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Framing in Entertainment-Education: Effects on Processes of Narrative Persuasion

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ABSTRACT

Nowadays, entertainment-education (E-E) is often used as a persuasive strategy to stimulate prosocial behavior. Although E-E is mostly regarded as a persuasive strategy in itself, in an increasing number of E-E programs several persuasive strategies are used to communicate the educational message to the audience. This study investigates the effects of a strategy widely used in health communication, but not previously studied in the field of E-E: framing. To this means we examined the effect of two different ways an E-E message can be framed: by emphasizing either the losses of not performing the behavior in question or the gains of performing this behavior. A serial multiple mediation model showed that framing affected intention to refrain from drunk cycling via counterarguing and attitude toward drunk cycling; the use of a gain frame decreased counterarguing, which decreased the attitude toward drunk cycling. This subsequently resulted in a higher intention to refrain from this behavior. Implications of these results are discussed.

The placement of educational messages in entertainment contexts may serve as a reliable source of health information (Davín, 2003; Langlieb, Cooper, & Gielen, 1999) and is a promising technique for influencing audiences' knowledge, attitudes, and behavior toward health-related issues (Moyer-Gusé, 2008; Singhal, Cody, Rogers, & Sabido, 2004; Thompson, Robinson, Cusella, & Shellabarger, 2000). As it is now the consensus that purely informational and educational approaches to crafting health messages are largely ineffective (McMath & Prentice-Dunn, 2005; Miller-Day & Hecht, 2013), this technique, referred to as entertainment-education (E-E), is gaining in popularity. Research supports the effectiveness of E-E and shows that integrating educational messages in entertaining content can, for example, lead to more positive attitudes toward condom use (Farrar, 2006), increased knowledge about breast cancer (Hether, Huang, Beck, Murphy, & Valente, 2008), decisions to have mammograms (Wilkin et al., 2007), or signing up to become a cornea donor (Bae, 2008).

In the present-day literature, E-E is mostly regarded as a persuasive strategy in itself, whereas in an increasing number of E-E programs several persuasive strategies, such as product placement, fear appeals, the use of social norms, and framing, are used to communicate the educational message to the audience (Asbeek Brusse, Fransen, & Smit, 2015). The way in which a persuasive health message is embedded in entertainment media and communicated to the audience may play an important role in the subsequent effects of the message, but this remains largely unexamined. This study fills this gap in the E-E literature by studying the effects of a strategy widely used in health communication; framing. More

specifically, we examined the effect of two different ways an E-E message can be framed: by emphasizing either the losses of not performing the behavior in question or the gains of performing this behavior.

To study the effect of framing in E-E we exposed participants to different versions of an entertaining cartoon. Although cartoons are neither common in E-E nor widely studied, previous research indicates that they might result in similar effects as other forms of E-E. A review by Houts, Doak, Doak, and Loscalzo (2006) showed that pictures closely linked to written or spoken text can, when compared to text alone, markedly increase attention to and recall of health education information. Additionally, research by Sewell and Moore (1980) showed that if comprehension is the main goal, printed text is just as effective as cartoon-embellished text or audiovisual presentation.

We focus on an educational message about a health subject that has not received much attention in the media: drunk cycling. The dangers of drunk driving by car are widely recognized, but the consequences and dangers of cycling with too much alcohol are not broadly incorporated in society. Verster, van Herwijnen, Volkerts, and Olivier (2009) showed that, on average, after an evening of alcohol consumption students have blood alcohol concentrations that are five-fold higher than allowed to participate in traffic. Nevertheless, particularly in many European countries the bicycle is considered a good alternative way of transport when driving a car is no longer considered safe due to a high alcohol level. According to legislation, the allowed maximum alcohol level is the same for every transport vehicle (e.g., bicycle, car, or scooter). These laws, however, are not properly enforced (Van

Hout, 2007), and accidents in which drunk cyclist are involved are common (Institute for Road Safety Research, 2011).

