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Impact of Narratives on Persuasion in Health Communication: A Meta-Analysis

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This meta-analysis assessed the persuasive effects of narratives in health communication. A search of the literature identified 25 studies ($N = 9{,}330$) that examined the effects of narratives on persuasion as measured by changes in attitudes, intentions, and behaviors. Analyses of the effect sizes indicated that, overall, narratives had a small impact on persuasion ($r = .063$, $p < .01$). Narratives delivered via audio and video produced significant effects; print-based narratives, however, did not exhibit a significant impact. Further, not all health issues were equally affected by narrative messages aiming at intervention. Those narratives that advocated detection and prevention behaviors led to significant effects, whereas those advocating cessation behaviors did not have significant effects. These findings offer both theoretical and practical implications.

One of the primary goals of public health communication is to design effective messages that can persuade the target audience to change attitudes or behaviors relevant to a range of health issues. These messages can be delivered in the form of advertisements, brochures, pamphlets, and other educational materials. In recent years, the use of narratives and its impact has received considerable attention by scholars in the fields of advertising and health communication (see Escalas 2004; Green 2006; Kreuter et al. 2007; Wang and Calder 2009). In a nutshell, narratives are the stories that people tell. When employed in health communication, narrative forms of communication often include anecdotes, testimonials, and other stories (Hinyard and Kreuter 2007). It is generally believed that narratives can capture audiences' attention by engaging them cognitively and emotionally (see Green 2006; Kreuter et al. 2007). Scholars consider narratives to be effective means to convey messages, because narratives are natural forms of communication that people comprehend easily. The present study reports findings from a meta-analysis that examined the effectiveness of narratives in health interventions in scholarly research. By reviewing published studies and quantifying the findings with a common metric (effect size), we hope to discover the extent to which narratives have contributed to persuasion effects and then identify areas where additional research is needed.

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CONCEPTUAL BACKGROUND

Narratives and Persuasion

Narrative is an umbrella term for personal stories, exemplars, testimonials, and entertainment–education contents. Narratives differ from other nonnarrative messages in several important ways. Nonnarratives typically rely on rhetorical arguments or the recitation of factual information to communicate messages and persuade the target. Narratives are stories with plots and chronological sequences of events, whereas rhetorical arguments and factual information are presented in a logical sequence. Rather than constructing arguments for readers to judge, narratives often invite readers into story actions and immerse them in the real or plausible life experiences of others that are often difficult either to disagree with or to dispute (Dal Cin, Zanna, and Fong 2004; Deighton, Romer, and

McQueen 1989). While traditional rhetorical arguments often explicitly present information to the audience with the purpose to persuade, the purpose of communication behind narratives, however, is often perceived as informational or entertaining. The persuasive element is often embedded and implicit.

According to researchers (Dal Cin, Zanna, and Fong 2004; Green 2006), narratives can persuade individuals through a process that is different from traditional methods of persuasion. Traditionally, persuasive message effects have been interpreted within the framework of the dual processing models of persuasion, such as the elaboration likelihood model (ELM) (Petty and Cacioppo 1986) and heuristic/systematic model (HSM) (Chaiken 1980). Both models assume that, depending on the recipients' motivation and ability to engage in message processing, persuasion occurs through either a central/systematic route or a peripheral/heuristic route (Hinyard and Kreuter 2007). Under the central route, individuals will elaborate on message contents, and attitude change will be a function of the favorability of thoughts these individuals generate. Under the peripheral route, individuals' attitudes stem from nonmessage cues and other peripheral elements in the messages (e.g., source credibility or use of celebrity).

In contrast, narrative persuasion employs well-crafted stories to engage the individuals affectively and simultaneously reduce their motivation for counterarguing. Narratives have the unique ability to involve audiences mentally by transporting them into the narrative world and arousing emotional reactions. According to Green (2006), transportation into a narrative world is an "integrative melding of attention, imagery, and feelings" (p. 164), which leads the audience to focus on the events in the story rather than make counterarguments. In recent years, scholars in several disciplines have found that narratives can exert both cognitive and affective influences on message recipients (e.g., Dal Cin, Zanna, and Fong 2004; Escalas 2004; Green and Brock 2000; Van Laer et al. 2014).

