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# Advertising a Desired Change: When Process Simulation Fosters (vs. Hinders) Credibility and Persuasion

Luca Cian , Chiara Longoni, and Aradhna Krishna

## Abstract

Ads promising a desired change are ubiquitous in the marketplace. These ads typically include visuals of the starting and ending point of the promised change (“before/after” ads). “Progression” ads, which include intermediate steps in addition to starting and ending points, are much rarer in the marketplace. Across several consumer domains, the authors show an ad-type effect: progression ads foster spontaneous simulation of the process through which the change will happen, which makes these ads more credible and, in turn, more persuasive than before/after ads (Studies 1–3). The authors also show that impairing process simulation and high skepticism moderate the ad-type effect (Studies 4–5). Finally, they show effect reversals: if consumers focus on achieving the desired results quickly, and it is possible to do so, progression ads and the associated process simulation backfire in terms of credibility and persuasion (Studies 6–7). These findings contribute to existing research by identifying conditions under which progression ads have beneficial or disadvantageous effects. These findings have managerial implications because they run counter to current marketing practices, which favor before/after over progression ads.

## Keywords

advertising, mental simulation, persuasion, process and outcome imagery

Online supplement: <https://doi.org/10.1177/0022243720904758>

Ken Cosgrove: Weight loss is a hard thing to prove.

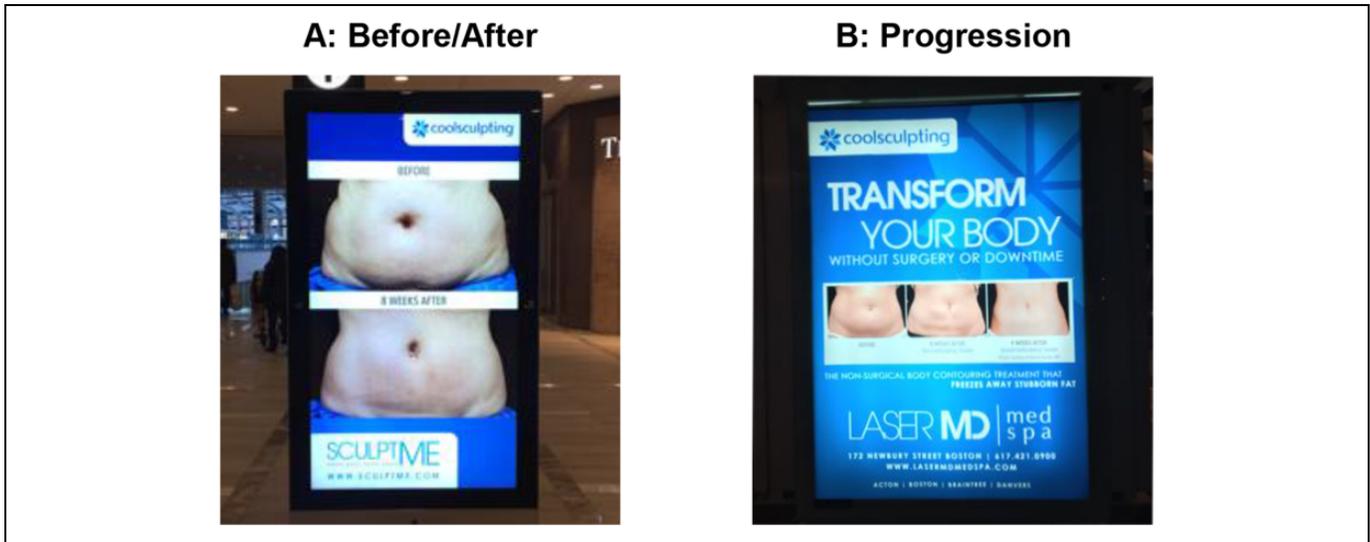
Don Draper: No, it isn't. It's “before” and “after” pictures. Since the dawn of time.

—*Mad Men*, season 1, episode 11, “Indian Summer”

Consumers often desire change. We want to be thinner, have whiter teeth, get rid of headaches, or have thicker hair. Companies respond to such desires by offering products that promise to deliver the corresponding changes: weight-loss programs, teeth-whitening products, painkillers, or hair-growth treatments. On a public policy level, desirable change is often the goal of public service announcements (PSAs) aiming to promote healthier behaviors. The advertisements for these products (change ads) typically feature visuals of the “before” and the desired “after” (e.g., photos of a person at the beginning and the end of a weight-loss program); we call these “before/after” ads. Another, less commonly used type of change ad features visuals of the intermediate outcomes that occur between the “before” and the “after” (e.g., photos of a person gradually slimming down); we call these “progression” ads (for examples, see Figure 1).

Given that companies benefit if consumers are persuaded by the ad and therefore buy the advertised product, consumers may question whether they can indeed achieve the advertised transformation. It is therefore important to identify the factors that foster, or hinder, the credibility and persuasiveness of change ads. The first part of our article tests the hypothesis that progression ads are more credible and persuasive than before/after ads and investigates what the underlying mechanism is. We build from the assumption that if consumers can mentally simulate the dynamic development through which change happens—in other words, if consumers engage in process simulation—the ad is more credible and therefore persuasive. We suggest that progression ads facilitate this kind of spontaneous simulation of process more than before/after ads, which renders progression ads more persuasive.

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**Figure 1.** Types of change ads in the marketplace.

The second part of our article explores when the effect of progression ads and process simulation on credibility and persuasion is weakened, strengthened, or detrimental. Progression ads are as credible and persuasive as before/after ads when cognitive load impairs process simulation. Progression ads are more credible and persuasive than before/after ads when consumers are highly skeptical of whether they can achieve the desired results. Finally, progression ads and process simulation are detrimental for credibility and persuasion if consumers focus on achieving the desired results quickly, and it is possible to do so.