Framing in health communication

Although the term *framing* has multiple meanings in the research literature, in health communication framing indicates a way of presenting information that is either more negative (losses, prevention, and undesirable attributes) or more positive (gains, promotion, and desirable attributes), while the different descriptions are equivalent in informational content (Morton, Rabinovich, Marshall, & Bretschneider, 2011). Although seemingly subtle, message framing has been proven to be an effective health communication strategy for promoting behavior change across a wide variety of health behaviors (Gallagher & Updegraff, 2012; Rothman, Bartels, Wlaschin, & Salovey, 2006). In health communication various messages can be framed in terms of either the benefits of engaging in the recommended behavior (gain-framed message) or the costs of not engaging in the behavior (loss-framed message). For example, a gain-framed message for a public health campaign may look as follows: “One in five lives could be saved in the U.S. if people didn’t smoke” (Steward, Schneider, Pizarro, & Salovey, 2003, p. 2460). On the other hand, a loss-framed message could read: “One in five deaths occur in the U.S. because people smoke” (Steward et al., 2003, p. 2460). It is important to note, however, that gain-framed statements can refer to both positive outcomes that may occur when engaging in a particular behavior and negative outcomes that may be prevented when engaging in this behavior. Likewise, loss-framed statements can refer to both negative outcomes that may happen when engaging in a particular behavior and positive outcomes that may not come about (Rothman et al., 2006). Framing is important in health information because research showed that one type of message frame may be more effective than another in promoting health behavior change (Rothman & Salovey, 1997).

Prospect theory (Kahneman & Tversky, 1979) provides an explanation for the phenomenon that essentially identical information can have different effects depending on how it is framed. This theory proposes that preferences for high- or low-risk choices depend on how these choices are framed. If the options emphasize potential losses, individuals are often inclined to choose a risky option to prevent those losses. However, if the choices emphasize potential gains, individuals are generally less willing to choose options involving risk to secure those gains (Salovey, Schneider, & Apanovich, 2002). Rothman and Salovey (1997) applied this reasoning to how people might respond to framed health messages. In particular, they suggest that gain-framed messages should be more effective than loss-framed messages for promoting health behaviors that are perceived to be only minimally risky to carry out. If health behaviors are perceived to have some higher degree of risk associated with performing them, loss-framed messages should be more effective.

Rothman and Salovey (1997) propose that the riskiness of performing behavior is suggested by the function of that

behavior. Behaviors that serve a disease prevention function (e.g., physical activity, quitting smoking, and sunscreen use) can be viewed as involving little risk because those behaviors are typically associated with safe and certain outcomes. Nonetheless, O’Keefe and Jensen (2007) propose that gain-framed messages may be differentially effective for disease prevention behaviors based on how individuals construe the target behavior. Some disease prevention behavior may actually be perceived as risky (e.g., sunscreen use involves putting chemicals onto the body, quitting smoking may cause weight gain) instead of involving little risk. Therefore, it is essential to take into account both the subjective perception of risk that can be associated with the behavior and the objective benefits that this behavior can induce.

In contrast to disease prevention functions, behaviors that serve a disease detection function (e.g., mammography, colonoscopy, sexually transmitted disease [STD] screening) are more likely to be viewed as involving a higher degree of risk because of the possibility that a serious condition is discovered (Rothman & Salovey, 1997). In this respect, the underlying function of health behavior should serve as a useful heuristic for the perceived riskiness of health behavior and should moderate people’s response to framed messages. Specifically, it is suggested that gain-framed messages should be more persuasive for illness prevention behaviors and loss-framed messages should be more persuasive for illness detection behaviors. In this research we focus on the avoidance of drunk cycling. This can be considered as prevention behavior because by refraining from drunk cycling, one can prevent being involved in an accident. As gain-framed messages are suggested to be more persuasive for prevention behaviors than loss-framed messages, we expect the following:

H1a: Exposure to a gain-framed E-E message results in a more negative attitude toward drunk cycling compared to exposure to a loss-framed E-E message.

H1b: Exposure to a gain-framed E-E message results in a higher intention to refrain from drunk cycling compared to exposure to a loss-framed E-E message.

As there is compelling evidence that attitudes are a sufficient cause of behavioral intention (Kim & Hunter, 1993a, 1993b), we expect that the attitude toward drunk cycling affects the intention to refrain from drunk cycling.

H1c: A more negative attitude toward drunk cycling results in a higher intention to refrain from drunk cycling.

Narrative processes in entertainment-education

In addition to the effects of framing on attitude and intention, we also study how these effects can be explained in E-E. Therefore, we study processes that are key in E-E effects, and examine how these processes are affected by a gain- or loss-framed E-E message. E-E programs, particularly those

that are presented in highly absorbing narratives, create conditions that are likely to enhance positive effects on attitudes, intention, and behavior (Singhal et al., 2004). Because of its narrative structure, E-E facilitates the experience of *transportation*: a state of being absorbed into a narrative where all of a person's mental system and capacities become focused on the events occurring in the narrative (Green & Brock, 2000). This experience of being transported into a narrative world has the power to affect viewers' real-world beliefs and behaviors and is one of the key mechanisms underlying narrative persuasion (Green, 2006; Green & Brock, 2000). Because a person in a transported state is engrossed, having devoted his or her cognitive resources to the event playing out in the narrative, he or she may be less likely to critically assess the persuasive message in the narrative. Indeed, studies of transportation have shown that highly transported individuals report more story-consistent beliefs (Green & Brock, 2000).