Narrative Persuasion in Advertising and Health Communication

Scholars have conducted numerous studies to examine the effectiveness of using narratives in communicating brand and health information. Studies of advertising have found that under certain conditions, advertisements can engage consumers and lead to narrative transportation and positive product evaluations (see Escalas 2004, 2007). In their research on fashion advertising, Phillips and McQuarrie (2010) found that grotesque images led to immersion and narrative transportation and, as a result, more positive brand experience. Wang and Calder (2009), in examining narrative transportation as a context-induced phenomenon, found that advertising effectiveness was impeded when ads intruded on readers' transportation experience.

In the field of health communication, significant research has been done to examine the effect of narrative messages. Greene and Brinn (2003), for example, explored the effects of narratives in communicating the risks of using tanning beds; they discovered that the narrative message had a significant effect on lowering recipients' intention to use tanning beds. More recently, researchers found that a narrative film was effective in communicating the importance of vaccination against the human papillomavirus (HPV) (Murphy et al. 2013). Other scholars examined narratives' impact on issues such as smoking cessation (Kim et al. 2012), alcohol use (Slater and Rouner, 1996), Pap tests (Love, Mouttapa, and Tanjasiri 2009), and mammography (Kreuter et al. 2010).

Scholars regard narratives as "a promising set of tools for motivating and supporting health-behavior change" (Hinyard and Kreuter 2007, p. 789) and "promising alternatives" (Kreuter et al. 2007, p. 222) for achieving public health promotion outcomes. Kreuter and colleagues (2007) define narratives in health communication as "a representation of connected events and characters that has an identifiable structure, is bounded in space and time, and contains implicit or explicit messages about the (health) topic being addressed" (p. 22). Not surprisingly, recent years have witnessed a surge of studies exploring the impact of narratives on persuasion (see reviews by Green 2006; Kreuter et al. 2007; Van Laer et al. 2014). Yet to our knowledge, no one has used meta-analysis to systematically examine the effects of narrative persuasion for health communication interventions. We have identified two meta-analytical studies on the effects of general narrative persuasion and transportation (see Allen and Preiss 1997; Van Laer et al. 2014). Allen and Preiss (1997) found statistical information was more persuasive than narrative messages. More recently, Van Laer and colleagues (2014) identified several receiver- or story-based characteristics that were significant antecedents of transportation. Their meta-analysis also found that transportation had significant effects on affective responses, thoughts and other persuasion outcomes. However, neither of these studies focused on health communication and the moderating factors unique to health interventions. As the number of studies testing the effects of health narratives has grown in recent years, the need to assess the ever-growing body of empirical research on narrative effectiveness is clearly warranted.

Thus, the primary objective of the current study is to analyze the persuasive effects of narratives for health communication interventions. We followed the typical operationalization of persuasion effects by identifying changes in attitudes, behavioral intentions, or actual behaviors as a result of exposure to narrative messages. Our second objective was to explore the extent to which effects of narrative messages might be moderated by several relevant factors.

Moderators of Narrative Persuasion Effects

After reviewing the extant research in health communication, we identified a few commonly examined moderating

factors: the type of health behaviors (e.g., cessation, prevention, or detection behaviors), message channels (e.g., text, video, or audio), research designs (e.g., lab or field studies), and sample characteristics (e.g., student versus adult participants).

Understanding the nature of health behaviors is essential in health message design, as messages must be tailored to induce the desired behaviors (Rothman and Salovey 1997). Prior meta-analytical studies examining other message features such as framing and tailoring have considered health issues as moderating variables (see Noar, Benac, and Harris 2007; O'Keefe and Jensen 2009; Shen and Han 2014). We identified three types of health behaviors—prevention, detection, and cessation behaviors—as the potential moderators of narrative persuasion. According to Rothman and Salovey (1997), detection behaviors are typically health screenings designed to find out whether one has desirable or undesirable health issues, whereas prevention behaviors involve steps to prevent the onset of undesirable health problems. Detection and prevention behaviors are also different in that the former is concerned with the potential discovery of undesirable outcomes or health risks, whereas the latter often is associated with the promotion of good health outcomes (Rothman and Salovey 1997). In addition to these, we included in our analysis cessation behaviors, which refer to the quitting of addictive behaviors, such as smoking and drinking. It is generally believed that intervention into such addictive behaviors often is more challenging than other behaviors (Snyder et al. 2004). These three types of health behaviors encompass the range of most frequently examined health behaviors in prior research.