Our research makes two important theoretical contributions. First, we contribute to the literature on mental simulation (Elder and Krishna 2012; Escalas and Luce 2003, 2004; Schlosser 2003, 2011; Thompson, Hamilton, and Petrova 2009; Ulkūmen and Thomas 2013) by identifying a novel antecedent of process simulation. Even though progression ads only include visuals of outcomes (e.g., photos of a person slimming down), they spontaneously facilitate simulation of the dynamic development of the process leading to the final transformation (e.g., the ways through which a person might lose weight). Thus, we identify in a visual progression of outcomes (i.e., in progression ads) an important antecedent of process simulation.

Second, we contribute to the literature on process and outcome simulation by identifying boundary conditions and effect reversals. Prior literature in this area has mostly focused on the beneficial effect of process simulation on persuasion (cf. Thompson, Hamilton, and Petrova 2009). In contrast, we show under what conditions process simulation fosters versus hinders persuasion. Process simulation may be particularly persuasive when consumers are highly skeptical of whether they can achieve a desired outcome. Conversely, process simulation may be detrimental for persuasion when the focus is on achieving the desired results quickly, and it is possible to do so.

Our research is also managerially relevant, as our findings run counter to current marketing practices that appear to favor

before/after ads over progression ads. To illustrate, a content analysis of 250 ads of the top five weight-loss programs in the United States (based on *Consumer Affairs*) revealed that whereas 36% of the ads used before/after visuals, only .8% used progression visuals (Web Appendix A1). Furthermore, when we asked business students to develop a marketing campaign for a weight-loss program, they generated before/after ads more frequently (22.9%) than progression ads (1.6%; Web Appendix A2). Although before/after ads seem to be the norm in practice, our findings challenge this assumption.

## Prior Research and Conceptual Framework

### Process Versus Outcome Mental Simulation

Mental simulation is the reenactment of perceptual experiences after exposure to visual or verbal representations of objects (Barsalou 1999, 2008). Mental simulation has been studied extensively in consumer psychology with the goal of understanding its impact on preference and persuasion (for a review, see Cian, Krishna, and Elder [2014, 2015]; Elder and Krishna [2012]; Escalas [2004]; MacInnis and Price [1987]; Nielsen, Escalas, and Hoeffler [2018]; Petrova and Cialdini [2005]). Prior literature has distinguished between mental simulation of an outcome (outcome simulation) and simulation of the means leading to an outcome (process simulation; Escalas and Luce 2003, 2004; Taylor et al. 1998; Thompson, Hamilton, and Petrova 2009; Zhao, Hoeffler, and Zauberman 2007).

Research has also documented how outcome and process simulation have different consequences depending on the phase of goal pursuit. When setting goals, outcome simulation is more beneficial than process simulation, because the former allows people to “keep their eyes on the prize,” so to speak (Houser-Marko and Sheldon 2008), instead of being distracted by other activities (Ferguson and Sheldon 2010). When executing goals, however, process simulation is more beneficial than outcome simulation because process simulation offers guidelines for what

actions one should take to attain a certain outcome. For instance, mentally simulating the process of preparing for an examination leads to better academic performance than mentally simulating the outcome (Pham and Taylor 1999).

In consumer psychology, researchers have focused on the effect of outcome and process simulation on persuasion and product preference. Escalas and Luce (2003, 2004) show that process (vs. outcome) simulation results in higher (vs. lower) behavioral intentions. Hamilton and Thompson (2007) demonstrate that process simulation attenuates the discrepancy in product evaluations arising from direct product experience (e.g., trial) versus indirect product experience (e.g., reading a product description).

With regard to change ads, existing literature on outcome and process simulation does not answer which ad (before/after vs. progression) is more persuasive. In a change ad, both the advantage of outcome simulation (to “keep the eyes on the prize” and avoid distractions) and the advantage of process simulation (to aid execution of goals) may influence persuasion. Our research answers this question, explores the factors that are critical for persuasiveness of change ads, and highlights the critical role of spontaneous simulation of process.

### *Process Simulation Enhances Credibility of Change Ads*

In change ads, marketers are promising consumers certain results. Credibility of a change ad reflects perceptions that the advertised product will deliver the promised results, and it therefore captures perceptions that the ad conveys the truth (Eagly and Chaiken 1993; Schlosser 2011). Consumers may question this promise, as the company benefits if consumers are persuaded by the ad and buy the advertised product (Kirmani and Wright 1989). We suggest that certain kinds of visual cues in change ads promote ad credibility more than others.

Imagine viewing an ad for a weight-loss program featuring two photos of a man called Jeffrey, taken at time  $x$  and time  $y$ , where Jeffrey looks heavy at time  $x$  and lean at time  $y$ . The credibility of this ad relies on the consumer being able to understand the process through which Jeffrey attains the desired weight loss. In other words, ad credibility implicates simulation of the process leading to the promised change. We predict that progression ads facilitate this kind of process simulation more than before/after ads and are therefore more credible.

This prediction is based on the very notion of mental simulation. Simulation is the reenactment of prior perceptual experiences, which allows one to run simulative models (i.e., what would happen if . . .) and draw implications for the actual world (Barsalou 1999). Although mental simulation is based on prior observations, it need not imply an actual experience (Barsalou 2008). How might one simulate the process leading to the desired results, such as losing weight? Because change in life typically happens by degrees rather than suddenly (e.g., weight loss typically happens gradually), process simulation likely entails the visualization of a change that occurs through small increments.