We argue that exposure to gain-framed stories results in more transportation compared to exposure to a loss frame. Gain-framed messages are likely to induce more positive affect than loss-framed messages. Since transportation is defined as an enjoyable and affective process (Green & Brock, 2000; Green, Brock, & Kaufman, 2004), we expect that a gain-framed message fits better with this current state, which is expected in E-E. It is plausible that exposure to a negative frame hinders the enjoyable experience of transportation. On the contrary, a gain frame might not disrupt the enjoyable process, but might increase it. Therefore we expect the following:

H2a: Exposure to a gain frame (vs. loss frame) in E-E will increase transportation.

In addition to transportation into the narrative, E-E also facilitates identification. According to Cohen (2006), viewers who truly identify with a character perceive the events happening to the character as if they were happening to themselves. We propose that the use of a gain frame (vs. a loss frame) increases identification. According to self-consistency theory and self-enhancement theory, people are motivated to remain or obtain a positive self-view (Swann, Griffin, Predmore, & Gaines, 1987). Since people, in general, regard themselves as responsible beings, their self-view might be confirmed by obtaining information that fits with this view. In the present context this means that a positively framed message is more useful than a negatively framed message in acknowledging one's self-view. Therefore, a positive self-view is easier to maintain by identifying with a character that shows responsible behavior and therefore experiences positive life outcomes (i.e., gain-framed information). Thus, we expect the following:

H2b: Exposure to a gain frame (vs. loss frame) in E-E will increase identification.

A third mechanism that is involved in E-E is *counterarguing* or the "generation of thoughts that dispute or are inconsistent with the persuasive argument" (Slater & Rouner, 2002, p. 180). Individuals often scrutinize threatening messages, especially those that attempt to change their behavior. Classic discussions

regarding the persuasion process acknowledge counterarguing as being a key obstacle to persuasive efforts (Petty & Cacioppo, 1986). The suspension of disbelief that appears to be a necessary component of being absorbed in a narrative is simply incompatible with thought elaborations questioning or debating content in that narrative (Slater, 1997). However, research into the area of narrative persuasion shows that when viewers are sufficiently transported, the generation of counterarguments should be suppressed by a narrative (Moyer-Gusé, 2008; Moyer-Gusé & Nabi, 2010). Because transportation is an enjoyable and immersive process (Green & Brock, 2000; Green et al., 2004), transported individuals are in a good mood. Good moods signal safety so that the individual processes information in a more heuristic and associative way, whereas bad moods tend to alert an individual to be cautious, so that the individual processes information in a more systematic and analytic way (Ahn, Jin, & Ritterfeld, 2012). In addition, fostering identification with characters also reduces viewers' motivation to generate counterarguments, since counterarguing requires the viewer to disengage from the narrative world and the character (Slater & Rouner, 2002). By counterarguing, the persuasive message will be less accepted and fewer story-consistent beliefs will be formed. When viewers do not experience transportation, there are cognitive resources available to render viewers more able to critically evaluate a story (Busselle, Ryabovolova, & Wilson, 2004). Critical evaluation can be considered comparable to counterarguing and thus can be considered a cognitive process. As Dunegan (1993) showed that framing information in a positive way is a catalyst for a more simplified cognitive process, we find it plausible that the deliberate cognitive processing that counterarguing requires will be hindered by exposure to a gain-framed story. Therefore, we expect the following:

H2c: Exposure to a gain frame (vs. loss frame) in E-E will result in less counterarguing.

An overview of the hypotheses can be found in Figure 1. In addition, as the effects of framing in E-E have not been studied before, we pose the following research question:

RQ1: Is the effect of framing on intention to refrain from drunk cycling mediated by (a) processes of narrative persuasion (i.e., transportation, identification, and counterarguing) and (b) attitude toward drunk cycling?

