS (Jensen et al., 2014). Our study found the same positive association with CRCS when participants read about a CRC survivor vs. a screener. Collectively these studies support the motivating force of survivor stories, but neither study identified mediators of narrative effects on CRCS behavior. In our study, health behavior determinants were better at explaining CRCS intention than behavior, and it is likely that unmeasured variables related to navigating the healthcare system are better at explaining the gap between CRCS intention and behavior.

Limitations.

Consistent with previous studies, our measures of engagement and emotions felt by participants while reading the study materials were all administered immediately following participants' exposure and we are unable to identify the temporal ordering of effects during the information processing phase. Our conceptual model was based on previous theory and empirical findings which may evolve as new measures, models, and approaches (e.g., (Kessels, Ruiter, & Jansma, 2010; Schmalzle, Hacker, Renner, Honey, & Schupp, 2013)) are applied to understanding how narratives "work".

Although we used an existing measure of narrative transportation to assess participants' engagement with what they read, analyses did not support the use of an aggregate measure. Future research on both theory and measurement may elucidate the conditions that support an integrative or global assessment of narrative engagement vs. domain-specific measures of each hypothesized component necessary for persuasion. Green & Brock (2000) found no differences in associations with their three factors of transportation which justified an aggregate measure in analysis. Our experience with and decision to include measures of

different facets of engagement in analyses was supported by our findings that different measures of engagement were related to different endogenous variables in our model, which is consistent with previous studies exploring different domains of engagement (Busselle & Bilandzic, 2009; de Graaf et al., 2009; Williams et al., 2010). Additional measurement evaluation is needed to adequately capture the influential aspects of this construct, how it relates to and is unique from other related constructs (identification), and to inform future message design to maximize the types of engagement shown to have greater effects on target outcomes of interest. For example, we found that survivor vs. screener role model narratives were less likely to prompt self-referential processing possibly due to not feeling as similar to the survivor compared with the screener. Future research on psychological distancing (Cao & Decker, 2015) related to negative role models, especially cancer survivors is also needed to improve our selection or design of influential survivor narratives.

The results of this study may not generalize to populations less able to participate in online studies; however, conducting our study online was intended to mimic the context in which people are likely to find and read similar narratives (McQueen et al. 2015; [PatientsLikeMe.com](https://www.patientslikeme.com)). Our narratives were largely based on existing stories on the internet and prioritized external validity over internal validity. Also, only a single narrative each was used to compare survivors vs. screeners, which may overlook other elements (confounders) within each narrative and unintended differences between them that could influence outcomes. Lastly, the presentation of factual information and narratives were not counter-balanced; future studies could explore potential differences by varying the sequence of narrative and didactic information vs. an integrated format vs. narratives alone.

Conclusions.

The increasing use of narratives in behavioral interventions, health communication, decision aids, and social media necessitates greater empirical evaluation. Understanding how narratives influence cognitions and behaviors is critical to maximizing their effectiveness, reducing any negative consequences, and developing appropriate applications for diverse settings. Our results support a growing literature on the important differences that can emerge from different role models or message features. Future research should also address the complex and competing direct and indirect effects of narratives on multiple outcomes to provide more empirical support for a comprehensive conceptual framework of narrative effects.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