We suggest that because progression ads include visuals of the intermediate outcomes of a transformation (they are

sort of “baby steps”), they render a more readily available and more lifelike mental simulation of the process needed to achieve the final results. These intermediate outcomes better facilitate simulation of the way in which change occurs in life: by degrees. This argument is in line with a Gestalt-based perspective on visual processing, which is posited to happen by subconsciously “connecting the dots” between individual elements (Lidwell, Holden, and Butler 2010) so as to perceive a set of elements as a pattern (Rock and Palmer 1990).

Thus, we propose that progression ads facilitate process simulation more than before/after ads. Because process simulation promotes ad credibility, progression ads are more credible than before/after ads. Because credibility leads to greater persuasion (Kavanoor, Grewal, and Blodgett 1997; MacKenzie and Lutz 1989), progression ads are more persuasive than before/after ads. Stated formally and as summarized in Figure 2,

**H<sub>1a</sub>:** Progression ads are more credible and persuasive than before/after ads.

**H<sub>1b</sub>:** Progression ads lead to greater process simulation than before/after ads.

**H<sub>1c</sub>:** The higher credibility and persuasiveness of progression (vs. before/after) ads is mediated by greater process simulation.

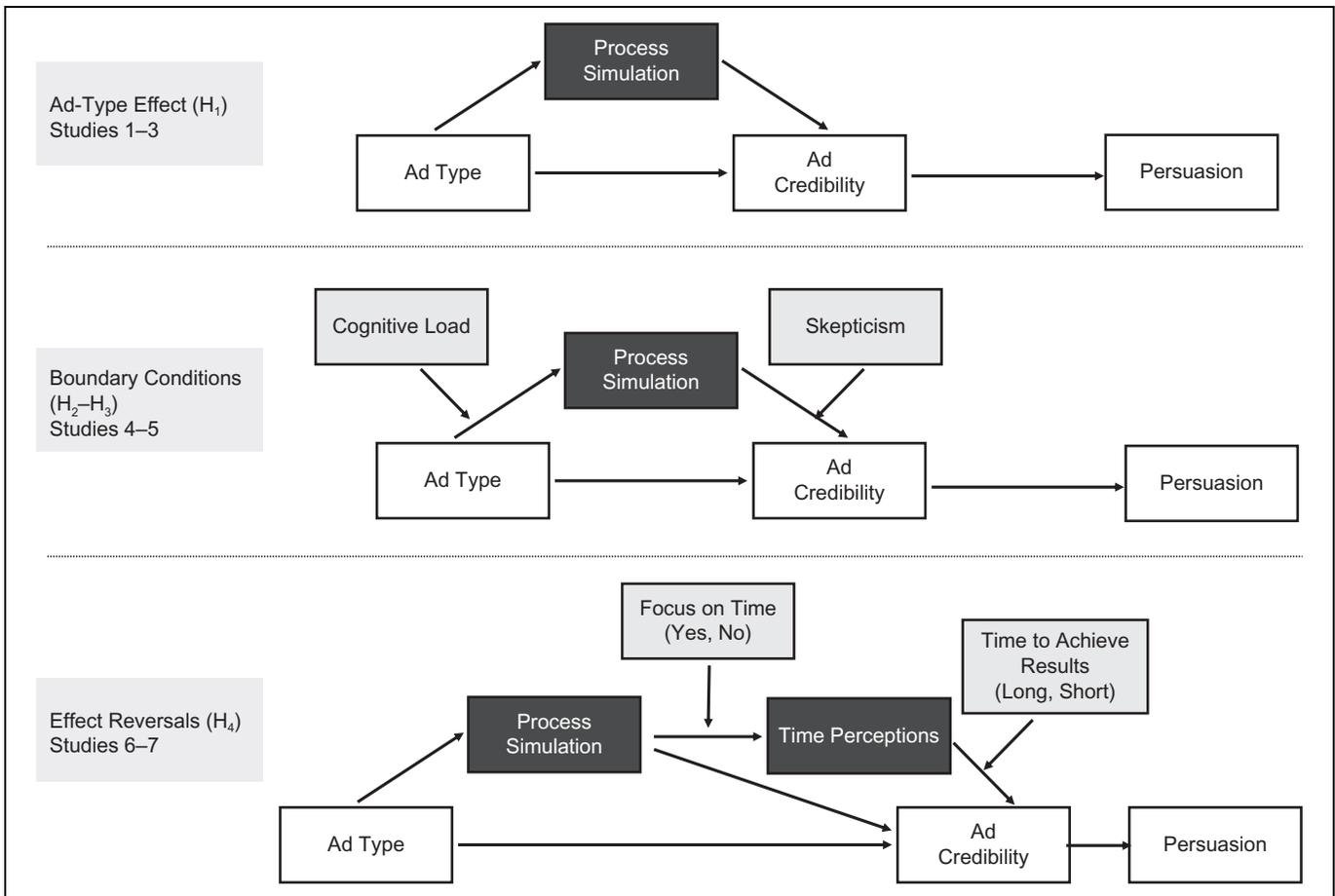
### *Moderation by Cognitive Load*

If process simulation indeed underlies the effect of ad type on credibility, this effect should be eliminated when process simulation is inhibited. One circumstance under which this occurs is when mental resources are impaired, such as when consumers are under cognitive load. Because process simulation relies on thoughts and cognitions, the availability of cognitive resources should affect the generation of images of the process leading to a certain outcome. Indeed, research has shown that cognitive load attenuates spontaneous mental simulation (Elder and Krishna 2010). For example, Elder and Krishna (2010) show that ads that mention multiple senses (vs. ads that mention taste alone) lead to higher taste perceptions because of the multisensory mental simulation evoked by the ad. This effect is attenuated, however, when mental simulation is impaired. In a similar vein, we propose that if mental resources are reduced by cognitive load, then the effect of ad type on credibility is attenuated because of inhibited process simulation. Stated formally,

