The Relative Effectiveness of Gain-Framed and Loss-Framed Persuasive Appeals Concerning Obesity-Related Behaviors: Meta-Analytic Evidence and Implications

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Obesity is a significant national health problem. The prevalence of obesity has been increasing (Ogden, Carroll, Curtin, McDowell, Tabak, and Flegal 2006), and obesity has significant undesirable health consequences (though estimates of the magnitude of effect vary; e.g., Flegal, Graubard, Williamson, and Gail 2005; Mokdad, Marks, Stroup, and Gerberding 2004).

A variety of persuasive communications and interventions have been explored as possible means to prevent or reduce obesity. One persuasive message variation that has been of interest to researchers in this domain is the contrast between gain-framed and loss-framed appeals. A gain-framed appeal emphasizes the advantages of compliance with the advocated action (e.g., "if you exercise regularly, it will be easier to maintain a healthy body weight"); a loss-framed appeal emphasizes the disadvantages of noncompliance ("if you don't exercise regularly, it will be harder to maintain a healthy body weight"). For example, Bannon and Schwartz (2006) compared the effects of gain- and loss-framed messages on the snack choices of kindergarteners, and Jones, Sinclair, and Courneya (2003) examined the relative persuasiveness of gain- and loss-framed appeals for encouraging exercise by college students.

The purpose of this paper is to provide a meta-analytic review of the accumulated experimental research concerning the relative persuasiveness of gain-framed and loss-framed appeals for influencing various obesity-related behaviors. A meta-analytic review of this research offers natural advantages over the typical primary-research design, precisely because a meta-analysis synthesizes results from a number of different studies using different concrete instantiations of the general message contrast of interest (see Jackson 1992).

General Background

Previous research has undermined a number of otherwise-plausible hypotheses about the persuasive effects of message framing variations. For example, one hypothesis has been that in general, loss-framed appeals will be more persuasive than gain-framed appeals (e.g., Johnson, Maio, and Smith-McLallen 2005, p. 640). This hypothesis was made plausible by findings that negative information is often more powerful than parallel positive information (e.g., Rozin and Royzman 2001) and that people are more willing to take a risk to avoid (or minimize) losses than to obtain gains (e.g., Kuhberger, Schulte-Mecklenbeck, and Perner 1999).

But this hypothesis is not supported by the research evidence. O'Keefe and Jensen's (2006) review of 165 gain-loss message framing studies found no significant general difference in persuasiveness between the two appeal forms.

A second approach invokes a distinction between disease detection behaviors and disease prevention behaviors. The hypothesis is that loss-framed appeals will be more persuasive than gain-framed appeals for encouraging disease detection behaviors, whereas gain-framed appeals will be more persuasive than loss-framed appeals for encouraging disease prevention behaviors (see, e.g., Rothman and Salovey 1997; Salovey and Wegener 2003).

But this hypothesis is also unsupported. Concerning the suggestion that loss-framed appeals will be more persuasive than gain-framed appeals for disease detection: O'Keefe and Jensen's (2009) meta-analysis found that across 53 framing studies (with over 9,000 participants) focused on disease detection behaviors, there was a trivially small effect (corresponding to r = -.04) favoring loss-framed messages—but that effect was attributable to the large number of

studies (k = 17) concerning breast cancer detection behaviors (which exhibited a small effect, r = -.06). The remaining 36 disease detection studies yielded no statistically significant difference in persuasiveness between gain-framed and loss-framed appeals, despite excellent statistical power. So the supposition that loss-framed appeals will generally have a persuasive advantage concerning disease detection behaviors is not tenable.

Concerning the suggestion that gain-framed appeals will be more persuasive than loss-framed appeals for disease prevention: O'Keefe and Jensen's (2007) meta-analysis found that across 93 framing studies (with over 21,000 participants) focused on disease prevention messages, there was a trivially small effect (corresponding to r = .03) favoring gain-framed appeals—but that effect was due to a large effect (r = .15) for studies of dental hygiene behaviors (k = 9). The remaining 84 disease prevention studies yielded no statistically significant difference in persuasiveness between gain-framed and loss-framed appeals, again despite excellent statistical power. So, the supposition that gain-framed appeals will generally have a persuasive advantage concerning disease prevention behaviors is not tenable.

