

# A Brief, Distance-Based Intervention Can Increase Intentions to Follow Evidence-Based Guidelines in Cancer Screening

Social Psychological and  
Personality Science  
2019, Vol. 10(5) 653–661  
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sagepub.com/journals-permissions  
DOI: 10.1177/1948550618779387  
journals.sagepub.com/home/spp



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## Abstract

Although research findings are increasingly accessible to the public, people may choose to rely on anecdotal over evidence-based information when making important decisions. Thus, a key challenge facing the scientific community is to develop effective strategies for increasing people's reliance on research evidence in their decision-making. Focusing on the critical context of cancer-screening decisions, we find that a brief, distance-based intervention can influence people's intentions to follow evidence-based rather than anecdotal information. Specifically, in a preregistered and well-powered experiment ( $N = 224$ ), participants who set a screening schedule for the next 10 years before considering a decision for an upcoming appointment were more inclined to follow the implications of evidence-based screening guidelines (vs. an anecdote), compared to participants who only considered the upcoming appointment. The success of this distance-based intervention represents an important first step in translating decades of laboratory research on distance into practical interventions for more complex and consequential decisions.

## Keywords

decision-making, social cognition, social influence

Recent years have witnessed a growing emphasis on evidence-based medicine across multiple health domains, and research findings have become increasingly available to both physicians and the public. Unfortunately, however, the mere availability of evidence-based information does not guarantee that people will use it. Instead, people frequently reject scientific evidence in favor of lay theories, anecdotes, and individual stories (Bassand, Priori, & Tendra, 2005; Cabana et al., 1999; Sack, 2009; see also Borgida & Nisbett, 1977; Kahneman & Tversky, 1973). For example, current recommendations provided by the U.S. Preventive Services Task Force (USPSTF) and the American College of Obstetricians and Gynecologists (ACOG) draw on research evidence to conclude that less frequent screenings for breast and cervical cancer could often promote better health outcomes, yet people continue to perform such screenings more frequently than the evidence-based guidelines recommend (Haas et al., 2016; Wang et al., 2014). Thus, one vital issue facing the scientific community is to identify the conditions under which people will actually use evidence-based recommendations, as well as how these factors can be harnessed to develop effective strategies for increasing the extent to which people rely on research evidence when making consequential health decisions. We focus here specifically on the critical case of cancer screening decisions, but note that the same challenge plays out across multiple contexts both within and beyond the health

domain, including improving managerial decision-making (Pfeffer & Sutton, 2006), encouraging the use of psychological research to inform public policy (Teachman, Norton, & Spellman, 2015), and promoting evidence-based practices in education (Odom et al., 2005; Slavin, 2008).

Evidence-based recommendations typically comprise broad, aggregated information—what works well for most people, on average—whereas anecdotes reflect individualized information about one person's particular experience. In other words, evidence-based recommendations might be considered a form of *general social influence* (prototypical social information that aggregates across multiple individuals and experiences), whereas anecdotes might be considered a form of

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*specific social influence* (social information about one particular individual's experience; Ledgerwood, 2014; Ledgerwood & Wang, 2018). Importantly, research on general and specific social influences suggests that psychological distance can play a key role in determining the extent to which people rely on different types of social information, at least for very simple decisions made in relatively impoverished informational contexts. For instance, in one study, asking participants to imagine choosing between two hypothetical toasters in the more distant future (next year vs. next week) led them to rely more on general consensus information about what most people liked (a sentence about the average star rating) as opposed to specific information about what one individual liked (a sentence about the first review that happened to pop up; Ledgerwood, Wakslak, & Wang, 2010, study 3; see also Ledgerwood & Callahan, 2012; Ledgerwood, Trope, & Chaiken, 2010). General and specific social influences may represent one instance of a broader set of psychological and social guides that humans recruit to expand the scope of their thinking beyond the current context (when they need to think about or act on objects at a distance) or immerse themselves within their current context (when they need to think about or act on proximal objects; Ledgerwood, Trope, & Liberman, 2015).