- Allen M, & Preiss RW (1997). Comparing the persuasiveness of narrative and statistical evidence using meta-analysis. *Communication Research Reports*, 14(2), 123–131.
- American Cancer Society. (2017). Cancer facts and figures 2017. In. Atlanta, GA: American Cancer Society.
- Appel M, Gnambs T, Richter T, & Green MC (2015). The transportation scale-short form (TS-SF). *Media Psychology*, 18(2), 243–266.
- Bae H (2008). Entertainment-education and recruitment of cornea donors: The role of emotion and issue involvement. *Journal of Health Communication*, 13(1), 20–36. [PubMed: 18307134]
- Bandura A (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes*, 50, 248–287.
- Bandura A, Bryant J, & Zillmann D (2001). Social cognitive theory of mass communication In *Media effects: Advances in theory and research* (Vol. 2). Hillsdale, N.J.: Earlbaum.
- Banerjee SC, & Greene K (2012). ‘I quit’ versus ‘I’m sorry I used’: A preliminary investigation of variations in narrative ending and transportation. *Psychology & Health*, 27(11), 1–15.
- Bekker HL, Winterbottom A, Butow P, Dillard A, Feldman-Stewart D, Fowler J, . . . Volk, R. (2012). Using personal stories In Volk R & Llewellyn-Thomas H (Eds.), *Update of the International Patient Decision Aids Standards (IPDAS) collaboration’s background document*. Chapter E. <http://ipdas.ohri.ca/resources.html>.
- Braddock K, & Dillard JP (2016). Meta-analytic evidence for the persuasive effect of narratives on beliefs, attitudes, intentions, and behaviors. *Communication Monographs*, 83(4), 446–467.
- Brown S, & Smith Z (2007). The inhibitory effect of a distressing anti-smoking message on risk perceptions in smokers. *Psychology And Health*, 22(3), 255–268.
- Busselle R, & Bilandzic H (2009). Measuring narrative engagement. *Media Psychology*, 12(4).
- Cao X, & Decker D (2015). Psychological distancing: the effects of narrative perspectives and levels of access to a victim’s inner world on victim blame and helping intention. *International Journal of Nonprofit and Voluntary Sector Marketing*, 20(1), 12–24.
- Cappella JN (2006). Integrating message effects and behavior change theories: Organizing comments and unanswered questions. *Journal of Communication*, 56, S265–279.
- Centers for Disease Control and Prevention. (2016). Colorectal cancer screening in U.S. Quick facts. Behavioral Risk Factor Surveillance System, 2016.
- Chen M, Bell RA, & Taylor LD (2017). Persuasive effects of point of view, protagonist competence, and similarity in a health narrative about type 2 diabetes. *Journal of Health Communication*, 22(8), 702–712. [PubMed: 28759317]
- Chen M, McGlone MS, & Bell RA (2015). Persuasive effects of linguistic agency assignments and point of view in narrative health messages about colon cancer. *Journal of Health Communication*, 20(8), 977–988. [PubMed: 26087078]
- Cherrington A, Williams JH, Foster PP, Coley HL, Kohler C, Allison JJ, . . . Houston TK (2015). Narratives to enhance smoking cessation interventions among African-American smokers, the ACCE project. *BMC Research Notes*, 1–10. doi:10.1186/s13104-015-1513-1 [PubMed: 25645429]
- Collins LM (2018). Optimization of behavioral, biobehavioral, and biomedical interventions The Multiphase Optimisation Strategy (MOST). New York: Springer.
- Consedine NS, Magai C, Krivoshekova YS, Ryzewicz L, & Neugut AI (2004). Fear, anxiety, worry, and breast cancer screening behavior: A critical review. *Cancer Epidemiology, Biomarkers and Prevention*, 13(4), 501–510.
- Cox D, & Cox AD (2001). Communicating the consequences of early detection: The role of evidence and framing. *Journal of Marketing*, 65, 91–103.
- Dal Cin S, Zanna MP, & Fong GT (2004). Narrative persuasion and overcoming resistance In Knowles ES & Linn JA (Eds.), *Resistance and Persuasion* (pp. 175–191). Mahwah, NJ: Lawrence Erlbaum Associates.