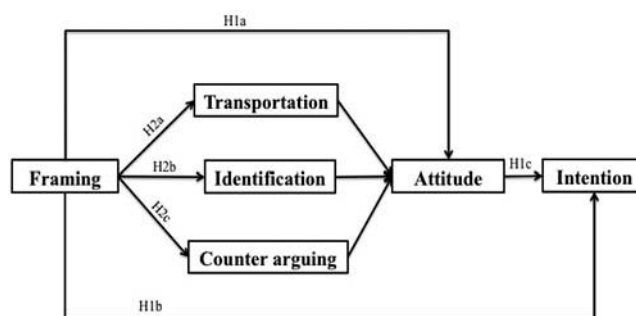


Figure 1. Estimated path model of the hypotheses.

Method

Participants and procedure

Sampling took place via the online panel of the ISO-certified market research company PanelClix. People were randomly selected and invited by e-mail to participate. Two hundred respondents (51% women; 32% bachelor's or master's degree, 17.5% lower vocational education) between the ages of 17 and 45 years ($M = 30.10$, $SD = 7.79$) participated in the experiment and were randomly assigned to one of the conditions (gain-frame condition, $n = 99$, vs. loss-frame condition, $n = 101$). Ethnicity of the participants is unknown. Participants received a link and were directed to the questionnaire, where they were exposed to a cartoon and answered several questions. They received credit points from the research company as a reward.

Stimulus material

The stimulus material used in this experiment was especially designed for purposes of this study. Based on written scripts, an illustrator was hired to draw the written stories into cartoons. The two versions of the cartoon did not differ, except for the use of either a loss frame or a gain frame.¹

Storyline

The storyline in the cartoons is about a man named Jos, who goes to a bar for a night out with two of his friends, where they all get under the influence of alcohol. The readers follow Jos's night starting when he is getting ready to leave his house, and as he cycles to the bar, where he jokes around with his friends and flirts with the woman behind the bar. When the night is over Jos and his friends say goodbye and go home. In the loss-frame condition Jos goes home on his bike intoxicated and gets involved in an accident, showing the negative consequences of biking under the influence of alcohol (undesired behavior). In the gain-frame condition, Jos walks home intoxicated, and he arrives home safely, showing the positive consequences of not biking under the influence of alcohol (desired behavior). The cartoon consisted of 14 pages with three or four frames per page. Participants could read the cartoon at their own pace and could click to the next pages. An example of a cartoon page with three frames is included in Figure 2.



Figure 2. Example of cartoon on one page with three frames. Translation of the cartoon from left to right: There is an ambulance with flashing lights. The boy is placed on a stretcher. Jos: "Wooohhhh!!" Ambulance attendant: "He incurred severe brain damage". The ambulance drives off with the boy. Anne and Bas run to Jos. Bas: "What happened?" Jos: "I caused an accident..."

Pretests

Before the cartoons were drawn, the written stories were pretested to confirm the difference between the two framing conditions (based on Gerend & Shepherd, 2007). To this means, 38 participants (53.5% women) between the ages of 21 and 58 years ($M = 30.00$, $SD = 8.08$) read one of the stories and responded to the statement "This story emphasizes..." followed by a 7-point bipolar scale anchored by: ... *what you can prevent when you don't cycle with too much alcohol* (1) and ... *what can happen when you do cycle with too much alcohol* (7). An analysis of variance (ANOVA) showed that participants who read the story that was loss-framed scored higher ($M = 6.05$, $SD = 0.33$) compared to participants who read the gain-framed story ($M = 3.38$, $SD = 0.34$, $F(1, 41) = 31.94$, $p < .001$), indicating that participants who read the loss-framed story indicated that the story was predominantly about loss and participants who read the gain-framed story indicated that the story was predominantly about gain. Hence, the manipulation was successful.

After the written stories were drawn into cartoons, we tested whether the cartoons differentiated between the two conditions. For this purpose, 30 participants (66.7% women) between the ages of 21 and 58 years ($M = 30.87$, $SD = 8.66$) read one of the cartoons and responded to the two items used in the written story pretest, adjusted to be about the cartoon. Again, an ANOVA was performed showing that participants who read the loss-framed cartoon indicated that the story was predominantly loss-framed ($M = 6.25$, $SD = 0.38$) and participants who read the gain-framed cartoon indicated that the story was predominantly framed as gain ($M = 3.07$, $SD = 0.40$, $F(1, 28) = 33.04$, $p < .001$). Hence, the manipulation in the cartoons was successful.

Measures

Transportation

To measure transportation, participants completed 10 items from Green and Brock's transportation scale (2000) that were applied to the cartoon (e.g., "I wanted to know how the cartoon ended"; "I was mentally involved in the cartoon while reading it"; "While I was reading the cartoon, activity going on in the room around me was on my mind" (reversed).