Specific Focus

Even if there are not broad-scale differences in persuasiveness between gain- and loss-framed appeals (e.g., such that loss-framed appeals are more persuasive for disease detection behaviors), it is still possible that such a difference might emerge for some more specific behavioral domain (e.g., dental hygiene). This report is concerned specifically with obesity-relevant behaviors. Researchers have compared the persuasiveness of gain- and loss-framed appeals for two such behaviors, namely, exercise and healthy eating practices. In our earlier review (O'Keefe and

Jensen 2007), there was no statistically significant difference in the persuasiveness of gain- and loss-framed appeals for either domain. However, there were too few studies of exercise behaviors (k = 8) to provide more than modest (.59) statistical power—and since that earlier review a number of additional studies have been completed.

Hence this report offers an updated review of research concerning differences in the relative persuasiveness of gain- and loss-framed appeals for obesity-relevant behaviors. We were interested in estimating the size of any overall difference between gain- and loss-framed appeals in this domain, and in estimating such differences separately for messages advocating greater physical activity and those advocating healthy eating practices. We also wanted to explore the possible moderating role of an aspect of the phrasing of the appeals, namely, the linguistic representation of the "kernel state" of the consequence under discussion (O'Keefe and Jensen 2006). The kernel state is the basic, root state mentioned in the message's description of the consequence. A given framing form might mention either desirable or undesirable kernel states. For example, a gain-framed appeal might take the form "if you exercise, you'll increase your chances of having a healthy heart" (where the kernel state, "healthy heart," is a desirable one) or the form "if you exercise, you'll reduce your risk of heart disease" (where the kernel state, "heart disease," is an undesirable one). Several commentators have suggested that this variation might influence the relative persuasiveness of gain- and loss-framed appeals (e.g., Dillard and Marshall 2003).

Method

Identification of Relevant Investigations

Relevant research reports were located through personal knowledge of the literature, examination of previous reviews, and inspection of reference lists in previously-located reports. Reports were also identified through computerized database searches through at least February 2009 of ABI-INFORM, CINAHL (Cumulative Index of Nursing and Allied Health Literature), Current Contents, Dissertation Abstracts, EBSCO, ERIC (Educational Resources Information Center), Linguistics and Language Behavior Abstracts, MEDLINE, and PsycINFO, using various appropriate combinations of terms such as *framing*, *framed*, *frame*, *appeal*, *message, persuasion, persuasive, gain*, *positive*, *positively*, *benefit, loss*, *negative*, *negatively, threat,* and *valence.*

We included a study if it met three criteria. First, the study had to compare gain-framed and loss-framed persuasive messages. A gain-framed message emphasizes the desirable consequences of compliance with the advocated view; a loss-framed message emphasizes the undesirable consequences of noncompliance. This criterion was applied so as to exclude imperfect realizations of this message contrast; for examples of such excluded studies, see Lockwood, Wong, McShane, and Dolderman (2005), Parrott, Tennant, Olejnik, and Poudevigne (2008), van den Heuvel (1982), and van Kleef, van Trijp, and Luning (2005).

Second, the messages had to advocate behaviors potentially relevant to obesity, such as undertaking regular exercise, engaging in healthy eating practices, and the like.

Third, appropriate quantitative data relevant to persuasive effects (e.g., attitude change, intention, or behavior) had to be available, either in the report or from authors. Excluded by this criterion were reports of effects on other outcome variables and studies for which appropriate quantitative information could not be obtained (e.g., Horgen and Brownell 2002; Siu 2004; van ‘t Riet, Ruiter, Werrij, Candel, and de Vries 2009, Experiment 1; Yi and Baumgartner 2007).

Outcome Variable and Effect Size Measure

The outcome variable was persuasion, as assessed through attitude change, postcommunication agreement, behavioral intention, behavior, and the like. When multiple indices of persuasion were available, we averaged the effects to yield a single summary. Most studies reported only immediate (short-term) effects; where both immediate and delayed effect size information was available (e.g., Jones et al. 2003), only immediate effects were included to maximize comparability across studies.

Every comparison between a gain-framed message and its loss-framed counterpart was summarized using *r* as the effect size measure. When not reported as correlations, results were converted to *r* using formulas provided by Johnson (1993) and Rosenthal (1991). Differences indicating greater persuasion with gain-framed messages were given a positive sign. When correlations were averaged (e.g., across several indices of persuasive effect), we computed the average using the *r*-to-*z*-to-*r* transformation procedure, weighted by *n*.

Moderating Factors

Advocated Behavior

Cases were classified by the kind of behavior advocated, with three broad categories distinguished: healthy eating behaviors, physical activity (e.g., exercise), and other (or multiple different) obesity-relevant behaviors (e.g., attending a weight control class).