Thus, experiments focusing on tightly controlled—but also relatively artificial—scenarios suggest that asking people to imagine a decision occurring in the more distant future (vs. near future) can increase the extent to which they rely on general (vs. specific) social information. But in the real world, where people often need to make decisions in the here and now, how can we get people to adopt a more distant perspective when thinking about a consequential decision like how often to get screened for cervical or breast cancer? In this article, we set out to design and test a simple, distance-based intervention that a doctor's office or imaging center could use to nudge people toward making decisions that better reflect evidence-based guidelines about cancer screening. Drawing on research suggesting that both temporal distance (thinking about the more distant future) and choice bracketing (thinking about a set of decisions together, rather than one at a time) are linked to abstraction (Fujita & Roberts, 2010; Trope, Liberman, & Wakslak, 2007), we crafted an intervention in which we asked participants to decide on a cancer screening schedule for the next 10 years rather than focusing only on making a decision for an upcoming appointment. In other words, rather than manipulating *when* a future decision would take place, we instead manipulated *what* participants were deciding. After conducting a series of preliminary studies to explore the effects of both (a) decision distance (i.e., imagining a near-future vs. distant-future appointment) and (b) our distance-based intervention on screening decisions for breast cancer and cervical cancer (see Online Supplemental Material), we conducted a highly powered, preregistered study to assess whether our distance-based intervention could help shift people away from relying on anecdotes and toward relying on evidence-based guidelines when considering how frequently to screen for cervical cancer.

Current evidence-based guidelines provided by the USPSTF and the ACOG recommend that women aged 21–65 should be

screened for cervical cancer every 3 years (ACOG, 2017; USPSTF, 2012). Meanwhile, however, women may encounter friends, acquaintances, or online commenters advocating for yearly screening (e.g., Canal, 2016; Ericson, 2015; see also Newman, 2012). We grounded our study in this real-world context. Participants imagined an upcoming GYN exam, scheduled for the current week. We randomly assigned half the participants to a baseline condition, in which we asked them to decide whether to be screened at their upcoming appointment, and half to an intervention condition, in which we asked them to decide on a screening schedule for the next 10 years. All participants read information about evidence-based guidelines from the USPSTF advocating screening once every 3 years, as well as anecdotal information advocating yearly screening, and then we assessed their screening intentions. We predicted that participants in the intervention (vs. control) condition would be more likely to express screening intentions that were consistent with the evidence-based guidelines. We also included several exploratory measures to begin probing what cognitive process might underlie this effect.

## Method

Following recent calls across scientific disciplines for improving research practices to enhance the replicability of published research (Ledgerwood, Soderberg, & Sparks, 2017; Munafò et al., 2017), we preregistered our focal prediction and pre-analysis plan (specifying inclusion/exclusion criteria, target sample size/stopping rule, and planned analyses) in a public repository (see <https://aspredicted.org/uj39t.pdf>). Four preliminary studies exploring how distance shapes breast cancer and cervical cancer screening decisions, as well as the type of information participants seek out when they are allowed to actively search for information, are reported in Online Supplemental Material; these results laid the foundation for the predictions and design of the preregistered experiment we report here (see Table 1 for a summary).

## Participants and Power

We sought to recruit a target sample size of  $N = 300$  women. A power analysis using G\*power indicated that we would need a final sample of 206 participants to provide 80% power to detect an effect size of  $\Phi = .277$  (the effect size estimate from a previous study reported in Online Supplemental Material that examined the effect of a distance-based intervention on screening intentions). Because such power analyses are often optimistic (Ledgerwood et al., 2017; McShane & Bockenholt, 2014) and because we expected to exclude some participants following the a priori exclusion criteria described below, we increased our initial target  $N$  to 300.