¹In our original design we also manipulated whether the consequences of (not) performing the communicated behavior are for the main protagonist in the story (Jos) or for other characters in the story. The results showed no effects of this variable. Therefore, we chose to omit this variable.

All items were measured on a 7-point scale anchored by *very much applicable to me* (7) and *not at all applicable to me* (1). The items were averaged to create an overall index of transportation (range: 1.10–6.50; $M = 3.92$; $SD = 0.91$; Cronbach's $\alpha = .73$; eigenvalue = 3.33; explained variance = 33.30).

Identification

Ten items suggested by Cohen (2001) were used to measure identification with the main character in the cartoon, Jos (e.g., “During viewing, I felt I could really get into Jos’s head”; “While viewing the program, I wanted Jos to succeed in achieving his goals”). All items were measured on a 7-point scale anchored by *very much applicable to me* (7) and *not at all applicable to me* (1) and averaged to create an overall measure of identification (range: 1–6.60; $M = 3.42$; $SD = 1.30$; Cronbach's $\alpha = .93$; eigenvalue = 6.27; explained variance = 62.69).

Counterarguing

Counterarguing was measured by means of the following three items based on Nabi, Moyer-Gusé, and Byrne (2007): “During the cartoon, I criticized the message of the cartoon”; “During the cartoon, several counterarguments occurred to me”; “During the cartoon I was looking for things that are not true.” All items were measured on a 7-point scale anchored by *very much applicable to me* (7) and *not at all applicable to me* (1). The items were averaged to create a measure of counterarguing (range: 1–7; $M = 3.17$; $SD = 1.40$; Cronbach's $\alpha = .71$; eigenvalue = 1.79; explained variance = 59.52).

Attitude toward drunk cycling

The attitude toward drunk cycling was measured using 7-point semantic differential scales based on word pairs used by Crites, Fabrigar, and Petty (1994) and Trafimow and Sheeran (1998). Participants responded to the statement “Drunk cycling is ...” followed by 11 word pairs such as *negative/positive*, *bad/good*, *not enjoyable/enjoyable*, and *unwise/wise*. An index scale was computed by averaging the items (range: 1–6.45; $M = 2.38$; $SD = 1.41$; Cronbach's $\alpha = .98$; eigenvalue = 9.22; explained variance = 83.83).

Intention to refrain from drunk cycling

Intention was measured by three 7-point bipolar scales. The statements used were “I intend not to cycle drunk (definitely do not/definitely do),” “I will try not to cycle drunk (definitely will not/definitely will),” and “I will not cycle when I’m drunk (definitely will not/definitely will)” (adapted from Sparks, Harris, & Lockwood, 2004). We averaged the items to create an index scale (range: 1–7; $M = 4.93$; $SD = 2.10$; Cronbach's $\alpha = .94$; eigenvalue = 2.57; explained variance = 85.58).

Control variables

Several control variables were measured at the end of the experiment to ensure that the effects of the manipulation were not caused by other differences among the experimental groups. To measure cycling frequency, we asked participants how many days in an average week they use a bike ($M = 4.27$, $SD = 2.21$). We also measured alcohol frequency by asking on how many days in an average week participants consume alcoholic drinks ($M = 3.80$, $SD = 2.90$) and asked how many

alcoholic drinks participants consume in an average week ($M = 3.74$, $SD = 4.75$). We also determined gender, age, and education (see Participants section).

The experimental conditions did not differ with respect to cycling frequency, $F(1, 198) = 0.03$, $p = .869$, alcohol frequency, $F(1, 198) = 0.35$, $p = .555$, and alcoholic consumption, $F(1, 198) = 0.12$, $p = .732$. In addition, the experimental conditions did not differ with respect to gender, $\chi^2(1) = 3.39$, $p = .066$, age, $F(1, 198) = 0.09$, $p = .764$, or education, $\chi^2(2) = 2.77$, $p = .250$. These results imply that differences among the groups regarding the dependent variable could not have been caused by differences in these variables.