The next factor this study examined was the channel used to communicate the health message. Similar to other health messages, narratives can be delivered via audio, video, or print (Green 2006; Hinyard and Kreuter 2007). Although earlier research on narrative persuasion relied primarily on print narratives (see Green and Brock 2000), some later research within health communication has explored the channel effects of different media (see Braverman 2008). Generally speaking, print messages are self-paced and therefore are more likely to be scrutinized by individuals than the externally paced audio or video messages (Petty and Wegener 1998). However, it is also possible that the ability of audio or video messages to contain more vivid information potentially causes them to be more effective than print-based information. Because the impact of different delivery channels has been rarely addressed in the past, our analysis of channel effects should provide new insights into how to pair narratives with channels for effective health communication interventions.

In addition to the factors of channels and health behaviors, the effects of narratives may also vary as a result of the research designs and the nature of samples used in previous studies. As such, exploring the differences across these methodological aspects will assist researchers and practitioners alike in their future endeavors. Prior studies identified research designs and samples as important features for meta-analysis (e.g., Noar, Benac, and Harris 2007; Shen and Han 2014). In the present study, we used experimental designs (lab or field) and participant characteristics (students or nonstudents; females or mixed gender) as relevant and commonly reported research designs and sample characteristics.

To summarize, although narratives are believed to be effective in communicating a variety of messages, the extent to which they affect persuasive outcomes has not been systematically analyzed. The purpose of the present analysis is to explore the degree to which narratives affected attitudes, behavioral intentions, and actual behavioral changes in prior research. Furthermore, we want to examine whether narrative effects had been consistently detected for different types of health behaviors. Finally, we intend to examine whether delivery channels, research designs, or sample characteristics affected the overall narrative persuasion effects.

METHODS

Literature Search

To find all relevant studies, we searched multiple databases including ABI/INFORM, PsycINFO, Communication and Mass Media Complete, EBSCO, Educational Resources Information Center (ERIC), Google Scholar, and Nursing and Allied Health Source. We used the following in our search: *narratives, stories, anecdotes, health*, and *communication*. We also identified relevant studies that have been cited by several review articles (e.g., Green 2006; Hinyard and Kreuter 2007; Kreuter et al. 2007). Because our focus is on the overall effects of narrative health messages, we selected the research articles that met several inclusion and exclusion criteria. First, the article must have had narrative messages on a health issue as the main stimuli. We adopted Kreuter and colleagues' (2007) definition for narratives as any story that has an "identifiable structure, is bounded in space and time, and contains implicit or explicit messages about the topic being addressed'' (p. 222). The narratives could be in the form of stories, anecdotes, or testimonials. Second, the study must have been a lab experiment or a field study that compared the effects of narratives against a control group. If an experiment used two control groups, one with a nonnarrative message and the other with no messages at all, we took a conservative approach by designating the group receiving nonnarrative message as the control group for our meta-analysis. All the subsequently selected studies had nonnarratives as the controls. Because of these two criteria, we also excluded studies examining health messages within entertainment–education (e.g., Smith, Downs, and Witte 2007). Most entertainment–education studies did not offer control conditions with nonnarrative messages, thus making comparisons difficult, if not impossible. Our third criterion was that each study must have one of the persuasion measures as the dependent variable(s). Persuasion effects

included changes in message attitudes, behavioral intentions, actual behaviors, or a combination thereof, which were reported in the included studies. This led to the exclusion of studies that only measured emotional or cognitive reactions and other responses that are not directly related to the focus of our analysis (e.g., McQueen and Kreuter 2010). Finally, we excluded any study for which we were unable to obtain the required statistics for meta-analytical purposes. These statistics included sample sizes, test statistics, means, standard deviations, and correlations. When the required statistics were not presented in the original articles, we contacted the authors directly and requested such information (e.g., Dunlop, Wakefield, and Kashima 2010; Gray and Harrington 2011).