- Debevec K, & Romeo JB (1992). Self-referent processing in perceptions of verbal and visual commercial information. *Journal of Consumer Psychology*, 1(1), 83–102.
- De Graaf A (2014). The effectiveness of adaptation of the protagonist in narrative impact: Similarity influences health beliefs through self-referencing. *Human Communication Research*, 40(1), 73–90.
- De Graaf A, Hoeken H, Sanders J, & Beentjes H (2009). The role of dimensions of narrative engagement in narrative persuasion. *Communications*, 34, 385–405.
- Dillard A, Ferrer RA, & Welch JD (2018). Associations between narrative transportation, risk perception and behaviour intentions following narrative messages about skin cancer. *Psychology & Health*, 33(5), 573–593. [PubMed: 28975805]
- Dillard AJ, Fagerlin A, Dal Cin S, Zikmund-Fisher BJ, & Ubel PA (2010). Narratives that address affective forecasting errors reduce perceived barriers to colorectal cancer screening. *Social Science and Medicine*, 71(1), 45–52. [PubMed: 20417005]
- Dillard AJ, & Main JL (2013). Using a health message with a testimonial to motivate colon cancer screening: Associations with perceived identification and vividness. *Health Education & Behavior*, 40(6), 673–682. [PubMed: 23355445]
- Dunlop SM, Wakefield M, & Kashima Y (2010). Pathways to persuasion: Cognitive and experiential responses to health-promoting mass media messages. *Communication Research*, 37(1), 133–164.
- Edwards BK, Ward E, Kohler BA, Ehemann C, Zauberman AG, Anderson RN, . . . Ries LAG (2010). Annual Report to the Nation on the Status of Cancer, 1975–2006, Featuring Colorectal Cancer Trends and Impact of Interventions (Risk Factors, Screening, and Treatment) to Reduce Future Rates. *Cancer*, 116, 544–573. [PubMed: 19998273]
- Emanuel AS, Kiviniemi MT, Howell JL, Hay JL, Waters E, Orom H, & Shepperd JA (2015). Avoiding cancer risk information. *Social Science & Medicine*, 147, 113–120. [PubMed: 26560410]
- Erwin DO, Spatz TS, Stotts C, Hollenberg JA, & Deloney LA (1996). Increasing mammography and breast self-examination in African American women using the Witness Project model. *Journal of Cancer Education*, 11(4), 210–215. [PubMed: 8989634]
- Evans AT, Peters E, Shoben AB, Meilleur LR, Klein EG, Tompkins MK, & Tusler M (2018). Cigarette graphic warning labels increase both risk perceptions and smoking myth endorsement. *Psychology & Health*, 33(2), 213–234. [PubMed: 28385093]
- Fishbein M, & Cappella JN (2006). The role of theory in developing effective health communications. *Journal of Communication*, 56, S1–17.
- Glanz K, Rimer BK, & Viswanath K (2008). *Health behavior and health education: theory, research, and practice* (5th ed.). San Francisco, CA: Jossey-Bass.
- Green MC (2004). Transportation into narrative worlds: The role of prior knowledge and perceived realism. *Discourse Processes*, 38(2), 247–266.
- Green MC (2006). Narratives and cancer communication. *Journal of Communication*, 56, S163–183.
- Green MC (2008). Research challenges in narrative persuasion. *Information Design Journal*, 16(1), 47–52.
- Green MC, & Brock TC (2000). The role of transportation in the persuasiveness of public narratives. *Journal of Personality and Social Psychology*, 79(5), 701–721. [PubMed: 11079236]
- Green MC, & Brock TC (2002). In the mind's eye: Transportation-imagery model of narrative persuasion. In Green MC, Strange JJ, & Brock TC (Eds.), *Narrative Impact: Social and Cognitive Foundations* (pp. 315–341). Mahwah, NJ: Lawrence Erlbaum Associates.
- Green MC, Kass S, Carrey J, Herzig B, Feeney R, & Sabini J (2008). Transportation across Media: Repeated Exposure to Print and Film. *Media Psychology*, 11(4), 512–539.
- Greene K, & Brinn LS (2003). Messages influencing college women's tanning bed use: Statistical versus narrative evidence format and a self-assessment to increase perceived susceptibility. *Journal of Health Communication*, 8(5), 443–461. [PubMed: 14530147]
- Herxheimer A, McPherson A, Miller R, Shepperd S, Yaphe J, & Ziebland S (2000). Database of patients' experiences (DIPEX): A multi-media approach to sharing experiences and information. *Lancet*, 355, 1540–1543. [PubMed: 10801187]
- Hoeken H, & Sinkeldam J (2014). The role of identification and perception of just outcome in evoking emotions in narrative persuasion. *Journal of Communication*.