**H<sub>2</sub>:** The effect of ad type on ad credibility and persuasion is attenuated under cognitive load.

### *Moderation by Skepticism*

Consumers often need to be convinced that they can indeed achieve the results claimed in the ad through use of the advertised product (e.g., that one can lose weight with a certain diet). As such, skepticism is theoretically central with respect to ad credibility. We propose that progression



**Figure 2.** Conceptual framework.

ads better counter skepticism than before/after ads. Because of process simulation, progression ads offer more evidence of the process through which a certain transformation might happen. Thus, progression ads are particularly suited to situations in which consumers question whether the desired results are achievable (i.e., if consumers are highly skeptical). As such, the greater credibility of progression (vs. before/after) ads should be higher under high (vs. low) skepticism. Stated formally,

**H<sub>3</sub>:** The effect of ad type on ad credibility is stronger (weaker) under high (low) skepticism.

### *When Progression Ads Backfire: The Role of Time Focus*

Next, we examine when progression ads, and the associated process simulation, might be detrimental for credibility and persuasion. So far, we have argued that progression ads are more credible than before/after ads because they facilitate simulation of the process through which the desired results might be achieved, which in turn enhances the credibility of the ad (ad type → process simulation → ad credibility). However, because process simulation entails mentally simulating the dynamic development through which change happens, process simulation might also suggest that it takes a long time to

achieve the desired results. Indeed, simulating the process through which weight loss happens, teeth get whiter, or hair grows thicker might also increase perceptions of the time necessary to achieve the promised results.

We suggest that, if a long time is necessary to attain the promised results, then progression ads are more credible than before/after ads. Even though progression ads elicit process simulation, and process simulation is associated with long time perceptions, time is a “necessary evil” to achieve the desired results. For example, in the context of a weight-loss program, a person who wants to lose weight will likely expect their weight loss to take a fairly long time—a long time is a necessary evil to achieve the desired weight loss. This is the case in several other consumer domains (e.g., at-home teeth-whitening treatments, hair-growth treatments).<sup>1</sup>

<sup>1</sup> Indeed, respondents from Amazon Mechanical Turk (MTurk; N = 100) reported how long they thought it would take to get whiter teeth using at-home teeth whitening strips, to get thicker hair using a hair-growth treatment, and to lose weight by enrolling in a weight-loss program (1 = “a very short time,” and 7 = “a very long time”). The time necessary to achieve results was fairly long in all cases (teeth whitening: M = 4.64; hair growth: M = 5.59; weight loss: M = 5.17) and higher than the midpoint of 4 (teeth whitening:  $t(99) = 4.63, p < .01$ ; hair growth:  $t(99) = 13.17, p < .01$ ; weight loss:  $t(99) = 9.09, p < .01$ ).

This line of reasoning is reminiscent of research on two-sided advertisements (i.e., ads with positive and negative claims; Crowley and Hoyer 1994; Golden and Alpert 1987; Schlosser 2011), which shows that two-sided messages, under certain conditions, might be more credible than one-sided messages (i.e., ads with only positive claims). One condition in which two-sided messages are more credible than one-sided ones is when a negative claim (e.g., price) is an inevitable downside to a positive claim (e.g., quality; Crowley and Hoyer 1994; Eisend 2006). We suggest that the same logic applies to process simulation. On the one hand, process simulation helps consumers envision the process leading to the desired results (a positive aspect). On the other hand, process simulation might suggest that achieving the desired results takes a long time (a negative aspect). If time is an inevitable downside of achieving results, then time (the negative aspect) will be viewed as a necessary evil to achieve these results (the positive aspect).

However, there are conditions under which a long time is not necessary to achieve the desired results. For example, in the context of nasal decongestion, a person is likely to expect that they can get effective relief in a relatively short time. In the context of a mild headache (vs. a severe headache), a person is likely to expect that they can get relief fairly quickly, as the headache is light.<sup>2</sup> As such, we suggest that progression ads are less credible than before/after ads if two conditions are met: (1) the desired results can be achieved quickly, and (2) consumers focus on achieving quick results. Condition 1 refers to the extent to which it is believable that results can be achieved quickly. Condition 2 refers to time focus, the extent to which consumers focus on and prioritize achieving quick results over achieving results in general. When conditions 1 and 2 are true, then progression ads and the associated process simulation and time perceptions are detrimental for ad credibility and persuasion (ad type → process simulation → time perceptions → ad credibility). As a result, the ad-type effect reverses, with time perceptions having a negative mediating role on ad credibility. Stated formally,

**H<sub>4</sub>:** Progression ads are less (more) credible and persuasive than before/after ads if (a) the desired results can be achieved quickly, and (b) consumers focus (vs. do not focus) on achieving quick results over achieving results in general.

## Overview of Studies

Table 1 summarizes our eight studies and main findings. Studies 1–3 focus on the main phenomenon: that ad type influences

<sup>2</sup> Indeed, respondents from MTurk (N = 100) reported how long they thought it would take to achieve relief from nasal congestion using a decongestant spray and relief from a mild headache using a headache medication (1 = “a very short time,” and 7 = “a very long time”). The time necessary to achieve results was fairly short (nasal decongestant: M = 2.78; headache medication for a mild headache: M = 2.86). In both domains, the means were lower than the midpoint of 4 (nasal decongestant:  $t(99) = -8.92, p < .01$ ; mild headache:  $t(99) = -8.60, p < .01$ ).

persuasion (behavior in Study 1a and choice between products in Study 1b) and that the effect of ad type on ad credibility is mediated by process simulation (Study 2), regardless of whether the final outcome is desirable (Study 3). Studies 4–7 focus on boundary conditions and effect reversals. Cognitive load (Study 4) and high skepticism (Study 5) moderate the ad-type effect. Studies 6 and 7 show under what conditions utilizing progression ads may backfire: when consumers focus on achieving the desired results quickly, and doing so is possible.