Articles that did not meet these criteria were excluded from our analysis. If a dissertation was later published in a journal, we included the journal article instead of the dissertation (e.g., Gray and Harrington 2011). In all, 25 studies met all of the inclusion and exclusion criteria, and were included in the final sample for the current meta-analysis.

Treatment of Dependent Variables

The main dependent variables in this study were persuasion effects as indicated by changes in attitudes, behavioral intentions, and actual behaviors. When several items were used to measure a persuasion effect (e.g., changes in aspects of an attitude), we examined them separately and then averaged them to form a single effect-size measure. Our use of a single persuasion index was consistent with prior research practices (e.g., O'Keefe and Jensen 2009). When a study used two different items to measure intentions or attitudes (e.g., Larkey and Gonzalez 2007), we used the mean of the two measures. Thus, we operationalized narratives' persuasion effects as the overall changes in attitudes, behavioral intentions, and behaviors, For example, attitude changes would represent persuasion effects if a study measured attitudes only. If a study measured both attitudes and intentions, we treated the average of the two as persuasion effects. While most of the included studies reported at least two separate measures, a few reported only a persuasion index, as in studies by Block and Keller (1997) and Braverman (2008).

Classification of Moderating Variables

As has been discussed previously, we identified several moderators relevant to health persuasion including health behaviors, delivery channels, research designs, and sample characteristics. We coded health behaviors measured in the studies as prevention, detection, or cessation, and classified narrative channels as audio, video, or text. Research designs included lab experiments or field experiments (field studies). We identified two types of participants in the included studies and coded them into (1) student versus nonstudent participants and (2) female-only versus mixed-gender participants. No included study used a sample of males only.

Calculation of Effect Sizes

The unit of analysis for effect size was an experimental pair where a narrative message condition was compared to or paired with the control group. Some studies contained multiple experimental pairs because they either had multiple experiments or multiple group comparisons. As a result, the 25 studies yielded a total of 34 experimental pairs. To calculate the effect sizes, we identified and collected the relevant statistics reported in each study or subsequently obtained from the authors. The comparable statistics included correlations, sample sizes, means, and standard deviations. We then used the data to compute a set of metrics for our meta-analysis: correlations (r), p values, and Q statistics. We used r as an effect size indicator and the Q statistics as a test of heterogeneity of effect sizes (Borenstein et al. 2009).

RESULTS

Effects of Narratives

We examined overall persuasion effects of narratives by computing the correlations (*r's*) for all experimental pairs, using the random-effects model. The random model was used instead of the fixed-effects model because measurement and sample variations within the selected studies led us to assume a range of distributions of the estimated correlations across these studies (Cumming 2012). Table 1 lists effect sizes, sample sizes, and key moderating variables for all studies in our analysis.

Across all studies, narratives exerted a small but significant effect on persuasion ($r = .063$, $p < .01$). When converted to the standardized mean difference, the r value is equivalent to a d value of .12 ($p < .01$). On the basis of Cohen's (1992) classification of effect sizes, we thus conclude that the impact of narratives as obtained in this meta-analysis was relatively small. When the persuasion items were examined separately, narratives had similarly small effects on attitudes ($r = .060$, $k = 19$), intentions ($r = .044$, $k = 18$), and behaviors ($r = .094$, $k = 7$). The average effect size for behaviors is slightly larger than the other two effect sizes. As we will discuss later, this might be caused by the use of video or tailored narratives by most of the studies that used behavioral measures. We also examined the Fisher's z transformed *r's* as recommended by Rosenthal (1991). The transformation did not yield a noticeable impact on the magnitude and significance of all the correlation-based effect size estimates.