- Hopfer S (2012). Effects of a narrative HPV vaccination intervention aimed at reaching college women: A randomized controlled trial. *Prevention Science*, 13(2), 173–182. [PubMed: 21993613]
- Hou SI, Fernandez ME, & Parcel GS (2004). Development of a cervical cancer educational program for Chinese women using intervention mapping. *Health Promotion Practice*, 5(1), 80–87. [PubMed: 14965438]
- Hu L, & Bentler PM (1995). Evaluating model fit In Hoyle RH (Ed.), *Structural Equation Modeling* (pp. 76–99). Thousand Oaks, CA: Sage Publications.
- Hu L, & Bentler PM (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1–55.
- Jensen JD, King AJ, Carcioppolo N, Krakow M, Samadder NJ, & Morgan S (2014). Comparing tailored and narrative worksite interventions at increasing colonoscopy adherence in adults 50–75: A randomized controlled trial. *Social Science & Medicine*, 104, 31–40. doi:10.1016/j.socscimed.2013.12.003 [PubMed: 24581059]
- Jensen JD, Yale RN, Krakow M, John KK, & King AJ (2017). Theorizing foreshadowed death narratives: Examining the impact of character death on narrative processing and skin self-exam intentions. *Journal of Health Communication*, 22, 84–93. [PubMed: 28060585]
- Jones RM, Devers KJ, Kuzel AJ, & Woolf SH (2010). Patient-reported barriers to colorectal cancer screening: A mixed-methods analysis. *American Journal of Preventive Medicine*, 38(5), 508–516. [PubMed: 20409499]
- Kessels LTE, Ruiter RAC, & Jansma BM (2010). Increased attention but more efficient disengagement: Neuroscientific evidence for defensive processing of threatening health information. *Health Psychology*, 29(4), 346–354. [PubMed: 20658820]
- Krakow M, Yale RN, Torres DP, Christy K, & Jensen JD (2017). Death narratives and cervical cancer: Impact of character death on narrative processing and HPV vaccination *Health Psychology*, 36(12), 1173–1180. [PubMed: 28749148]
- Kreuter MW, Buskirk TD, Holmes K, Clark EM, Robinson L, Rath S, . . . Mathews K (2008). What makes cancer survivor stories work? An empirical study among African American women. *Journal of Cancer Survivorship*, 2(1), 33–44. [PubMed: 18648985]
- Kreuter MW, Green MC, Cappella JN, Slater MD, Wise ME, Storey D, . . . Wooley S (2007). Narrative communication in cancer prevention and control: A framework to guide research and application. *Annals of Behavioral Medicine*, 33(3), 221–235. [PubMed: 17600449]
- Kreuter MW, Holmes K, Alcaraz K, Kalesan B, Rath S, Richert M, . . . Clark EM (2010). Comparing narrative and informational videos to increase mammography in low-income African American women. *Patient Education & Counseling*, 81, S6–S14. doi:10.1016/j.pec.2010.09.008 [PubMed: 21071167]
- Larkey LK, & Hecht M (2010). A model of effects of narrative as culture-centric health promotion. *Journal of Health Communication*, 15(2), 114–135. [PubMed: 20390982]
- Lemal M, & Van den Bulck J (2010). Testing the effectiveness of a skin cancer narrative in promoting positive health behavior: A pilot study. *Preventive Medicine*, 51(2), 178–181. [PubMed: 20450930]
- Lockwood P, Chasteen AL, & Wong C (2005). Age and regulatory focus determine preferences for health-related role models. *Psychology and Aging*, 20(3), 376–389.
- Lockwood P, & Kunda Z (2000). Outstanding role models: Do they inspire or demoralize us? In Tesser A, Felson RB, & Suls JM (Eds.), *Psychological perspectives on self and identity*. Washington DC: American Psychological Association.
- McGregor LM, von Wagner C, Atkin W, Kralj-Hans I, Halloran SP, Handley G, . . . Wardle J (2016). Reducing the social gradient in uptake of the NHS Colorectal Cancer Screening Programme using a narrative-based information leaflet: A cluster-randomised trial. *Gastroenterology Research & Practice*, 1–10. doi:10.1155/2016/3670150
- McGuire WJ, Lindzey G, & Aronson E (1985). Attitudes and attitude change In *The handbook of social psychology* (Vol. 3rd, pp. 233–346). New York, NY: Random House.
- McQueen A, Arnold L, & Baltes M (2015). Characterizing online narratives about colonoscopy experiences: Comparing colon cancer “screeners” vs. “survivors”. *Journal of Health Communication*, 20, 958–968. [PubMed: 26087222]