We test the ad-type effect both on credibility and persuasiveness. We define ad credibility as a judgment of the extent to which an ad conveys the truth (Eagly and Chaiken 1993; Schlosser 2011) and assess the extent to which ad type leads to greater credibility in Studies 2–7. We define ad persuasiveness as the extent to which an ad affects behaviors and beliefs (Dillard and Pfau 2002; MacKenzie and Lutz 1989) and assess the extent to which ad type leads to greater persuasion through willingness to support a company (Study 1a), choice (Study 1b), click-through rate (Studies 4 and 7), and shift in beliefs (Study 3).

## Study 1a: Ad Type Affects Behavior

Study 1a tested the hypothesis that progression ads are more persuasive than before/after ads (H<sub>1a</sub>) by observing actual behavior in a field setting. Specifically, we employed a sample from the general population (i.e., passersby) and measured the proportion of consumers who would support a new business (i.e., the opening of a new wellness center) as a function of whether the business was advertised by a before/after or a progression ad. We assessed persuasion by measuring whether the ad affected behavior (Dillard and Pfau 2002).

### Procedure

One hundred people participated in the study. A research assistant, blind to the hypothesis and purpose of this study, approached people walking around a square in Boston. The research assistant approached passersby under the guise of being sent by a local council to gauge the neighborhood sentiment with respect to the opening of a new wellness center in the area. Specifically, the research assistant approached passersby with the following script:

Excuse me, we are trying to gain support for a new wellness center to open in this area. We are part of the Wellness Council of Massachusetts. We have a new policy that says that before bringing in a new wellness center to the neighborhood, we need support from the residents of the neighborhood. Here is some information about the new wellness center that would like to open here. Would you be interested in signing a petition in support of the opening of a new wellness center?

In a two-cell, between-subjects design, participants who were willing to listen were then handed one of two versions of a leaflet. Both versions of the leaflet included the logo of the

**Table 1.** Summary of All Studies and Main Findings.

<b>Study 1a: Ad Type Affects Behavior (Consumer Domain: Weight-Loss Program Advertised by Men; N = 100; Field Study)</b>				
	<b>Before/After Ad</b>		<b>Progression Ad</b>	
% of passersby supporting a new business	44%		72%	
Main findings: Progression ads foster favorable behavior toward a firm more than before/after ads.				
<b>Study 1b: Ad Type Affects Product Choice (Consumer Domain: Teeth-Whitening Treatment; N = 121; Lab Study)</b>				
	<b>Before/After Ad</b>		<b>Progression Ad</b>	
% choosing the product sample over a bonus	52.5%		77.4%	
Main findings: Progression ads promote product choice more than before/after ads.				
<b>Study 2: Mediation Through Process Simulation (Consumer Domain: Weight-Loss Program; N = 213; MTurk)</b>				
	<b>Before/After Ad</b>	<b>Progression Ad</b>	<b>Information-Rich Ad</b>	
Ad credibility	4.93	5.59	4.67	
Process simulation	4.03	4.68	3.83	
Perceived informativeness	2.35	2.53	2.51	
Main findings: Progression ads facilitate process simulation more than before/after ads, resulting in higher ad credibility. Amount of information does not account for differences in ad credibility.				
<b>Study 3: Ad-Type Effect When the Final Outcome Is Undesirable (Consumer Domain: PSA About the Damage of Alcohol Abuse; N = 151; MTurk)</b>				
	<b>Before/After Ad</b>		<b>Progression Ad</b>	
Persuasion	5.24		5.83	
Process simulation	4.40		5.19	
Outcome simulation	6.04		5.89	
Main findings: Progression ads facilitate process simulation more than before/after ads, resulting in higher persuasion even when the final outcome is undesirable. Outcome simulation does not account for differences in persuasion.				
<b>Study 4: Moderation by Cognitive Load (Consumer Domain: Hair-Growth Treatment; N = 351; MTurk)</b>				
	<b>Control</b>		<b>Cognitive Load</b>	
	<b>Before/After Ad</b>	<b>Progression Ad</b>	<b>Before/After Ad</b>	<b>Progression Ad</b>
Persuasion (1 = click, 0 = no click)	47%	73%	47%	49%
Ad credibility	3.97	4.89	4.24	4.22
Process simulation	3.36	4.41	3.49	3.57
Main findings: Progression ads facilitate process simulation more than before/after ads, resulting in higher ad credibility and persuasion (control conditions). However, when process simulation is inhibited by cognitive load, neither process simulation, nor credibility, nor persuasion differ between ad types.				
<b>Study 5: Moderation by Skepticism (Consumer Domain: Hair-Growth Treatment; N = 325; MTurk)</b>				
	<b>Low Skepticism</b>		<b>High Skepticism</b>	
	<b>Before/After Ad</b>	<b>Progression Ad</b>	<b>Before/After Ad</b>	<b>Progression Ad</b>
Ad credibility	4.46	5.01	2.89	4.25
Process simulation	3.46	4.57	2.87	4.54
Main findings: Progression ads are particularly critical for credibility in conditions of high skepticism.				
<b>Study 6: Effect Reversal—When Process Simulation Lowers Credibility (Consumer Domain: Nasal Decongestion; N = 412; MTurk)</b>				
	<b>No Time Focus (Focus on Getting Results)</b>		<b>Time Focus (Focus on Getting Results Quickly)</b>	
	<b>Before/After Ad</b>	<b>Progression Ad</b>	<b>Before/After Ad</b>	<b>Progression Ad</b>
Ad credibility	5.03	5.46	5.75	5.42
Process simulation	4.03	4.87	4.36	4.79
Time perceptions	2.56	3.24	2.45	2.89

(continued)

**Table 1.** (continued)

Main findings: Progression ads are less credible than before/after ads when two conditions are met: (1) the desired results can be achieved quickly, and (2) consumers focus on achieving quick results. In Study 6, we held Condition 1 constant, as the desired results in this domain could be achieved quickly, and we manipulated Condition 2, whether people were focused on getting results (no time focus) or were focused on getting results quickly (time focus).