Kernel State Phrasing

The kernel states in each appeal were identified. As described earlier, a kernel state is the basic, root state mentioned in the message's description of the consequence under discussion. We coded each appeal as containing exclusively desirable kernel states, exclusively undesirable kernel states, a combination of desirable and undesirable kernel states, or as indeterminate with respect to kernel-state phrasing (as when insufficient detail was available about the messages).

Unit of Analysis and Meta-Analytic Procedures

The unit of analysis was the message pair, that is, the pair composed of a gain-framed message and its loss-framed counterpart. We recorded an effect size for each distinguishable message pair. When a message pair was used in more than one study (Bibby 2008, Study 1 and Study 2), an effect size estimate was initially computed for each study and then these multiple estimates were averaged to yield a single summary estimate. When a study reported data separately for multiple message pairs, each pair provided a separate effect size estimate (e.g., van Assema, Martens, Ruiter, and Brug 2001). When a given investigation was reported in more than one outlet, it was treated as a single study and analyzed accordingly. The collected effect sizes were analyzed using random-effects procedures (specifically, those of Borenstein and Rothstein 2005).

Results

Overall Effects

Effect sizes were available for 43 cases, with a total of 5,154 participants. Details for each included case are contained in Table 1. Across all 43 cases, the mean correlation was .083, a statistically significant persuasive advantage for gain-framed appeals (p = .002); see Table 2. This overall effect, of course, averages results across rather different behaviors (even if all are in some way obesity-relevant). Hence the more illuminating analyses are those that examine effects for different varieties of advocated actions.

<<TABLE 1 NEAR HERE>>

Specific Obesity-Relevant Behaviors

For messages that encouraged physical activity, gain-framed appeals were significantly more persuasive than loss-framed appeals. Across 18 cases, the random-effects weighted mean correlation was .171 (p = .001); see Table 2.

<<TABLE 2 NEAR HERE>>

For messages that encouraged healthy eating practices, there was no significant difference in persuasiveness between gain-framed and loss-framed appeals. Across 21 cases, the random-effects weighted mean correlation was .017 (p = .527), a nonsignificant effect despite excellent statistical power (.95); see Table 2. [Power values reported in this paper are those for

detecting a population effect size of r = .10, assuming large heterogeneity, with a random-effects analysis, .05 alpha, and a two-tailed test (Hedges and Pigott 2001).] The various "healthy eating" behaviors were quite diverse, which limited the utility of further analyses. In four cases, the messages advocated eating more fruits and vegetables (Bibby 2008; Cesario, Grant, and Higgins 2004, prevention condition; Cesario et al. 2004, promotion condition; van Assema et al. 2001, fruit and vegetable condition); across these cases, mean r = -.049 (n = 293), 95% CI limits of -.186 and .091 (p = .495), power = .22; $Q(3) = 4.1$, p = .251. In five cases, the messages advocated consumption of some form of dietary supplements (Brug, Ruiter, and van Assema 2003, Study 2 and Study 3; Hashimoto 2002; Lee and Aaker 2004, Experiment 3 high risk and Experiment 3 low risk); across these cases, mean r = -.003 (n = 488), 95% CI limits of -.156 and .151 (p = .972), power = .34; $Q(4) = 10.3$, p = .036. In the remaining 12 cases, various other healthy-eating practices were encouraged, including making wise snack food choices, reducing salt consumption, and so on; across these cases, mean r = .038 (n = 1,841), 95% CI limits of -.022 and .098 (p = .215), power = .85; $Q(11) = 16.3$, p = .129.

In four studies, the advocated action was some other obesity-relevant behavior (such as attending a weight-control class) or multiple such behaviors (e.g., "regular exercise and a healthy diet"; Shen 2005). Across these four cases, the persuasive advantage for gain-framed appeals (mean r = .083) was not quite statistically significant (p = .056); see Table 2.

Kernel-State Phrasing

Kernel-State Phrasing in Gain-Framed Appeals

Gain-framed appeals were significantly more persuasive than loss-framed appeals when the gain-framed appeal had exclusively desirable kernel states (mean r = .158, p = .014); see Table 2. Gain-framed appeals that had exclusively undesirable kernel states were not significantly more persuasive than loss-framed appeals (mean r = -.002, p = .967). The persuasive advantage (compared to loss-framed appeals) of gain-framed appeals using exclusively desirable kernel states (mean r = .158) was significantly different from the effect obtained when gain-framed appeals used exclusively undesirable kernel states (mean r = -.002); $Q(1) = 4.19$, p = .041.