- McQueen A, & Kreuter MW (2010). Women's cognitive and affective reactions to breast cancer survivor stories: A structural equation analysis. *Patient Education and Counseling*, 81, S15–21. PMID: PMC2993782. [PubMed: 20850258]
- McQueen A, Kreuter MW, Kalesan B, & Alcaraz K (2011). Understanding narrative effects: The impact of breast cancer survivor stories on message processing, attitudes, and beliefs among African American women. *Health Psychology*, 30(6), 674–682. PMID: PMC3217077. [PubMed: 21895370]
- McQueen A, Swank PR, & Vernon SW (2014). Examining patterns of association with defensive information processing about colorectal cancer screening. *Journal of Health Psychology*, 9(11), 1443–1458.
- McQueen A, Tiro JA, & Vernon SW (2008). Construct validity and invariance of four factors associated with colorectal cancer screening across gender, race, and prior screening. *Cancer Epidemiology, Biomarkers and Prevention*, 17(9), 2231–2237. PMID: PMC2603464.
- McQueen A, Vernon SW, & Swank PR (2013). Construct definition and scale development for defensive information processing: An application to colorectal cancer screening. *Health Psychology*, 32(2), 190–202. [PubMed: 22353026]
- Moran MB, Murphy ST, Frank LB, & Baezconde-Garbanati L (2013). The ability of narrative communication to address health-related social norms. *International Review of Social Research*, 3(2), 131–149. [PubMed: 24179677]
- Moyer-Guse E (2008). Toward a theory of entertainment persuasion: Explaining the persuasive effects of entertainment-education messages. *Communication Theory*, 18(3), 407–425.
- Moyer-Guse E, Chung AH, & Jain P (2011). Identification with characters and discussion of taboo topics after exposure to an entertainment narrative about sexual health. *Journal of Communication*, 61(3), 387–406.
- Moyer-Guse E, & Nabi RL (2010). Explaining the effects of narrative in an entertainment television program: Overcoming resistance to persuasion. *Human Communication Research*, 36(1), 26–52.
- Murphy ST, Frank LB, Chatterjee JS, & Baezconde-Garbanati L (2013). Narrative versus non-narrative: The role of identification, transportation, and emotion in reducing health disparities. *Journal of Communication*, 63(1), 116–137.
- Murphy ST, Frank LB, Chatterjee JS, Moran MB, Nan Zhao A, de Herrera P, & Baezconde-Garbanati LA (2015). Comparing the Relative Efficacy of Narrative vs Nonnarrative Health Messages in Reducing Health Disparities Using a Randomized Trial. *American Journal of Public Health*, 105(10), 2117–2123. [PubMed: 25905845]
- Murphy ST, Frank LB, Moran MB, & Patnoe-Woodley P (2011). Involved, transported, or emotional? Exploring the determinants of change in knowledge, attitudes, and behavior in entertainment-education. *Journal of Communication*, 61(3), 407–431.
- National Cancer Institute. (2005). Health Information National Trends Survey (HINTS). Retrieved from http://hints.cancer.gov/docs/HINTS_2005_Instrument-English.pdf
- Nyhan B, Reifler J, Richey S, & Freed GL (2014). Effective messages in vaccine promotion: A randomized trial. *Pediatrics*, 133(4), e835–842. [PubMed: 24590751]
- PatientsLikeMe. website <http://www.patientslikeme.com>.
- Perrier MJ, & Ginis KAM (2015). Narrative interventions for health screening behaviours: A systematic review. *Journal of Health Psychology*, 22(3), 375–393.
- Petty RE, & Cacioppo JT (1986). The elaboration likelihood model of persuasion In Berkowitz L (Ed.), *Advances in Experimental Social Psychology* (pp. 123–205). New York, NY: Academic Press.
- Philip EJ, DuHamel K, & Jandorf L (2010). Evaluating the impact of an educational intervention to increase CRC screening rates in the African American community: A preliminary study. *Cancer Causes and Control*, 21(10), 1685–1691. [PubMed: 20535541]
- Powe BD (1995). Fatalism among elderly African Americans: Effects on colorectal cancer screening. *Cancer Nursing*, 18(5), 385–392. [PubMed: 7585493]
- Pulley L, McAlister AL, Kay LS, & O'Reilly K (1996). Prevention campaigns for hard-to-reach populations at risk for HIV infection: Theory and implementation. *Health Education Quarterly*, 23(4), 488–496. [PubMed: 8910026]