**Study 7: Effect Reversal—When Process Simulation Lowers Persuasion (Consumer Domain: Headache Relief; N = 350; MTurk)**

	Time to Achieve Results: Long		Time to Achieve Results: Short	
	Before/After Ad	Progression Ad	Before/After Ad	Progression Ad
Ad credibility	4.51	5.36	5.54	4.63
Process simulation	4.00	5.20	4.27	5.08
Time perceptions	3.36	3.75	2.45	3.13
Persuasion (1 = click, 0 = no click)	20%	38%	40%	25%

Main findings: Progression ads are less credible and persuasive than before/after ads when two conditions are met: (1) the desired results can be achieved quickly, and (2) consumers focus on achieving quick results. In Study 7, we manipulated Condition 1, whether the desired results could be achieved quickly (time to achieve results: short [mild headache]) or not (time to achieve results: long [severe headache]), and we held constant Condition 2, the focus on achieving quick results.

Wellness Council and the request for the willingness to sign a petition. The leaflets, however, differed on the type of ad they contained (before/after vs. progression). In the before/after condition, the ad showed two photos of a man, heavier in the “before” photo and slimmer in the “after” photo. In the progression condition, the ad showed the same “before” and “after” photos, with the addition of three intermediate outcomes (Figure 3).<sup>3</sup>

We instructed the research assistant to count as “approached” those passersby who looked at the leaflet, as it was critical for passersby to view the ad manipulation. That is, passersby who did not look at the leaflet (i.e., they walked away before the research assistant had showed them the leaflet) were not counted as approached. After listening to this information and looking at the leaflet, the research assistant asked passersby if they were willing to sign a petition supporting the opening of the wellness center.

## Results and Discussion

To assess behavior (i.e., our operationalization of persuasion), we computed the proportion of passersby who signed the petition over the total number of approached passersby by condition. As predicted, whereas 72% (36 out of 50 approached) of passersby signed the petition when the company was advertised by a progression ad, only 44% (22 out of 50 approached) signed the petition when the company was advertised by a before/after ad ( $\chi^2(1, N = 100) = 7.97, p < .01$ ). Thus, Study 1a supported the hypothesis that progression ads are more persuasive as they lead to positive behavior toward a company.

<sup>3</sup> We tested the stimuli used in Study 1a and all subsequent studies to ensure that before/after and progression ads did not differ on dimensions that could influence credibility and persuasiveness: degree of informativeness, visual appearance, and visual complexity. The ads did not differ on any of these dimensions (all  $ps > .2$ ; Web Appendix B).

## Study 1b: Ad Type Affects Product Choice

Study 1b further tested the hypothesis that progression ads are more persuasive than before/after ads ( $H_{1a}$ ) by assessing product choice. In an incentive-compatible setting, we offered participants the opportunity to get a free sample of an at-home teeth-whitening treatment. Thus, we assessed persuasion by measuring whether the ad affected behavior (Dillard and Pfau 2002).