Potential participants responded to two questions asking their gender and age; only women aged 22–56 were allowed to participate in the study (so that the evidence-based guidelines would be equally relevant for all participants). We used TurkPrime to ensure that no participant completed the study who had previously been in a similar study conducted by our

**Table 1.** List of Exploratory Studies Reported in Supplemental Material.

Study	Topic	Suggestive Evidence	Page
S1	Decision distance and cervical cancer screening	The distance of a doctor's appointment (this week vs. 8 months from now) may influence the extent to which women rely on evidence-based (vs. anecdotal) information when making decisions about screening for cervical cancer	p. S3
S2	Decision distance and breast cancer screening	The results of Study S1 may generalize to breast cancer screening	p. S6
S3	Piloting a distance-based intervention	A simple, distance-based intervention may increase the extent to which participants rely on evidence-based recommendations (vs. anecdotes) when deciding how frequently to screen for cervical cancer	p. S8
S4	Intervention effects on active information search	Our distance-based intervention may lead participants to seek out more evidence-based (vs. anecdotal) information when they are allowed to access whichever type of information they want	p. S10

*Note.* Before conducting the preregistered study described here in the main text, we conducted a number of preliminary studies exploring the effects of distance and a distance-based intervention on decisions related to cancer screening. The results helped inform the design of our main, preregistered study, and they are interesting and suggestive in their own right; therefore, we report them in Supplemental Material and briefly summarize the key questions they address here for easy reference. However, note that because we did not set and record our stopping rules and analysis plans ahead of time for these studies, the results should be viewed as suggestive rather than definitive.

lab. Three hundred and six women completed the 10-min study via Amazon's Mechanical Turk in exchange for 25 cents. Data were cleaned according to our preregistered inclusion and exclusion criteria: appropriate age and risk category (each verified again at survey end), completing the key dependent variable (DV), no report of midsurvey malfunctions, and passing an attention check of the manipulation. This left a total of 224 participants ( $M_{\text{age}} = 34.22$ ,  $SD_{\text{age}} = 9.05$ , age range = 21–55).

### Materials and Procedure

Participants completed a survey about their attitudes and decisions regarding cervical cancer screening (see Online Supplemental Material for complete survey). All participants were asked to imagine having their annual GYN exam scheduled for a day that week. In the control condition, participants read that

they would be asked at the appointment to decide whether to have a Pap smear during the visit. In the intervention condition, participants read instead that they would be asked at the appointment to decide on a Pap smear schedule for the next 10 years.

All participants then read a basic description of cervical cancer and Pap smears, the most common screening procedure for this form of cancer. Next, participants read the following:

You look on the internet and find that a list of general guidelines has been developed by the US Preventive Services Task Force (an independent body specializing in evidence-based medicine). These general guidelines are designed to provide recommendations for how frequently women should have Pap smears based on a thorough examination of all available evidence. You also happen to mention the issue to an acquaintance of yours who you see at lunch, and she offers her opinion.

Participants then saw (a) evidence-based information in the form of the current guidelines from USPSTF and (b) anecdotal information in the form of their acquaintance's opinion. The order of these two pieces of information was counterbalanced across participants.

The evidence-based information was closely based on the guidelines provided on the USPSTF's actual website (USPSTF, 2012). Participants read:

The USPSTF's recommendations for cervical cancer screening (based on data from a large number of studies, which took into account the benefits of early detection, the slow growth of cervical cancer, and the risks of too much screening) are as follows:

Women ages 21–65 who have a cervix should have a Pap smear once every three years. Women ages 30–65 who want to be screened less frequently can opt for combination Pap smear and human papillomavirus testing every five years. Routine screening is not advised for women who: are younger than 21, have had a hysterectomy (without a history of high-grade precancerous lesions), are older than 65 who previously have been adequately screened and are not at a high risk for cervical cancer. All of these recommendations do not apply to women considered high risk for cervical cancer such as: women who have received a diagnosis of a high-grade precancerous cervical lesion or cervical cancer, women with in utero exposure to diethylstilbestrol, or women who are immunocompromised.

The anecdotal information was crafted based on real comments from women in various online forums. Participants read that their acquaintance said the following:

Oh, I'm a big believer in yearly Pap smears. At my last gynecological visit this past spring I had my regular yearly Pap smear, which came back with some abnormal results. My GYN recommended a colposcopy where they use a magnifying lens to examine abnormal cell growth in the cervix and a biopsy, and they found some precancerous cells in there. I was so glad I kept up with my yearly exams, so they could identify the issue and remove the abnormal tissue surgically before it had a chance to progress.