- Quintero Johnson JM, Harrison K, & Quick BL (2013). Understanding the effectiveness of the entertainment-education strategy: An investigation of how audience involvement, message processing, and message design influence health information recall. *Journal of Health Communication*, 18, 160–178. [PubMed: 23030409]
- Schmalzle R, Hacker F, Renner B, Honey C, & Schupp HT (2013). Neural correlates of risk perception during real-life risk communication. *The Journal of Neuroscience*, 33(25), 10340–10347. [PubMed: 23785147]
- Sestir M, & Green MC (2010). You are who you watch: Identification and transportation effects on temporary self-concept. *Social Influence*, 5(4), 272–288.
- Shen F, Sheer VC, & Li R (2015). Impact of narratives on persuasion in health communication: A meta-analysis. *Journal of Advertising*, 44(2), 105–113.
- Silvia PJ (2005). Deflecting Reactance: The Role of Similarity in Increasing Compliance and Reducing Resistance. *Basic and Applied Social Psychology*, 27(3), 277–284.
- Slater MD (1999). Drinking and driving PSAs: A content analysis of behavioral influence strategies. *Journal of Alcohol and Drug Education*, 44(3), 68–81.
- Slater MD (2002). Entertainment education and the persuasive impact of narratives In Green MC, Strange JJ, & Brock TC (Eds.), *Narrative Impact: Social and Cognitive Foundations* (pp. 157–181). Mahwah, NJ: Lawrence Erlbaum Associates.
- Slater MD, Buller DB, Waters E, Archibeque M, & LeBlanc M (2003). A test of conversational and testimonial messages versus didactic presentations of nutrition information. *Journal of Nutrition Education and Behavior*, 35(5), 255–259. [PubMed: 14521825]
- Slater MD, & Rouner D (2002). Entertainment-education and elaboration likelihood: Understanding the processing of narrative persuasion. *Communication Theory*, 12(2), 173–191.
- Sood S (2002). Audience involvement and entertainment-education. *Communication Theory*, 12(2), 153–172.
- Tal-or N, & Cohen J (2010). Understanding audience involvement: Conceptualizing and manipulating identification and transportation. *Poetics*, 38, 402–418.
- U. S. Department of Health & Human Services, National Institute of Health, & National Cancer Institute. (2004). *Making health communication programs work*.
- U. S. Preventive Services Task Force. (2008). Screening for colorectal cancer: U.S. Preventive Task Force recommendation. *Annals of Internal Medicine*, 149(9), 627–637. [PubMed: 18838716]
- Van Laer T, De Ruyter K, Visconti LM, & Wetzels M (2014). The extended transportation-imagery model: A meta-analysis of the antecedents and consequences of consumers' narrative transportation. *Journal of Consumer Research*, 40(5), 797–817.
- van Leeuwen L, Van Den Putte B, Renes RJ, & Leeuwis C (2017). Do narrative engagement and recipients' thoughts explain the impact of an entertainment-education narrative on discouraging binge drinking? *Media Psychology*, 20, 194–220.
- Vernon SW, & McQueen A (2010). Colorectal cancer screening In Holland JC, Breitbart WS, Jacobson PB, Lederberg MS, Loscalzo MJ, & McCorkle R (Eds.), *Psycho-Oncology* (2nd ed., pp. 71–83). New York, NY: Oxford University Press.
- Vernon SW, Meissner HI, Klabunde CN, Rimer BK, Ahnen D, Bastani R, . . . Zapka J (2004). Measures for ascertaining use of colorectal cancer screening in behavioral, health services, and epidemiologic research. *Cancer Epidemiology, Biomarkers and Prevention*, 13(6), 898–905.
- Vernon SW, Myers RE, & Tilley BC (1997). Development and validation of an instrument to measure factors related to colorectal cancer screening adherence. *Cancer Epidemiology, Biomarkers and Prevention*, 6, 825–832.
- Watson D, Clark LA, & Tellegen A (1988). Development and validation of brief measures of positive and negative affect: The PANAS scale. *Journal of Personality and Social Psychology*, 54(6), 1063–1070. [PubMed: 3397865]
- Weinstein ND, Kwitel A, McCaul KD, Magnan RE, Gerrard M, & Gibbons FX (2007). Risk perceptions: assessment and relationship to influenza vaccination. *Health Psychology*, 26(2), 146–151. [PubMed: 17385965]