Results

To test the hypotheses that exposure to a gain-framed E-E message results in a more negative attitude toward drunk cycling and a higher intention to refrain from drunk cycling compared to exposure to a loss frame, we performed a multivariate analysis of variance (MANOVA). Framing was included as the independent variable, and attitude toward drunk cycling and intention to refrain from drunk cycling as dependent variables. Results showed a marginally significant effect of framing on attitude toward drunk cycling, $F(1, 198) = 3.66$, $p = .057$. Inspection of the mean scores indicated that the attitude toward drunk cycling was more negative in the condition in which respondents were exposed to the gain-framed story ($M = 2.18$, $SD = 0.14$) compared to exposure to the loss-framed story ($M = 2.56$, $SD = 0.14$), confirming H1a. Results showed no effect of framing on intention to refrain from drunk cycling, $F(1, 198) = 0.48$, $p = .491$. Therefore, H1b is not supported. To test the effect of attitude toward drunk cycling on intention to refrain from drunk cycling, we performed a regression analysis. Results showed that attitude significantly predicted intention, $b^* = -0.59$, $t(198) = -10.26$, $p < .001$. As the beta is both significant and negative, indicating that a more negative attitude toward drunk cycling results in a higher intention to refrain from drunk cycling, H1c is confirmed.

To test the second hypothesis that exposure to a gain frame (vs. loss frame) will result in more (a) transportation and identification (b), and less (c) counterarguing, we performed again a MANOVA. Framing was included as the independent variable, and transportation, identification, and counterarguing as dependent variables. Results showed that framing had a significant effect on counterarguing, $F(1, 198) = 11.09$, $p = .001$. Inspection of the mean scores indicated that respondents showed less counterarguing when exposed to the gain frame ($M = 2.85$, $SD = .14$) compared to exposure to the loss frame ($M = 3.49$, $SD = 0.14$), confirming H2c. Framing had no effects on transportation, $F(1, 198) = 0.01$, $p = .929$, and identification, $F(1, 198) = 0.43$, $p = .512$. Hence, H2a and H2b are not supported.

To investigate whether the effect of framing on intention to refrain from drunk cycling is mediated by processes of narrative persuasion (i.e., transportation, identification, and counterarguing) as well as by the attitude toward drunk cycling, we performed a mediation analysis. We first examined whether, and which of, the processes of narrative persuasion functioned

Table 1. Effect of framing on attitude toward drunk cycling through transportation, identification, and counterarguing.

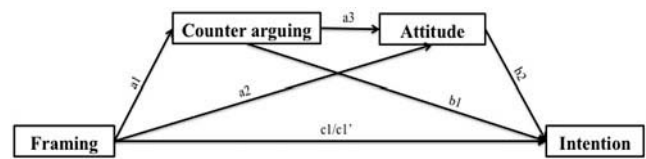
Variable	Bootstrap results for mediation effects		
	<i>b</i>	<i>SE</i>	95% CI
Transportation	-0.00	0.04	[-0.09, 0.08]
Identification	0.03	0.05	[-0.04, 0.16]
Counterarguing	-0.14	0.07	[-0.32, -0.03]

Note. Boldface highlights a significant effect as determined by the 95% bias corrected and accelerated confidence interval (95% CI).

as a mediator between the effect of framing on attitude toward drunk cycling by using the SPSS macro PROCESS (Hayes, 2012). As the pattern of significance or nonsignificance for individual paths in a mediation model is not pertinent to whether the indirect effect is significant (Hayes, 2009), we chose to include counterarguing as well as transportation and identification as proposed mediators in the analysis. The indirect effects were formally tested using a bootstrapping procedure, a method that does not rely on the assumption of a normally distributed sampling distribution of the indirect effect. Based on 10,000 bootstrap samples, a bias-corrected 95% confidence interval was computed for the point estimate of the indirect effects (Preacher & Hayes, 2008). Results in Table 1 show that only counterarguing significantly mediated the effect of framing on attitude toward drunk cycling. This means that framing has an indirect effect on attitude toward drunk cycling through counterarguing. A gain-framed E-E message resulted in less counterarguing, which resulted in a more negative attitude toward drunk cycling, compared to a loss frame.

Now that we had identified that counterarguing mediates the effect of framing on attitude toward drunk cycling, we tested whether counterarguing and attitude toward drunk cycling sequentially mediate the influence of messages framing on intention to refrain from drunk cycling. To this means a serial mediation analysis, also referred to as multiple-step multiple mediation (e.g., Hayes, Preacher, & Myers, 2011), was conducted using the SPSS macro PROCESS (Hayes, 2012) with both counterarguing and attitude toward drunk cycling as mediators in one analysis (process model: message frame → counterarguing → attitude toward drunk cycling → intention to refrain from drunk cycling). This procedure uses an ordinary-least-squares path analysis to estimate the coefficients in the model in order to determine the direct and indirect effects of framing on behavioral intentions. Bootstrapping was implemented in this analysis to obtain bias-corrected 95% confidence intervals for making statistical inference about specific and total indirect effects (see Preacher & Hayes, 2008). All paths for the full process model are illustrated in Figure 3 and their corresponding coefficients are provided in Table 2.