Gain-framed appeals that combined desirable and undesirable kernel states were not significantly more persuasive than loss-framed appeals (mean r = .073, p = .102); see Table 2. The persuasive advantage (compared to loss-framed appeals) of gain-framed appeals using exclusively desirable kernel states (mean r = .158) was not significantly different from the effect obtained when gain-framed appeals used a combination of desirable and undesirable kernel states (mean r = .073); $Q(1) = 1.21$, p = .272.

Kernel-State Phrasing in Loss-Framed Appeals

Gain- and loss-framed appeals did not differ significantly in persuasiveness either when the loss-framed appeal had exclusively desirable kernel states (mean r = -.001, p = .987) or when it had exclusively undesirable kernel states (mean r = -.006, p = .803); see Table 2. These two mean effects were not significantly different [$Q(1) = .01$, p = .945].

When the loss-framed appeal had a combination of desirable and undesirable kernel states, gain-framed appeals had a significant persuasive advantage (mean r = .154, p = .003); see Table 2. This effect was not significantly different from the effect obtained using loss-framed

appeals with exclusively desirable kernel states [mean r = -.001; $Q(1) = 3.40$, p = .065], but was significantly larger than the effect obtained using loss-framed appeals with exclusively undesirable kernel states [mean r = -.006; $Q(1) = 7.70$, p = .006].

Discussion

Broadly speaking, these results would appear to recommend the use of gain-framed appeals for encouraging obesity-relevant behaviors; across the whole set of studies, gain-framed appeals were significantly more persuasive than loss-framed appeals. And these results would seem to point specifically to the desirability of using gain-framed appeals that are expressed in terms of desirable kernel states; across the studies reviewed here, gain-framed appeals enjoyed their persuasive advantage when the appeals invoked exclusively desirable kernel states but not when the appeals invoked exclusively undesirable kernel states.

But this characterization of these results is misleading. The advantage of gain-framed appeals over their loss-framed counterparts was obtained specifically for messages encouraging physical activity. No such advantage was obtained for messages encouraging healthy eating practices. In fact, the mean effect for physical-activity messages (mean r = .171) and that for healthy-eating messages (mean r = .017) are significantly different; $Q(1) = 6.70$, p = .010. So it will be useful to consider separately these two broad behavioral categories.

Healthy Eating Practices

The studies in which messages advocated various healthy eating practices are not narrowly relevant to obesity prevention or reduction. The advocated eating practices—such as consuming more fruits and vegetables, reducing salt intake or red meat consumption, taking dietary supplements, and so forth—are not ones aimed specifically at preventing or reducing obesity. We examined these studies because of their potential for shedding light on effective advocacy of other eating practices that *would* be directly relevant to obesity.

But—consistent with our earlier review (O'Keefe and Jensen 2007)—there is no evidence here that either gain- or loss-framed appeals enjoy any persuasive advantage in influencing healthy eating behaviors. Thus we think it unlikely to be profitable for researchers to investigate gain-loss framing variations for healthy eating behaviors that are more specifically targeted to obesity, and we think it unwise for designers of messages aimed at specifically obesity-relevant eating practices to worry very much about whether those messages are gain- or loss-framed.

Physical Activity

In our earlier review (O'Keefe and Jensen 2007), there was no significant difference between gain- and loss-framed appeals for encouraging physical activity, but there were relatively few studies (8, as against the 18 reviewed here) and correspondingly relatively poor statistical power (.59). But the current review makes it clear that advocates for increased physical activity should employ gain-framed rather than loss-framed appeals. Indeed, the advantage that loss-framed appeals have over gain-framed appeals in this domain (mean $r = .17$) is relatively large compared to the mean effect sizes observed for other persuasive message variations (see O'Keefe 1999).

But this result naturally gives rise to two questions. First, if physical-activity messages are to be gain-framed, are some forms of gain-framed appeals likely to be more persuasive than others? Second, what explains the persuasive advantage of gain-framed appeals for physical activity messages?

Enhancing the Persuasiveness of Gain-Framed Physical Activity Appeals

There is no reason to suppose that all gain-framed physical-activity appeals will be equally persuasive. However, the data most relevant to this question will come from designs that compare alternative forms of a gain-framed appeal.