- Williams JH, Green MC, Kohler C, Allison JJ, & Houston TK (2010). Stories to communicate risks about tobacco: Development of a brief scale to measure transportation into a video story-The ACCE Project. *Health Education Journal*, 70(2), 184–191.
- Winawer SJ, Zauber AG, Ho MN, O'Brien MJ, Gottlieb LS, Sternberg SS, . . . Stewart ET (1993). Prevention of colorectal cancer by colonoscopic polypectomy. The National Polyp Study Workgroup. *New England Journal of Medicine*, 329, 1977–1981. [PubMed: 8247072]
- Witte K (1992). Putting the fear back into fear appeals: The extended parallel processing model. *Communication Monographs*, 59, 330–349.
- Yoo JH, Kreuter MW, Lai C, & Fu Q (2015). Understanding narrative effects: The role of discrete negative emotions on message processing and attitudes among low-income African American women. *Health Communication*, 29(5), 494–504.
- Zebregs S, van den Putte B, Neijens P, & de Graaf A (2014). The Differential Impact of Statistical and Narrative Evidence on Beliefs, Attitude, and Intention: A Meta-Analysis. *Health Communication*, 1–8.

Figure 1.
Conceptual Model

^a Surveys sent to post-intervention survey respondents who did not report screening at one month follow-up

^b Surveys sent to post-intervention survey respondents who did not previously withdraw from study participation

Figure 2.
CONSORT flow of participation

Figure 3. Standardized estimates for significant paths comparing information plus a narrative vs. information only

Figure 4.
Standardized estimates for significant paths comparing Survivor vs. Screener Narratives

Table 1.

Sample characteristics by study group

	Information only N=159	Info plus a Screener Narrative N=155	Info plus a Survivor Narrative N=159	Total N=473	p-value
N (%) or Mean (SD)					
Age (50–75 years)	57.1 (5.8)	57.8 (6.6)	57.4 (6.2)	57.4 (6.2)	.61
Gender					
Male	52 (32.7)	48 (31.0)	42 (26.4)	142 (30.0)	
Female	107 (67.3)	107 (69.0)	117 (73.6)	331 (70.0)	.45
Race					
White	117 (73.6)	122 (78.7)	122 (76.7)	361 (76.3)	
Non-White	42 (26.4)	33 (21.3)	37 (23.3)	112 (23.7)	.56
Education					
High school or less	18 (11.3)	10 (6.5)	18 (11.3)	46 (9.7)	
Some post high school	58 (36.5)	68 (43.9)	58 (36.5)	184 (38.9)	
Bachelors or higher	83 (52.2)	77 (49.7)	83 (52.2)	243 (51.4)	.39
Employed					
Yes	106 (66.7)	57 (36.8)	58 (36.5)	168 (35.5)	
No	53 (33.3)	57 (36.8)	58 (36.5)	168 (35.5)	.78
Income					
< \$35,000	64 (41.3)	51 (33.8)	64 (40.5)	179 (38.6)	
\$35,000 – 100,000	65 (41.9)	71 (47.0)	73 (46.2)	209 (45.0)	
\$ > 100,000	26 (16.8)	29 (19.2)	21 (13.3)	76 (16.5)	.47
Health Insurance					
Insured	141 (88.7)	144 (92.9)	145 (91.2)	430 (90.9)	
No insurance	18 (11.3)	11 (7.1)	14 (8.8)	43 (9.1)	.42
Married/Living with partner					
Yes	80 (50.3)	76 (49.0)	69 (43.4)	225 (47.6)	
No	79 (49.7)	79 (51.0)	90 (56.6)	248 (52.4)	.42
Regular health care provider					
Yes	117 (73.6)	111 (71.6)	116 (73.0)	344 (72.7)	
No	42 (26.4)	44 (28.4)	43 (27.0)	129 (27.3)	.92
Family history of CRC					
Yes	12 (7.5)	14 (9.0)	5 (3.1)	31 (6.6)	
No	147 (92.5)	141 (91.0)	154 (96.9)	442 (93.4)	.09
Doctor recommended CRCS					
Yes	89 (56.0)	88 (56.8)	97 (61.0)	274 (57.9)	
No	70 (44.0)	67 (43.2)	62 (39.0)	199 (42.1)	.62
Ever had CRCS					
Yes	45 (28.3)	57 (36.8)	51 (32.1)	153 (32.3)	
No	114 (71.7)	98 (63.2)	108 (67.9)	320 (67.7)	.28
Baseline CRCS Intention (0–100)	55.40 (27.0)	54.15 (26.3)	52.56 (30.0)	54.04 (27.8)	.66