We subsequently explored the extent to which different moderating variables might have caused effect-size estimates to vary across conditions. A follow-up analysis suggested that heterogeneity indeed existed in the distribution of the effect sizes of the included studies ($Q = 83.318$, $df = 33$, $p < .001$). We followed with an examination of the impact of the key moderating variables on narrative persuasion effects. Effect sizes and other basic statistics by moderating conditions are provided in Table 2. Because the heterogeneity significance

TABLE 1
Sample Sizes, Correlations, Health Issues, and Moderating Variables

Author names	*N*	*r*	*p* values	Health behaviors	Channels	Designs	Participants	Genders
Block and Keller (1997) Study 1 High efficacy	108	.152	.109	HPV (P)	Print	EX	Nonstudents	Both
Block and Keller (1997) Study 1 Low efficacy	88	−.132	.212	HPV (P)	Print	EX	Nonstudents	Both
Braverman (2008) Study 1	148	.128	.117	Weight loss (P)	Audio	EX	Nonstudents	Both
Braverman (2008) Study 1	92	−.223*	.028	Weight loss (P)	Print	EX	Nonstudents	Both
Braverman (2008) Study 2	51	.074	.596	Alcohol drinking (C)	Audio	EX	Students	Both
Braverman (2008) Study 2	67	−.260*	.027	Alcohol drinking (C)	Print	EX	Students	Both
Chang (2008)	264	.173**	.004	Depression (P)	Print	EX	Students	Both
Cox and Cox (2001) Gain messages	58	−.284*	.004	Breast cancer (D)	Print	EX	Nonstudents	Women
Cox and Cox (2001) Loss messages	58	.191	.138	Breast cancer (D)	Print	EX	Nonstudents	Women
Dillard et al. (2010)	1,533	.058*	.024	Colorectal cancer (D)	Print	EX	Nonstudents	Both
Dunlop, Wakefield, and Kashima (2010) Study 1	121	−.010	.912	Smoking (C)	Audio	EX	Nonstudents	Both
Dunlop, Wakefield, and Kashima (2010) Study 2	82	.078	.476	Skin cancer (P)	Print	EX	Students	Both
Gray and Harrington (2011) Gain messages	134	−.064	.460	Exercise (P)	Print	EX	Students	Both
Gray and Harrington (2011) Loss messages	141	.141	.090	Exercise (P)	Print	EX	Students	Both
Greene and Brinn (2003)	100	.035	.725	Skin cancer (P)	Print	EX	Students	Women
Hopfer (2011) Peer	253	.006	.925	HPV (P)	Video	EX	Students	Women
Hopfer (2011) Peer/Expert	253	.194*	.033	HPV (P)	Video	EX	Students	Women
Hopfer (2011) Expert	253	−.089	.450	HPV (P)	Video	EX	Students	Women
Jensen et al. (2014)	209	.229	.058	Colorectal cancer (D)	Print	FS	Nonstudents	Both
Kim et al. (2012) Study 1	1,166	.004	.881	Smoking (C)	Print	EX	Nonstudents	Both
Kim et al. (2012) Study 2	630	.001	.968	Smoking (C)	Print	EX	Nonstudents	Both
Kreuter et al. (2010)	489	.111	.082	Breast cancer (P)	Video	FS	Nonstudents	Women
Larkey and Gonzalez (2007)	24	.185	.383	Colorectal cancer (P)	Print	EX	Nonstudents	Both
Lemal and Van den Bulck (2010)	147	.098	.347	Skin cancer (D)	Print	EX	Students	Both
Love, Mouttapa, and Tanjasiri (2009)	246	.182**	.009	Pap test (D)	Video	FS	Nonstudents	Women
Mazor et al. (2007)	128	.035	.683	Blood medication (P)	Video	FS	Nonstudents	Both
Moran et al. (2013)	843	−.015	.653	Pap test (D)	Video	FS	Nonstudents	Women
Murphy et al. (2013)	758	.197***	.000	Pap test (D)	Video	FS	Nonstudents	Women
Slater and Rouner (1996)	103	.211	.065	Alcohol drinking (P)	Print	EX	Students	Both
Slater et al. (2003) Conversational	62	.058	.648	Nutrition (P)	Print	EX	Nonstudents	Both
Slater et al. (2003) Testimonial	62	−.027	.832	Nutrition (P)	Print	EX	Nonstudents	Both
Volkman and Parrott (2012) Study 3, 1st hand	153	.155*	.050	Osteoporosis (P)	Print	EX	Students	Women
Volkman and Parrott (2012) Study 3, 2nd hand	153	.215**	.006	Osteoporosis (P)	Print	EX	Students	Women
Wise et al. (2007)	353	.123*	.021	Breast cancer (P)	Video	EX	Nonstudents	Both
Total *N*	9,330							
Mean correlation		.063**	.003					