The total effect (*c1*) of message frame on intention to refrain from drunk cycling was not significant ($p = .491$) and neither was the total direct effect (*c1'*), removing the effect of the mediators. The total indirect effect, the sum of the specific indirect effects, was not significant, with a point estimate of 0.32 and a 95% confidence interval between -0.04 and 0.69. The specific indirect effect through counterarguing only was not significant ($a1b1 = -0.02$; 95% CI [-0.17, 0.11]), nor was the specific indirect effect through attitude only

**Figure 3.** A serial multiple mediation model with counterarguing and attitude as proposed mediators of message frame effects on intention.**Table 2.** Path coefficients estimated using PROCESS.

Path	Bootstrap results for mediation effects			
	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
a1	-0.64	0.19	-3.33	.001
a2	-0.22	0.20	-1.10	.275
a3	0.25	0.07	3.57	.001
b1	0.03	0.09	0.34	.739
b2	-0.89	0.09	-9.96	.000
c1	0.21	0.30	0.69	.491
c1'	-0.11	0.25	-0.45	.651

Note. Boldface highlights a significant effect.

($a2b2 = .19$; 95% CI [-0.16, 0.55]). However, more importantly, when testing serial multiple mediation, the specific indirect effect of framing on intention to refrain from drunk cycling through both counterarguing and attitude toward drunk cycling ($a1a3b2$) was significant with a point estimate of 0.15 and a 95% confidence interval between 0.04 and 0.34. Thus, counterarguing resulting from the gain-framed message (compared to the loss-framed message) increases the attitude toward drunk cycling, which in turn produces a lower intention to refrain from drunk cycling. In other words, counterarguing decreased the attitude toward drunk cycling, which resulted in a higher intention to refrain from drunk cycling.

Discussion

In this study we aimed to unravel the effects of framing displayed in an E-E message on measures of persuasion and processes that have been shown to play an important role in narrative persuasion: transportation, identification, and counterarguing. An entertaining and educating cartoon about drunk cycling was developed in which framing was manipulated by the usage of a loss or a gain frame. Results showed that counterarguing mediated the effect of framing on attitude toward drunk cycling, and that a more negative attitude toward drunk cycling resulted in a higher intention to refrain from drunk cycling. A serial multiple mediation model was tested in which both counterarguing and attitude toward drunk cycling were included as sequential mediators. Results showed that the use of a gain frame (compared to a loss frame) resulted in less counterarguing, which resulted in a more negative attitude toward drunk cycling, which resulted in a higher intention to refrain from this behavior.

The result that a gain frame as compared to a loss frame leads to a higher intention to refrain from drunk cycling is in line with research from Rothman and Salovey (1997), who proposed that gain-framed messages should be more persuasive for illness prevention behaviors, and loss-framed messages should be more persuasive for illness detection

behaviors. As refraining from drunk cycling can be considered prevention behavior, the positive effect of the gain-framed versus the loss-framed cartoon on intention was expected. In addition, our results show that framing does not directly affect attitude and intention, but that one process of narrative persuasion, counterarguing, plays an important role in this result. An explanation for this might be the fact that in framing research, participants are usually only exposed to one explicit gain- or loss-framed message. However, in this study participants are exposed to an entertaining cartoon in which the gain- and loss-framed messages are less explicit and, more importantly, participants are engrossed in the storyline. As Slater and Rouner (2002) state, there are crucial differences between the processing of narratives with persuasive content and conventional, nonnarrative persuasive messages. Involvement with the topic of a persuasive message and engagement with a narrative are qualitatively different in ways that should greatly influence the elaboration that takes place in response to persuasive content in such messages (Prentice & Gerrig, 1999; Slater, 1997). Through engagement in the storyline, individuals come to identify with characters, counterarguing is reduced, and the individuals are more open to persuasive messages contained in the narrative (Green, 2004; Slater, 2002; Slater & Rouner, 2002). The fact that E-E stories are processed differently than traditional persuasive messages might account for the fact that framing did not directly affect intention, but only via both counterarguing and attitude toward drunk cycling.