All women were told to assume that they received a Pap smear at their last annual exam (so that choosing to screen for cervical cancer at their upcoming appointment would reflect a decision to screen annually rather than once every 3 years). We asked about screening intentions in two ways. First, participants responded via a question tailored to condition. In the control condition, participants were asked to indicate whether they would choose at their appointment that week either to have a Pap smear (coded 0; consistent with the acquaintance's advice) or to skip the Pap smear (coded 1; consistent with the evidence-based advice). Participants in the intervention condition were asked to indicate whether they would choose at their appointment that week to set either a once-a-year screening schedule (coded 0; consistent with the acquaintance's advice) or a once-every-three years screening schedule (coded 1; consistent with the evidence-based advice). We designated this question as our primary DV of interest in our preregistration.

Next, in order to be able to capture screening intentions with an identical item across conditions, all participants were also asked to indicate whether they would have a Pap smear at their upcoming appointment that week (coded as *yes* = 0, consistent with the acquaintance's advice, and *no* = 1, consistent with the evidence-based advice). We designated this question as a secondary DV of interest in our preregistration.

After indicating their screening intentions, participants completed an attention check of the focal manipulation ("When you read the earlier information about cervical cancer and Pap smears, we asked you to focus on making a decision about cancer screening. Do you remember what decision we asked you to focus on? Whether you will screen at your appointment this week; What screening schedule to set for the next 10 years; I don't know/I don't remember"). Then, they responded to a number of follow-up questions collected for exploratory analyses. Participants rated the importance of the first-person account in their decision, the importance of the general guidelines in their decision (1 = *not at all important*; 7 = *very important*), and indicated which of the two was most important when making their decision. They also rated the trustworthiness of each of the two data sources (1 = *not at all trustworthy*; 7 = *very trustworthy*) and picked dichotomously which was more trustworthy. Finally, they rated the personal relevance of each of the two data sources (1 = *not at all relevant*; 7 = *very relevant*) and picked dichotomously which was more personally relevant. Participants then completed a few final questions regarding our exclusion criteria, whether they had close experience with a cancer diagnosis, their level of distraction while taking the survey, and demographics.

## Results

### Focal Hypothesis

As predicted, screening intentions on our primary dependent measure varied by condition: Participants in the intervention (vs. control) condition were significantly more likely to express screening intentions consistent with the evidence-based

guidelines,  $\chi^2(1, N = 224) = 21.58, p < .001$ , odds ratio (*OR*) = 3.622,<sup>1</sup> 95% confidence interval (CI) [2.084, 6.295]. In the control condition, most participants (68.4%) chose to have a Pap smear at the upcoming visit, reflecting a decision to screen annually that is contraindicated by the evidence-based guidelines. In contrast, far fewer participants in the intervention condition (37.4%) chose to screen annually.

Moreover, this pattern continued to emerge on our secondary dependent measure that asked participants in both conditions to indicate specifically whether they would have a Pap smear at the upcoming visit. Here, saying no to a screening reflects a decision that is consistent with the evidence-based guidelines to screen less frequently than once every year (since all women were told to assume they had screened last year). Compared to 34.2% of control participants who indicated they would decline a screening at their upcoming appointment, 49.5% of intervention condition indicated they would decline a screening,  $\chi^2(1, N = 224) = 5.42, p = .020, OR = 1.889, 95\% CI [1.127, 3.415]$ . Interestingly, the intervention appeared to overcome an overall tendency to opt for a screening at the upcoming visit: An exploratory chi-square showed that across all participants, 58.5% indicated that they would screen at their upcoming visit, compared to 41.5% overall who said they would not,  $\chi^2(1, N = 224) = 6.45, p = .011$ .

### Exploratory Analyses

We conducted exploratory analyses on self-reported weighting of the first-person account and the general guidelines, and trustworthiness and personal relevance of those two data sources. Although we were primarily interested in participants' behavioral intentions, we included these measures in order to better understand potential mechanisms via which our distance intervention might influence such choice. We conducted a series of mixed-design analyses of variance (ANOVAs) to explore ratings of anecdotal versus evidence-based information across condition, as well as  $\chi^2$  tests to examine dichotomous choices. We then conducted logistic regression analyses to consider how these different measures predict cancer-screening behavioral intentions. We encourage readers to focus on the CIs around the effect sizes reported in this section rather than drawing strong conclusions from the *p* values given the exploratory nature of these analyses.