Note. Health behaviors coded as P for prevention, D for detection, and C for cessation; design coded as EX for lab experiment and FS for field study. *$p < .05$; **$p < .01$; ***$p < .001$.

TABLE 2
Summary Results by Moderating Conditions

Moderators	*k*	%	*r* (*Q*)	*p*
Total experimental pairs	34	100	.063**	.003
Channels			(.932)	.334
Audio/video	12	35	.086**	.005
Text	22	65	.048	.058
Health behaviors			(6.824)*	.033
Prevention	20	59	.075**	.004
Detection	9	26	.091*	.021
Cessation	5	15	−.008	.765
Research designs			(1.506)	.220
Lab experiments	28	82	.049*	.018
Field studies	6	18	.115*	.021
Participants			(.181)	.670
Students	16	47	.073*	.024
Nonstudents	18	53	.056*	.026
Genders			(.903)	.342
Females	12	35	.088 *	.022
Both males and females	22	65	.046*	.031

Note. Effect size calculations were based on the random effects model; k = number of experimental pairs; Q values are listed in parentheses.

test is a function of sample size (Rosenthal and DiMatteo 2001), we focus on the magnitude of the effect-size estimates in our interpretations of the results.

Effects of Channels

A channel is the medium by which the narrative health messages are delivered or presented to participants in a study. The channels identified in the literature review were audio, video, and text. Due to the small sample size, we combined audio and video into one category. Of the 34 experimental pairs, 65% ($k = 22$) used print narratives, 35% ($k = 12$) used video or audio. A comparison of the two delivery channels indicated that audio/video narratives had a significant effect size, $r = .086$, $p < .01$; while print narratives had a smaller and insignificant effect size, $r = .048$, $p > .05$. It thus appears that narratives delivered via audio and video had a larger effect on persuasion than those delivered via text.

Effects of Health Behavior Types

Prior research has indicated that health message effects could vary depending on the types of behaviors advocated in the messages (Noar, Benac, and Harris 2007; O'Keefe and Jensen 2009). Of the three types of health behaviors examined in all the studies, 59% ($k = 20$) focused on prevention issues such as breast cancer, colorectal cancer, skin cancer, depression, HPV, weight loss, exercise, and osteoporosis; 26% ($k = 9$) focused on detection behaviors (e.g., mammography, skin exam, and Pap test); and 15% ($k = 5$) used cessation behaviors (e.g., drinking and smoking). Results showed that the effect size was significant for detection behaviors ($r = .091$, $p < .05$) and prevention behaviors ($r = .075$, $p < .01$). However, the effect size for cessation behaviors was negligible ($r = -.008$, $p > .05$). These results showed that narratives were modestly effective in persuading individuals to adopt detection or preventive health behaviors. However, narratives were not found to have an impact in encouraging people to quit risky or harmful behaviors (e.g., smoking or drinking).

Effects of Research Designs

Of all experimental groups included in this analysis, 82% ($k = 28$) used lab experiments, and 18% ($k = 6$) used field studies. The former typically invited participants to a central location and then measured persuasion effects immediately after their exposure to the experimental treatment. The latter usually exposed participants to the stimuli in naturalistic settings and then measured persuasion effects using follow-up surveys or other delayed measures. Our analysis suggested that different designs led to different effect sizes. Both field studies ($r = .115$, $p < .05$) and lab-based studies ($r = .049$, $p < .05$) resulted in significant effect sizes, but the effect size for field studies appeared to be larger than that for lab experiments.