Against expectation, exposure to a gain frame (vs. loss frame) did not result in more transportation and identification. Although we expected that exposure to a gain frame would not hinder the enjoyable experience of these processes as opposed to exposure to a loss-framed E-E message, this was not the case. A possible explanation for these results could be found in the possibility that exposure to the loss-framed message was equally enjoyable and immersive as exposure to the gain-framed message. Although the loss-framed message was sad (the main protagonist has an accident and is hospitalized), sadness can enhance perceived reality and increases a sense of involvement, leading viewers to enjoy a sad story (Ahn et al., 2012). This might explain why we found no difference in measures of transportation and identification between both frames. Future research could examine if this was indeed the case.

The results did demonstrate an effect of counterarguing. It was shown that exposure to a gain-framed message (vs. loss-framed message) lowers counterarguing. Therefore, it could be argued that for prevention behavior one should employ a gain-framed message in an E-E production. An important question that can be raised, however, is to what extent the expected effect of a gain-framed message involves the fact that the behavior in question was preventive and not detective. It lies within the realm of possibilities that a gain-framed message in an E-E production is in any case preferred above the use of a loss-framed message, independent of the function of the behavior (prevention or detection). Framing information in a positive way is a catalyst for a more simplified cognitive process, which is incompatible with the process of counterarguing, which

requires more deliberate cognitive processing to occur. Future research could study framing effects in E-E by employing both prevention and detection behaviors, to address this question. Moreover, it would be interesting for future research to focus on possible moderators. The effects of framing could depend, for example, on involvement with the topic, the severity of the consequences of the proposed behavior, or individual differences between viewers (e.g. the number of days participants drink alcohol or the number of alcoholic drinks consumed during an average week). In addition, it would be interesting to include a control condition in which participants are not exposed to any form of persuasive messaging. In this way we could examine the relative effectiveness of differently framed messages compared to no message exposure. Another option is to examine framing effects in different entertainment education formats (e.g., written cartoon vs. animation). Future research could delve into these matters to examine possible boundary conditions for the observed effects.

Limitations

A limitation of this study is that the data were collected in the Netherlands where cycling levels are more than 10 times higher than, for example, in the United Kingdom and the United States. Although cycling in much of the industrialized world is seen as a marginal mode of transport that is occasionally used for recreational purposes, in the Netherlands cycling is a mainstream mode of transport (Pucher & Buehler, 2008). Therefore, the results of this study are more generalizable to countries where cycling is more prominent, such as Germany and Denmark. Future research could examine the effects of framing in E-E with other types of behavior that are more broadly generalizable, such as car driving.

In addition, the measurement of transportation might have some drawbacks. According to Miller-Day and Hecht (2013), there is an ideal or maximal level of transportation. They suggest that when transportation is too low, a person will disconnect from the message. When the amount of transportation is too high, on the contrary, a person will feel immersed into the story but not into the health message. Therefore, it might be hard to target the optimal level of transportation via exposure to an E-E production. Also, transportation is measured primarily by self-report, and as with any self-report measure it may be affected by response biases (Green & Clark, 2013). Therefore, future studies can try to tap transportation physiologically. Lastly, transportation is conceptually distinct from related concepts such as identification, but empirically these concepts tend to be correlated, which may make it difficult to determine the exact mechanism of effects (Green & Clark, 2013).

In this study we used cartoons as stimulus material to test the effects of framing in E-E. We chose for this format because it provided us with the opportunity to accurately manipulate gain and loss frames, which was the main goal of this study. However, one could argue that cartoons may not be as involving and immersive as other forms of E-E because, for example, it might be more difficult to identify with a cartoon character than with a real-life character. In this

study the cartoon was relatively short, which also could have impacted the results. Although cartoons have been effectively used before in E-E interventions, such as in the *Meena* campaign to address traditional attitudes of gender inequality throughout South Asia (McKee, Aghi, Carnegie, & Shahzadi, 2004), it could be interesting for future research to examine differences between various forms of E-E.

Conclusion

This study showed that framing in E-E has the power to affect people's attitudes and intentions. The characteristics used in the communicated message to bring these effects about were long unstudied in the field of E-E. In fact, as far as we are aware, this is the first study that examines persuasive strategies within E-E. Interestingly, in practice many examples can be found in which storylines in E-E are framed either positively or negatively. For instance, positively framed storylines may focus on the positive outcomes of taking your medicines as prescribed, while negatively framed messages focus on negative consequences when not taking your medicine as suggested by your doctor. Based on the results of these studies it would be more effective to frame these storyline positively because this seems to reduce counterarguing and subsequently attitudes and intentions.

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