**Perceived importance of individual and aggregate information sources.** A mixed-design ANOVA indicated that on average, participants assigned greater importance to the general guidelines ( $M = 5.42, SD = 1.40$ ) versus the anecdotal information ( $M = 4.84, SD = 1.65, F(1, 222) = 15.65, p < .001, \eta_p^2 = .066, 90\% CI [0.023, 0.124]$ ).<sup>2</sup> Directionally, the pattern varied by condition in a way that was consistent with participants' behavioral intentions, with intervention condition participants reporting that they attached greater relative importance to the general guidelines ( $M = 5.50, SD = 1.33$ ) versus the anecdotal information ( $M = 4.68, SD = 1.61$ ), compared to control participants ( $M_{\text{aggregate}} = 5.34, SD_{\text{aggregate}} = 1.46$  vs.  $M_{\text{individual}}$

= 4.98,  $SD_{\text{individual}} = 1.68$ ); the CI for this interaction ranged from zero to small,  $F(1, 222) = 2.35, p = .127, \eta_p^2 = .011, 90\% \text{ CI } [0.000, 0.043]$ . A  $\chi^2$  test on the dichotomous choice question revealed a similar directional pattern across conditions,  $\chi^2(1, N = 224) = 2.86, p = .091, OR = 1.602, 95\% \text{ CI } [0.926, 2.770]$ . Whereas 68.2% of the intervention condition participants indicated that they felt the general guidelines were the most important type of information when they made their decision, only 57.3% of control condition participants did so.

**Trust of individual and aggregate information sources.** A mixed-design ANOVA indicated that participants reported trusting the general guidelines ( $M = 5.63, SD = 1.35$ ) somewhat more than the anecdotal information ( $M = 5.45, SD = 1.31$ ),  $F(1, 222) = 2.78, p = .098, \eta_p^2 = .012, 90\% \text{ CI } [0.000, 0.047]$ . This was not qualified by an interaction with condition,  $F(1, 222) = 0.96, p = .328, \eta_p^2 = .004, 90\% \text{ CI } [0.000, 0.050]$ . A  $\chi^2$  test on the dichotomous choice question revealed a significant difference across condition,  $\chi^2(1, N = 224) = 5.74, p = .017, OR = 1.961, 95\% \text{ CI } [1.127, 3.415]$ . Whereas 71% of the intervention condition participants indicated that they felt the general guidelines seemed more trustworthy than the first-person account, only 55.6% of control condition participants did so.

**Personal relevance of individual and aggregate information sources.** A mixed-design ANOVA indicated that participants reported finding the general guidelines ( $M = 5.25, SD = 1.31$ ) somewhat more personally relevant than the anecdotal information ( $M = 5.00, SD = 1.57$ ),  $F(1, 222) = 3.13, p = .078, \eta_p^2 = .014, 90\% \text{ CI } [0.000, 0.050]$ . There was also a main effect of condition,  $F(1, 222) = 4.68, p = .032, \eta_p^2 = .021, 90\% \text{ CI } [0.001, 0.061]$ : Participants in the control condition reported overall that the information was more personally relevant ( $M = 5.26, SD = 1.03$ ) than those in the intervention condition ( $M = 4.98, SD = .92$ ). These effects were not qualified by a significant interaction with condition,  $F(1, 222) = 1.49, p = .223, \eta_p^2 = .007, 90\% \text{ CI } [0.000, 0.035]$ . A  $\chi^2$  test on the dichotomous choice question suggested a difference between conditions,  $\chi^2(1, N = 224) = 5.42, p = .020, OR = 1.878, 95\% \text{ CI } [1.102, 3.200]$ . Whereas 61.7% of the intervention condition participants indicated that they felt the general guidelines were more personally relevant than the first-person account, only 46.2% of control condition participants did so.