Effects of Sample Characteristics

We further examined the possible moderating effects of sample characteristics. Results indicated that college student samples ($r = .073$, $p < .05$, $k = 16$) and nonstudent samples ($r = .056$, $p < .05$, $k = 18$) did not differ much in affecting narrative persuasion's effect sizes. Further, studies using women only ($r = .088$, $p < .05$, $k = 12$) and those using both men and women ($r = .046$, $p < .05$, $k = 22$) had a significant impact on narrative persuasion effects. However, those targeting women seemed to have a slightly stronger effect than studies using both men and women.

DISCUSSION

The purpose of this article was to assess the effects of narratives used in health communication interventions. Results from our meta-analysis suggested that, while narrative persuasion worked well in most conditions, it had no effects in other conditions. When compared to control groups, narratives had a small and significant effect ($r = .063$) on persuasion, as measured by changes in attitudes, intentions, and behaviors. This effect size is similar to those reported in other meta-analytical studies that have examined the effects of other forms of health communication interventions. For example, Noar, Benac, and Harris (2007) discovered that the mean effect size on behavioral intention for message tailoring had an r of .074.

Similarly, Snyder and colleagues (2004) analyzed the effects of media health campaigns on behaviors and found that the average campaign's impact on health behaviors was an $r = .09$. O'Keefe and Jensen's (2009) analysis also found that for disease prevention, gain messages were more effective than loss messages ($r = .046$). However, according to O'Keefe and Jenson (2009), the difference between gain and loss messages was not significant. In light of these prior results, the overall effect size for narrative messages is fairly respectable.

Several moderating variables changed the impact of narrative persuasion. Our study of message channels revealed that narratives delivered via audio and video were more likely to have a strong persuasion impact than narratives expressed in the print medium. In fact, the effect size for print narratives was small and not significant. Could this be related to the lengths of the messages? To explore this possibility, we identified and coded the lengths of the narratives. Among the 22 experimental pairs that used text narratives, message lengths ranged from 73 to 1,212 words, and the median was 400 words. We computed the correlation between the effect sizes and the lengths of the narratives as suggested by Rosenthal and DiMatteo (2001). Message length was significantly correlated to effect size, $r = .408$, $p < .05$, suggesting that the longer the narratives, the more effective they were. Indeed, long text narratives (e.g., those with 400 words or more) had a substantially larger average effect size than short narratives, $r_{long} = .071$ versus $r_{short} = .007$.

As the strength of narratives is enticing people naturally into the world of a story (i.e., narrative transportation) rather than convincing audiences explicitly with rational arguments, the video and audio channels seemed particularly useful. Audio and video messages, capable of evoking emotions, appear to have a better fit with the narrative form of persuasion than the print medium, which is more conducive for rational information processing. Perhaps short text narratives are simply not as transporting as narratives in videos or audios. It is worth noting that the lengths of video- or audio-based narratives ranged from 72 seconds to 11 minutes. However, audio and video lengths were not significantly related to effect sizes.

For health behaviors, we discovered that the average effect size was significant for disease prevention and detection but not for the cessation of addictive behaviors. This might be because the cessation of risky or harmful behaviors is inherently difficult to achieve for those who are addicted, regardless of forms of persuasion. Medical or clinical interventions likely are needed when persuasion does not work. Alternatively, different health behaviors may entail different levels of issue involvement and thus might have different effects on attitudes (Petty, Cacioppo, and Schumann 1983). We examined narratives' effects on attitude change across the three types of health issues. Results indicated that the effect size for attitude change was positive for both detection, $r = .097$, and prevention behaviors, $r = .068$, but negative for cessation behaviors, $r = -.103$. The effect sizes for attitude change were therefore consistent with those for the overall persuasion index, when both were analyzed across the three issue types.