Still, one might try to mine the current studies for some clues on this matter, by seeing whether the relative advantage of gain-framed appeals (concerning physical activity) varies as a function of the kernel-state language in the appeal. Unfortunately, the extant gain-loss message framing research literature is less than ideal for this purpose—for two reasons. First, the existing studies are not well-distributed across different kernel-state phrasings of gain-framed appeals. For example, of the 18 studies of physical-activity messages, only two had gain-framed appeals with exclusively undesirable states. Second, the results of a comparison of a given gain-framed version against a loss-framed message might vary depending on the kernel-state phrasing of the *loss*-framed message—and the extant studies are not well-distributed across different kernel-state phrasings of loss-framed appeals.

But these studies do permit one relatively clean contrast, between the effects observed for gain-framed appeals that contained a combination of desirable and undesirable kernel states and the effects observed for gain-framed appeals that contained exclusively desirable kernel states,

where the comparison loss-framed appeal contained both desirable and undesirable kernel states. When the gain-framed appeal contained both desirable and undesirable kernel states, the mean effect size was r = .079 [k = 8, n = 1,082, 95% CI limits of -.062 and .217, p = .274; Q(7) = 29.2, p < .001]. When the gain-framed appeal contained exclusively desirable kernel states, the mean effect size was r = .421 [k = 4, n = 352, 95% CI limits of .251 and .565, p <.001; Q(3) = 8.5, p = .037]. These two mean effect sizes are significantly different [Q(1) = 9.26, p = .002]. This evidence, although limited, suggests that messages advocating physical activity should avoid appeals phrased in terms of both desirable and undesirable kernel states and should instead phrase appeals exclusively in terms of desirable kernel states.

It should not pass unnoticed that the contrast between desirable and undesirable kernel states in gain-framed appeals can be redescribed in term of a contrast between “promotion-focused” and “prevention-focused” appeals (see, e.g., Higgins 1999). A promotion-focused appeal emphasizes (the obtaining of, or the failure to obtain) positive states; a prevention-focused appeal emphasizes (the obtaining of, or the avoidance of) negative states. Expressed that way, these data hint that for physical activity messages, promotion-focused gain-framed appeals may be more persuasive than gain-framed appeals that combine promotion- and prevention-based appeals (for some discussions of the interplay of gain-loss framing and promotion-prevention focus, see Lin 2007; Yi and Baumgartner 2008; Zhao and Pechmann 2007).

Explaining the Persuasive Advantage of Gain-Framed Physical Activity Appeals

It is not immediately apparent what might explain the persuasive advantage that gain-framed appeals enjoy over loss-framed appeals for encouraging physical activity. One well-publicized explanatory framework, however, can be shown to be insufficient.

That explanatory framework is based on Kahneman and Tversky's (1979) prospect theory, which has often been interpreted as suggesting that the relative persuasiveness of gain- and loss-framed appeals will vary depending on the riskiness of the advocated behavior. The idea has been that for riskier behaviors, such as disease detection behaviors (e.g., cancer screenings), loss-framed appeals will be more persuasive than gain-framed appeals, whereas for low-risk behaviors, such as disease prevention behaviors (e.g., exercising or wearing sunscreen), gain-framed appeals will have the advantage (see, e.g., Rothman and Salovey 1997; Salovey, Schneider, and Apanovitch 2002). [This account, though common, is arguably not entirely well thought out. In particular, it seems to depend on confusing dangerousness and uncertainty, which are two distinct possible senses of "risk" (see O'Keefe and Jensen 2006, pp. 22-23).]

But, as discussed above, these expectations have not been borne out by the research evidence. For disease detection behaviors, any advantage of loss-framed appeals may be limited to breast cancer detection behaviors (O'Keefe and Jensen 2009). For disease prevention behaviors (exercise apart), gain-framed appeals enjoy an advantage only when the messages advocate dental hygiene behaviors (O'Keefe and Jensen 2007). In short, the observed advantage of gain-framed appeals for physical activity messages cannot be explained simply by invoking some putatively general advantage of such appeals for encouraging disease prevention behaviors, because there is no such advantage.

The lack of a good explanation, of course, is no barrier to seeing the practical advice that issues from this result: Those advocating greater physical activity should use gain-framed

appeals rather than loss-framed appeals. At the same time, a good explanatory account would presumably provide a better grasp of the mechanisms underlying the observed effects—and that, in turn, could inform the development of even more effective messages.