**Predictors of cancer-screening behavioral intentions.** To examine whether one or another of these exploratory variables might play a stronger role in driving behavioral intentions, we also entered all six measures (i.e., importance, trust, and personal relevance for each type of information) simultaneously as predictors into two separate logistic regression models predicting screening intentions as indexed by (1) our primary dependent measure and (2) our secondary dependent measure. In both cases, screening intentions were coded so that 0 indicated a *decision consistent with the anecdote* and 1 indicated a *decision consistent with the evidence-based information*. The two dependent measures revealed similar results, as can be seen

**Table 2.** Continuous Exploratory Measures Predicting Screening Intentions (Primary DV).

Exploratory Measure	B	SE B	Wald	p	OR
<b>Guideline ratings</b>					
Importance	.80	.23	11.84	.001	2.23
Trust	.11	.22	0.24	.621	1.12
Personal relevance	-.09	.20	0.19	.661	0.92
<b>Anecdote ratings</b>					
Importance	-.90	.19	22.24	<.001	0.41
Trust	.12	.20	0.34	.559	1.12
Personal relevance	-.20	.18	1.29	.257	0.82

Note. Nagelkerke  $R^2 = .48$ . OR = odds ratio.

**Table 3.** Continuous Exploratory Measures Predicting Screening Intentions (Secondary DV).

Exploratory Measure	B	SE B	Wald	p	OR
<b>Guideline ratings</b>					
Importance	.60	.21	8.15	.004	1.83
Trust	.20	.21	0.91	.341	1.22
Personal relevance	-.31	.19	2.60	.107	0.74
<b>Anecdote ratings</b>					
Importance	-.56	.17	11.15	.001	0.57
Trust	-.09	.18	0.25	.616	0.91
Personal relevance	-.25	.16	2.43	.119	0.78

Note. Nagelkerke  $R^2 = .40$ . OR = odds ratio.

in Tables 2 and 3 (Table 4 reports zero-order correlations between all variables). In both cases, the strongest predictors of screening intentions were the perceived importance of aggregate and anecdotal information: As the importance of a given type of information increased, participants were more likely to express screening intentions consistent with that information. Specifically, as the importance of aggregate information increased, the odds increased that participants would express intentions consistent with the general guidelines; in contrast, as the importance of anecdotal information increased, the odds decreased that participants would express intentions consistent with the general guidelines.

Additional logistic regressions using choice of information (rather than ratings of each type of information) as a predictor of screening intentions showed similar results (see Tables 5 and 6). When participants chose the general guidelines as more important than anecdotal information, the odds increased that they would express screening intentions consistent with the guidelines. In addition, when participants chose the general guidelines as more personally relevant than the anecdotal information, the odds increased that they would express screening intentions consistent with the guidelines.

### General Discussion

Evidence-based recommendations are increasingly available to the public, but how can we get people to actually use them instead of relying on anecdotes? This fundamental question

**Table 4.** Correlation Between Exploratory Measures.

Measure	1	2	3	4	5	6	7	8
1. Guideline importance	—	.70*	.69*	-.05	-.02	-.06	.30*	.23*
2. Guideline trust	.70*	—	.55*	-.05	.19*	-.02	.23*	.18*
3. Guideline relevance	.69*	.55*	—	-.05	.01	-.06	.20*	.11
4. Anecdote importance	-.05	-.05	-.05	—	.60*	.77*	-.52*	-.47*
5. Anecdote trust	-.02	.19*	.01	.60*	—	.55*	-.27*	-.29*
6. Anecdote relevance	-.06	-.02	-.06	.77*	.55*	—	-.43*	-.42*
7. Primary DV	.30*	.23*	.20*	-.52*	-.27*	-.43*	—	.72*
8. Secondary DV	.23*	.18*	.11	-.47*	-.29*	-.42*	.72*	—

\*Correlation is significant at the <.01 level (two-tailed).

**Table 5.** Dichotomous Exploratory Measures Predicting Screening Intentions (Primary DV).

Exploratory Measure	B	SE B	Wald	p	OR
More important	2.30	.47	24.45	<.001	9.97
More trusted	-0.04	.44	0.01	.933	0.96
More relevant	1.03	.40	6.50	.011	2.79

Note. Selecting the general guidelines (vs. anecdote) as more important, trusted, or relevant was coded as 1 (vs. 0). Nagelkerke  $R^2 = .42$ . OR = odds ratio.