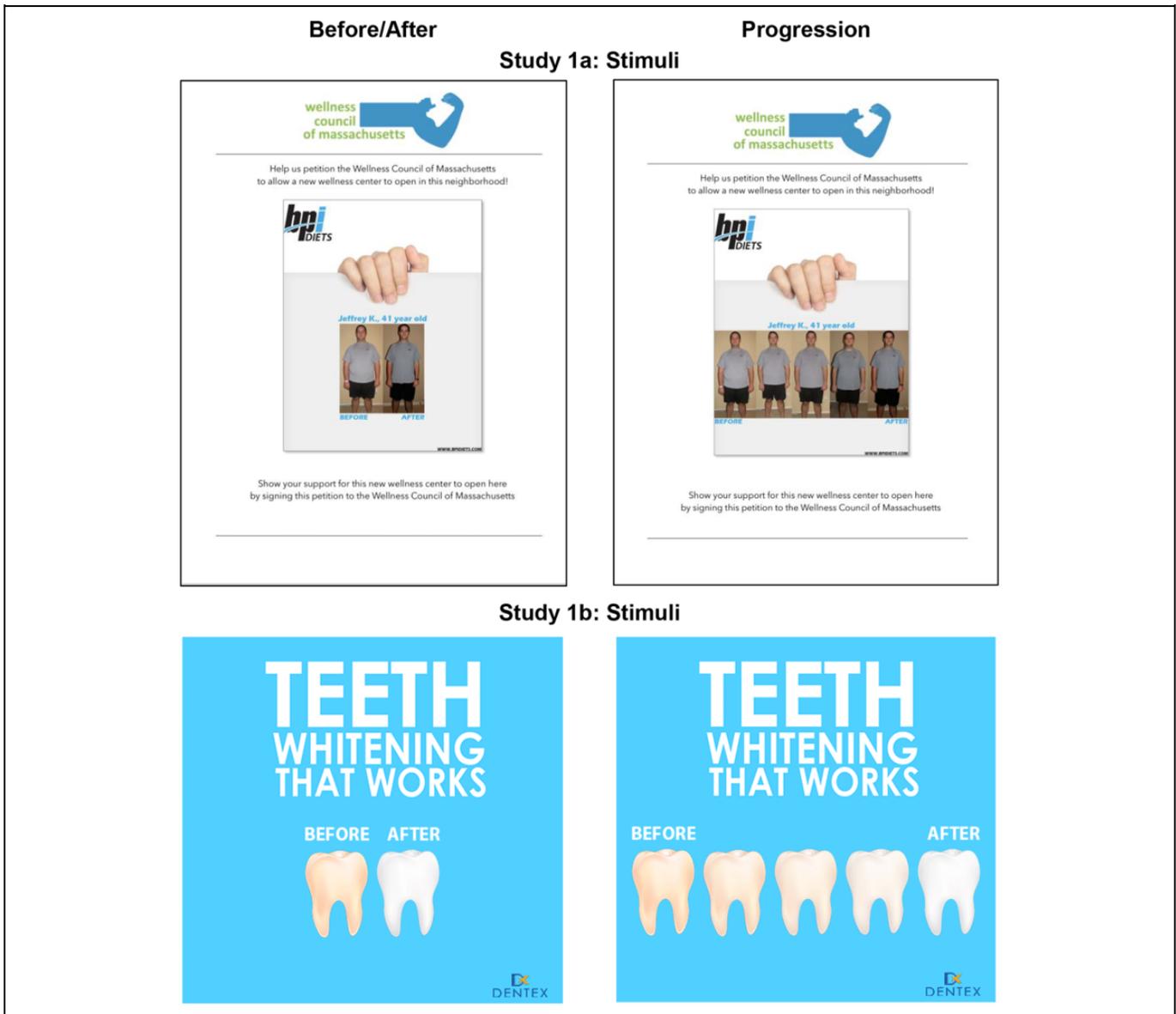
### Procedure

One hundred twenty-one paid participants at University of Virginia’s Behavioral Research at Darden lab completed the study. As a cover story, participants read that the university’s department of dentistry, in collaboration with the business school, wanted to market a new at-home teeth-whitening product. In a two-cell between-subject design, participants viewed one of two ads (before/after vs. progression) for this product. The before/after ad featured two visuals (a visual of teeth before using the treatment, and a visual of teeth after using the treatment). The progression ad featured the same two visuals and three additional intermediate outcomes (Figure 3). After viewing the ad, participants chose between receiving a product sample of one teeth-whitening treatment (in the form of two whitening strips) or receiving a bonus of \$1. Participants indicated their age and gender, and received the option they had chosen.

### Results and Discussion

Neither gender (59.5% female) nor age ( $M = 23.74$  years,  $SD = 8.08$ ) had a significant main effect (gender:  $B = -.19$ ,  $Wald = .25$ ,  $d.f. = 1, p > .6$ ; age:  $B = -.03$ ,  $Wald = 1.84$ ,  $d.f. = 1, p > .1$ ) or interacted with ( $B = -.01$ ,  $Wald = 1.25$ ,  $d.f. = 1, p > .2$ ) the main independent variable in Study 1b and in any of the following studies; we therefore refrain from discussing these variables further.

The progression ad led to higher product choice than the before/after ad ( $\chi^2(1, N = 121) = 8.26, p < .01$ ). When



**Figure 3.** Studies 1a and 1b stimuli.

advertised by a progression ad, 77.4% of participants (48 out of 62) chose the product sample over the monetary bonus (which was chosen by 22.6% [14 out of 62]). By contrast, when advertised by a before/after ad, only 52.5% of participants (31 out of 59) chose the product sample over a monetary bonus (which was chosen by 47.5% [28 out of 59]; no difference with chance). Thus, these results supported the hypothesis that progression ads are more persuasive than before/after ads, as captured by product choice (i.e., our operationalization of persuasion).

### Study 2: Mediation Through Process Simulation

The goal of Study 2 is twofold. First, we used an analysis of mediation to test that progression ads facilitate process

simulation more than before/after ads ( $H_{1b}$ ), and that greater process simulation fosters ad credibility ( $H_{1c}$ ). In addition, we ruled out the potential role of amount of information as the driver of the higher credibility of progression ads. One might argue that it is the number of visuals that renders progression ads more credible than before/after ads, in line with research showing that more information might increase credibility (e.g., Petty and Cacioppo 1986; Petrova and Cialdini 2005). We manipulated amount of information to directly test this alternative explanation.

In addition to before/after (two visuals) and progression ads (six visuals), we created a third, information-rich ad that contained three pairs of before/after visuals of three different people. Thus, the information-rich ad contained the same number of visuals as the progression ad (six). Per our hypotheses, it is the amount of process simulation (facilitated by a progression

ad) and not the amount of information that leads to greater ad credibility. Therefore, we expected the progression ad to be more credible than both the before/after ad and the information-rich ad.

### Procedure

In a three-cell, between-subjects design, 213 participants from MTurk viewed one of three ads (before/after vs. progression vs. information-rich) for a weight-loss program. The before/after ad contained two visuals (a “before” and an “after”). The progression ad contained visuals of the “before” and “after” with the addition of four intermediate steps. The information-rich ad contained three pairs of before/after visuals of three different people (Figure 4).

To measure ad credibility, participants rated the ad on a six-item scale (adapted from Park and John [2014]; 1 = “unlikeable/ineffective/useless/bad/not credible/not believable,” and 7 = “likable/effective/useful/good/credible/believable”;  $\alpha = .97$ ). Participants then rated process simulation on a three-item scale (adapted from Escalas and Luce [2004]; Taylor et al. [1998]; Zhao, Hoeffler, and Zauberman [2007]). Specifically, participants rated the extent to which the ad evoked images related to the process of achieving the desired results (“the process of losing weight,” “the steps involved in losing weight,” “the means by which one loses weight”) on a seven point-scale (1 = “this statement does not at all fit the images that the ad evokes,” and 7 = “this statement perfectly fits the images that the ad evokes”;  $\alpha = .91$ ). Finally, to measure informativeness, participants rated the extent to which they thought that the ad was informative (1 = “not informative at all,” and 7 = “very informative”).