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Table 1

Cases Analyzed

Study	*r*	*N*	Codings[a]
Arora and Arora (2004)	.088	267	1/2/4
Bannon and Schwartz (2006)	.016	32	1/1/2
Bibby (2008)	-.147	121	1/2/1
Brug, Ruiter, and van Assema (2003) Study 2	.039	149	1/4/4
Brug et al. (2003) Study 3	-.061	92	1/4/4
Cesario, Grant, and Higgins (2004) prevention	-.169	53	1/3/3
Cesario et al. (2004) promotion	.115	53	1/1/2
Gray (2008) narrative	.160	132	2/3/3
Gray (2008) statistical	.222	143	2/1/3
Hashimoto (2002)	-.013	166	1/2/1
Hsiao (2002) exercise-prevention	.546	49	2/3/3
Hsiao (2002) exercise-detection	-.378	51	2/3/3
Jayanti (2001)	.007	69	1/4/4
Jones, Sinclair, and Courneya (2003)	.048	192	2/3/3
Jones, Sinclair, Rhodes, and Courneya (2004)	.020	413	2/3/3
Kroll (2004)	.063	192	2/3/3
Latimer, Rench, et al. (2008)	.336	97	2/4/4
Latimer, Rivers, et al. (2008)	.148	155	2/4/4
Lawatsch (1990)	.071	72	1/1/3

Lee and Aaker (2004) Experiment 3 high risk	-.312	45	1/3/3
Lee and Aaker (2004) Experiment 3 low risk	.382	36	1/3/3
Levin, Gaeth, Evangelista, Albaum, and Schreiber (2001)	-.127	224	1/2/1
Levin, Gaeth, Schreiber, and Lauriola (2002)	.021	102	1/2/1
Looker and Shannon (1984)	.006	227	1/1/1
McCall and Ginis (2004)	.311	29	2/3/3
Meyers-Levy and Maheswaran (2004)	.270	147	1/3/3
Nan (2007) Experiment 1 desirable-gain desirable-loss	-.121	75	2/1/2
Nan (2007) Experiment 1 desirable-gain undesirable-loss	.055	74	2/1/1
Nan (2007) Experiment 1 undesirable-gain desirable-loss	.029	81	2/2/1
Nan (2007) Experiment 1 undesirable-gain undesirable-loss	.197	80	2/2/2
Robberson and Rogers (1988) health	-.190	24	2/3/3
Robberson and Rogers (1988) self-esteem	.537	24	2/1/3
Shannon and Rowan (1987)	.031	138	3/4/4
Shen (2005) Study 1 obesity	.157	286	3/3/3
Simmering (1993) non-social	-.030	78	3/3/1
Simmering (1993) social	.027	77	3/1/3
Tsai (2007)	-.002	458	1/1/1
Tykocinski, Higgins, and Chaiken (1994)	.029	39	1/4/4
van Assema, Martens, Ruiter, and Brug (2001) low-fat	.035	75	1/3/1
van Assema et al. (2001) fruit and vegetable	.068	66	1/3/1
van ‘t Riet et al. (2009, Experiment 2)	.087	129	1/3/1
Whitbourne and Lachman (2003) appearance	.477	93	2/1/3

Whitbourne and Lachman (2003)	health	.506	92 2/1/3

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[a]The coding judgments, in order, are: specific obesity-relevant behavior (1 = healthy eating, 2 = physical activity, 3 = other obesity-relevant behavior); gain kernel-state language (1 = desirable states, 2 = undesirable states, 3 = both desirable and undesirable states, 4 = indeterminate); loss kernel-state language (1 = undesirable states, 2 = desirable states, 3 = both desirable and undesirable states, 4 = indeterminate).

Table 2

Summary of Results

	k	*N*	mean *r*	95% CI	power	*Q* (*df*)
All cases	43	5,154	.083	.030, .134	--	133.8(42)**
Advocated behavior						
healthy eating	21	2,622	.017	-.036, .070	.95	32.9(20)*
physical activity	18	1,953	.171	.068, .270	--	80.7(17)**
other	4	579	.083	-.002, .167	.39	3.2(3)
Gain message kernel						
desirable only	12	1,420	.158	.032, .278	--	52.9(11)**
undesirable only	7	1,041	-.002	-.089, .086	.62	11.4(6)
both	17	1,997	.073	-.014, .159	.88	51.4(16)**
indeterminate	7	696	.082	-.019, .180	.45	10.1(6)
Loss message kernel						
desirable only	4	241	-.001	-.130, .128	.19	1.8(3)
undesirable only	12	1,800	-.006	-.053, .041	.84	10.9(11)
both	19	2,150	.154	.051, .253	--	90.1(18)**
indeterminate	8	963	.083	.003, .162	--	10.1(7)

*$p < .05$. **$p < .001$.