**Table 6.** Dichotomous Exploratory Measures Predicting Screening Intentions (Secondary DV).

Exploratory Measure	B	SE B	Wald	p	OR
More important	2.15	.48	20.42	<.001	8.60
More trusted	0.39	.42	0.86	.355	1.48
More relevant	0.57	.40	2.05	.152	1.77

Note. Selecting the general guidelines (vs. anecdote) as more important, trusted, or relevant was coded as 1 (vs. 0). Nagelkerke  $R^2 = .35$ . OR = odds ratio.

cuts across domains, applying wherever there is an opportunity for decisions to be based on lessons from the aggregate rather than the individual. The present findings support the efficacy of a simple, distance-based intervention in fostering greater evidence-based decision-making. Focusing specifically on the context of cancer-screening choices, we asked participants in an intervention condition to set a screening schedule for the next 10 years before making a decision for an upcoming appointment. We found that participants in the intervention (vs. control) condition were more inclined to follow evidence-based cancer-screening guidelines, rather than the implications of an anecdote.

These findings are both theoretically and practically important. First, they add to a growing body of literature suggesting that people may fail to use evidence-based information even when they are aware of and understand this information (Haas et al., 2016; Sack, 2009). In contrast, however, many researchers implicitly assume that individuals fail to make evidence-based choices because evidence-based recommendations are unavailable, inaccessible, or difficult for them to understand

(e.g., Nielsen-Bohlman, Panzer, & Kindig, 2004; Rynes, Colbert, & Brown, 2002). Interestingly, our exploratory measures suggest that, overall, participants favored the evidence-based information over the anecdotal information: They indicated that they weighted it more when making their decision and that they trusted it more and found it more personally relevant. Even in the control group (who tended to favor the evidence-based information less strongly than the intervention group), a relatively high percentage of participants reported that they favored the evidence-based guidelines over the anecdotal information (e.g., 57.3% reported they weighted it more, 55.6% said it was more trustworthy, and 46.2% said it was more personally relevant). This is in striking contrast to the much smaller percentage of participants in the control condition (31.6%) whose decisions actually followed the implications of the evidence-based recommendations. This divergence is intriguing, suggesting that people may lack complete self-awareness about their evidence-based decisions; alternatively, it may reflect an understanding among participants that they *should* be swayed by aggregate information, even as they make their actual decisions using other sources of information.

The current research also contributes to the growing literature on psychological distance and abstraction, tackling the important challenge of designing implementable interventions based on this burgeoning body of lab-based research (see also Aknin, Van Boven, & Johnson-Graham, 2015). The majority of research in this topic area has looked at how decisions for the near and distant future naturally differ, most typically in the context of fairly low-stakes decisions such as which product or experience one might prefer (e.g., Baskin, Wakslak, Trope, & Novemsky, 2014; Liberman & Trope, 1998; Trope & Liberman, 2000; for a review, see Trope, Liberman, & Wakslak, 2007). In addition to testing predictions derived from this literature within an important, higher stakes context, the current research successfully translates the naturally varying distance studied extensively by researchers (e.g., “imagine making a decision in 1 week vs. in 8 months;” see, e.g., studies S1 and S2 in Online Supplemental Material) into a distance-based intervention that could be implemented within a proximal decision-making context (e.g., an upcoming doctor’s appointment). As such, it tests one approach for moving from well-established effects of distance documented

in the lab to interventions that can be pragmatically implemented in the field.

Of course, an important limitation of this research is that it still involves hypothetical choice, rather than a binding decision, and we therefore do not know how these effects would translate to a field context. In fact, work on psychological distance suggests that the hypotheticality of a choice may act as a distance dimension in and of itself (e.g., Bar-Anan, Liberman, & Trope, 2006), which may make people across conditions more likely to favor evidence than they otherwise would (see abovementioned findings that participants across conditions did self-report favoring the evidence-based guidelines). Thus, in the real world, we might expect to see a stronger overall tendency for people to act in line with anecdotal (vs. evidence-based) information; in such a context, a distance-based intervention might be especially important for encouraging people to rely on research evidence. Moreover, research suggests that the effect of additional dimensions of distance is less strong when one distance dimension is already salient (Maglio, Trope, & Liberman, 2013); thus, to the extent that the distance dimension of hypotheticality was salient to participants from the outset of the study, we may have seen smaller effects of the distance-based intervention on screening intentions than one would observe in the real world. Of course, real-world effects could also be weaker. Future research should assess this question empirically.