Note. CRC=Colorectal cancer; CRCS= CRC screening

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Table 2.

Direct effects of study condition on CRCS intention and behavior

Variables	Outcomes					
	Post-intervention CRCS Intention			CRCS by 12 mo (n=143 got CRCS)		
	M (SD)	t (df)	p	OR	p	
Narratives + Information vs. Information only	64.90 (28.65)	68.64 (26.42)	1.38 (471)	.169	0.840	.405
Survivor Narrative vs. Screener Narrative	64.30 (29.99)	65.51 (27.29)	0.37 (312)	.709	1.748	.027

CRCS=colorectal cancer screening

Table 3.

Correlations between model variables not shown in Figure 2 Narrative + Information vs. Information only

	Distraction		Emotional engagement		Positive affect		Negative affect	
Distraction	1							
Emot engagement	.05		1					
Positive affect	.02		.40***		1			
Negative affect	.16***		.64***		.24***		1	
	Counter-arguing	Cancer Fatalism	Perceived Risk	Worry	Benefits	Barriers	Norms	Self-Efficacy
Counter	1							
Fatalism	.40***	1						
P. Risk	-.43***	-.15***	1					
Worry	<.01	.15***	.33***	1				
Benefits	-.60***	-.32***	.43***	-.05	1			
Barriers	.34***	.29***	-.12**	.29***	-.33***	1		
Norms	-.32***	-.12**	.25***	.13**	.51***	-.13**	1	
S.Efficacy	-.37***	-.24***	.28***	-.16***	.54***	-.48***	.29***	1

Table 4.

Correlations between model variables not shown in Figure 3 Survivor vs. Screener Narratives

	Self-reference	Cog-Imagery	Distraction	Emotional reaction	Positive affect	Negative affect	Similarity	Liking
Self-reference	1							
Cog-Imagery	.61***	1						
Distraction	-.11	-.15**	1					
Emotional engagement	.43***	.28***	.06	1				
Positive affect	.44***	.28***	-.01	.45***	1			
Negative affect	.23***	.13*	.12*	.52***	.32***	1		
Similarity	.72***	.42***	.02	.30***	.28***	.28***	1	
Liking	.50***	.40***	-.08	.27***	.32***	.23***	.54***	1
Counter		Fatalism	P. Risk	Worry	Benefits	Barriers	Norms	S.Efficacy
Counter	1							
Fatalism	.34***	1						
P. Risk	-.40***	-.09	1					
Worry	.05	.13**	.24***	1				
Benefits	-.52***	-.25***	.37***	-.13*	1			
Barriers	.29***	.19***	-.07	.36***	-.33***	1		
Norms	-.15**	-.11*	.19***	.10	.39***	-.05	1	
S.Efficacy	-.20***	-.20***	.18**	-.22***	.41***	-.44***	.09	1