Looking at research designs, we found that the effect size obtained was statistically significant for both field studies and lab experiments. The average effect size for field studies was slightly larger than in lab experiments. This may be attributed to the fact that a majority of the field studies used tailored or culturally sensitive narratives in their interventions (e.g., Jensen et al. 2014; Kreuter et al. 2010; Love, Mouttapa, and Tanjasiri 2009; Mazor et al. 2007; Moran et al. 2013; Murphy et al. 2013). In contrast, the two field studies (i.e., Mazor et al. 2007; Moran et al. 2013) that did not use tailored messages exhibited smaller effect sizes. Further, the stronger effects of field experiments might also be attributed to use of video as four of the six field studies employed video messages. It is thus likely that the combined use of tailored messages and video contributed to the quality of the narratives, making them more effective than lab experimental studies. Narratives also appeared to be more persuasive when the participants were females only than when they were males and females. This is consistent with the literature suggesting that women in general are more responsive to narratives and relate better to emotionally charged messages than men (Green and Brock 2000; Van Laer et al. 2014).

Our findings have both theoretical and practical implications. Prior meta-analysis research on the impact of narrative persuasion was conducted for communications in general, without focusing on health message effects (e.g., Allen and Preiss 1997; Van Laer et al. 2014). Allen and Preiss (1997) produced the main finding that statistical evidence was more persuasive than narratives ($r = .101$). Our study, which compared the effects of narratives to those of statistical or factual messages, was comparable to Allen and Preiss's study; however, our findings contradicted theirs. The different findings might have resulted from the inclusion of a significant number of new studies published since 1997. New communication technologies may also have enabled researchers to produce better-quality, multimedia (e.g., video and audio) narrative messages in recent years. Furthermore, our narrow focus on health narratives might have also accounted for the different findings in our analysis and those by Allen and Preiss (1997).

Our results and analysis suggest several areas for additional research. The lack of an overall significant effect of print narratives means additional research is needed to fully explore how channels exert influences on narrative persuasion processes. We therefore call for additional studies to examine the conditions under which print narratives may or may not work. Future research can explore the unique features of narratives that might work effectively within the print medium or features possibly hindered by the print media. More research is needed, for example, to learn how narrative sources and culturally tailored messages may affect narratives' effectiveness. Certainly, much work remains to be done to determine how best to use narratives to change addictive behaviors. From

smoking to obesity, many of today's most urgent health problems stem from individuals' unhealthy habitual behaviors. This is an area where message strategies are sorely needed. Additional research on using narratives to address such behaviors will be an important step to take in health communication.

One glaring gap in the extant narrative research is the impact of repeated exposures to stories. All studies reviewed here used a single exposure to gauge a message's impact on individuals. This is hardly sufficient and does not reflect the media plans of actual health campaigns. It is well known in social psychology and advertising that repetition provides individuals ample opportunities to engage in message processing (Cacioppo and Petty 1979; Pechman and Stewart 1989). With repetition, narratives can potentially be more effective or backfire. As such, the role of repetition is worthy of further scholarly inquiry.

Practically, our findings support the notion that narrative messages can play an important role in health communication campaigns. The evidence from this meta-analysis suggests that narratives can be influential in changing attitudes, intentions, and behaviors. More important, we found that narratives can be particularly effective when delivered via audio and video or by using longer texts. Narratives can also be effective when the content focuses on the detection and prevention of diseases.

Our study is not without its limitations. Although we made a genuine effort to search all relevant articles related to our topic, it is entirely possible that we may have failed to include some relevant articles in our analysis. Due to the small sample size of our study, we focused on only a few moderating variables. As the number of empirical studies continues to grow, future meta-analytical reviews should expand the range of mediators and moderators that will provide enough data to explain the process underlying the effects of narrative health messages. Our evidence revealed that print narratives did not appear to be effective. We suspect that print stories used in health communication, especially short ones, may not be able transport the audiences to the world of a story as well as audio or video channels. Future research can probe further into how media characteristics may enhance or hinder narratives' transportation process and audiences' identification with the story themes (see Green 2006; Van Laer et al. 2014). Although experimental groups in narrative conditions were found to be more susceptible to persuasion than control groups, almost all of which received rational, factual arguments about health risks, the power of narrative persuasion must be further validated through comparisons with other frequently used message strategies in health communication such as fear, humor, frames, and cultural appeals.

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