Another potential limitation of the current study is that we only examined a context in which evidence-based guidelines pointed toward less frequent screening compared to common anecdotal advice. Future research should test whether distance will also increase people's reliance on evidence-based information when the guidelines point toward *more* frequent screening. Given studies suggesting that in the absence of any evidence-based information, distance can directly increase people's willingness to experience discomfort or inconvenience for the sake of their health or another important goal (Fujita, Trope, Liberman, & Levin-Sagi, 2006; Rogers & Bazerman, 2008; Sweeney et al., 2012), one might expect that a distance-based intervention would be especially impactful when evidence-based guidelines advocate more (rather than less) frequent screening.

Future research should also consider potential moderators of the current effects, including those related to the content of the decision (e.g., would our intervention's effectiveness vary based on the type of disease considered?) and those related to characteristics of the decision maker (e.g., personality, preference for health information, risk factors, and prior habits). Exploring moderators would point to potential boundary conditions and help shed light on the processes underlying the current effects.

Future research could also continue to unpack the specific mechanisms through which any effect of distance and abstraction influence choice. Surprisingly, despite the large literature on the effects of psychological distance on abstraction and its downstream consequences (Soderberg, Callahan, Kochersberger, Amit, & Ledgerwood, 2015; Trope & Liberman, 2010), we know relatively little about the precise mechanisms that

drive many of these findings. In this regard, our exploratory process measures contribute to this literature by suggesting that different types of information can be evaluated differently depending on distance. That is, the effects of psychological distance on decision-making may be supported by a host of inter-related microprocesses: Distance may lead people to seek out different types of information (see Online Supplemental Material, study S4) and to approach general and specific information that they are exposed to with different degrees of skepticism and presumed relevance. Future research should continue to explore these and other related effects, to better understand the precise mechanisms by which distance influences choice and how to potentially intervene in this process.

Finally, our findings speak most directly to the challenge faced by public health experts as they seek to change cancer-screening behavior based on evidence-based recommendations. Such recommendations have undergone extensive revisions over the last decade as data have accumulated, with recommendations now encouraging less frequent screening for several types of cancer (including cervical, breast, and prostate cancer). Public health researchers have sought to quantify the impact of these changed guidelines (e.g., Wang et al., 2014) and to explore reasons for resistance to such change (Haas et al., 2016). These latter efforts have focused primarily on individual difference approaches, assuming that resistance or openness to behavioral change varies between people in a stable manner. We add to this an important social-psychological message, showing that shifting the framing of the decision can be a useful nudge for encouraging evidence-based behavior.

### Authors' Note

Alison Ledgerwood and Cheryl J. Wakslak contributed equally; the authorship order of their names was determined by a coin flip. Author Contributions: Ledgerwood and Wakslak developed the study concept. All authors contributed to the study design. Ledgerwood and Wakslak collected the data and conducted the primary analyses; Sánchez and Rees conducted exploratory analyses and analyses of the studies reported in Online Supplemental Material. Ledgerwood and Wakslak wrote the main manuscript; Sánchez and Ledgerwood wrote the Online Supplemental Material. Rees double-checked all statistics. All authors approved the final version of the manuscript for submission.

### Acknowledgments

The authors would like to thank Katie Schwarm and Susanna Stone for their assistance with this research.

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

## Supplemental Material

The supplemental material is available in the online version of the article.

## Notes

1. The odds ratio (*OR*) can be interpreted as the factor by which the odds of selecting the evidence-based guidelines are increased. For example, an *OR* of 3.62 indicates that the intervention increased the odds of participants making an evidence-based choice by a factor of 3.62, relative to the control condition.
2. Note that 90% confidence intervals (CIs) around partial  $\eta^2$  are comparable to 95% CIs around *d* (Steiger, 2004).

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Handling Editor: Kate Ratliff