### Results and Discussion

**Ad credibility.** A one-way analysis of variance (ANOVA) on ad credibility was significant ( $F(2, 210) = 7.19, p < .01$ ) and planned contrasts revealed that the progression ad was more credible than both the before/after ad ( $M_{\text{prog}} = 5.59, M_{\text{b/a}} = 4.93; F(1, 210) = 7.13, p < .01$ ) and the information-rich ad ( $M_{\text{info}} = 4.67; F(1, 210) = 13.75, p < .01$ ). The before/after and information-rich ads did not differ in terms of credibility ( $F(1, 210) = 1.14, p > .2$ ).

**Process simulation.** A one-way ANOVA on process simulation was significant ( $F(2, 210) = 4.19, p < .05$ ), and planned contrasts revealed that the progression ad led to greater process simulation than both the before/after ad ( $M_{\text{prog}} = 4.68, M_{\text{b/a}} = 4.03; F(1, 210) = 4.56, p < .05$ ) and the information-rich ad ( $M_{\text{info}} = 3.83; F(1, 210) = 7.83, p < .01$ ). The before/after and information-rich ads did not differ in terms of process simulation ( $F(1, 210) = .46, p > .4$ ).

**Perceived informativeness.** A one-way ANOVA on perceived informativeness revealed that there was no difference across conditions ( $M_{\text{prog}} = 2.53, M_{\text{b/a}} = 2.35, M_{\text{info}} = 2.51$ ; before/after vs. information rich:  $F(1, 210) = .37, p > .5$ ; before/after

vs. progression:  $F(1, 210) = .46, p > .4$ ; progression vs. information rich:  $F(1, 210) = .01, p > .9$ ).

**Mediation.** A mediation analysis (PROCESS Model 4; Hayes 2018) tested whether the relationship between ad type and ad credibility was mediated by process simulation, with informativeness also entered as a simultaneous mediator. We programmed PROCESS to treat the independent variable as multicategorical (using the *mcx* option; Hayes 2018). The mediational path from ad type to ad credibility was indeed significant through process simulation (progression vs. before/after: 95% confidence interval [CI] =  $[-.42, -.02]$ ; progression vs. information rich: 95% CI =  $[-.49, -.06]$ ) but not through informativeness (progression vs. before/after: 95% CI =  $[-.15, .06]$ ; progression vs. information rich: 95% CI =  $[-.11, .11]$ ).

Thus, these results supported the hypothesis that progression ads facilitate process simulation more than before/after ads ( $H_{1b}$ ), and that process simulation drives the ad-type effect ( $H_{1c}$ ). Furthermore, these results showed that amount of information, as captured by the number of visuals in the ad, does not account for differences in ad credibility.

### Study 3: Ad-Type Effect When the Final Outcome Is Undesirable

Study 3 has three goals. First, we generalized the ad-type effect to circumstances when the final outcome is undesirable, whereas in Studies 1a, 1b, and 2, the final results were desirable (slimmer body, whiter teeth). Second, we assessed persuasion ( $H_{1a}$ ) in terms of shifts in beliefs (MacKenzie and Lutz 1989), whereas in Studies 1a and 1b, we measured persuasion by assessing behavior and product choice (Dillard and Pfau 2002). The domain of Study 3 is a PSA to raise awareness of the negative consequences of alcohol abuse, an important domain given that alcohol is implicated in more than 88,000 deaths per year (National Institute on Alcohol Abuse and Alcoholism 2018). Thus, greater persuasiveness in this domain is captured by a shift in beliefs in the direction of the advocated message—that alcohol abuse has negative effects on health. Third, we tested whether outcome simulation, the extent to which the ad promotes simulation related to the final results, affects persuasion. This should not be the case as both before/after and progression ads show the final outcome (the “after”).

### Procedure

In a two-cell between-subjects design, 151 participants from MTurk viewed one of two ads (before/after vs. progression) of a PSA about alcohol abuse. To create the stimuli for this study, we reversed the order of the transformation displayed in the ad from desirable to undesirable: the ad depicted visuals of a brain changing from healthy to harmed (Figure 5).

We measured shift in beliefs (persuasion; MacKenzie and Lutz 1989) by asking participants to report the extent to which, based on the ad, they thought that alcohol had a negative effect



**Figure 4.** Study 2 stimuli.

on the brain (1 = “not negative at all,” and 7 = “extremely negative”). To measure process simulation and outcome simulation, participants rated the extent to which the ad evoked images related to process simulation (“the progressive damage caused by abusing alcohol,” “the steps involved in the damage caused by abusing alcohol,” “how the brain might become damaged by abusing alcohol”;  $\alpha = .81$ ) and to outcome simulation (“the resulting damage of alcohol abuse,” “the end result of abusing alcohol,” “the effects of abusing alcohol”;  $\alpha = .95$ ; 1 = “this statement does not at all fit the images that the ad evokes,” and 7 = “this statement perfectly fits the images that the ad evokes”).

### Results and Discussion

**Persuasion.** An ANOVA on persuasion revealed that the perceived negative effect of alcohol on the brain was rated as more severe when advertised by the progression ad than by the before/after ad ( $M_{b/a} = 5.24$ ,  $M_{prog} = 5.83$ ;  $F(1, 149) = 5.55$ ,  $p < .05$ ).

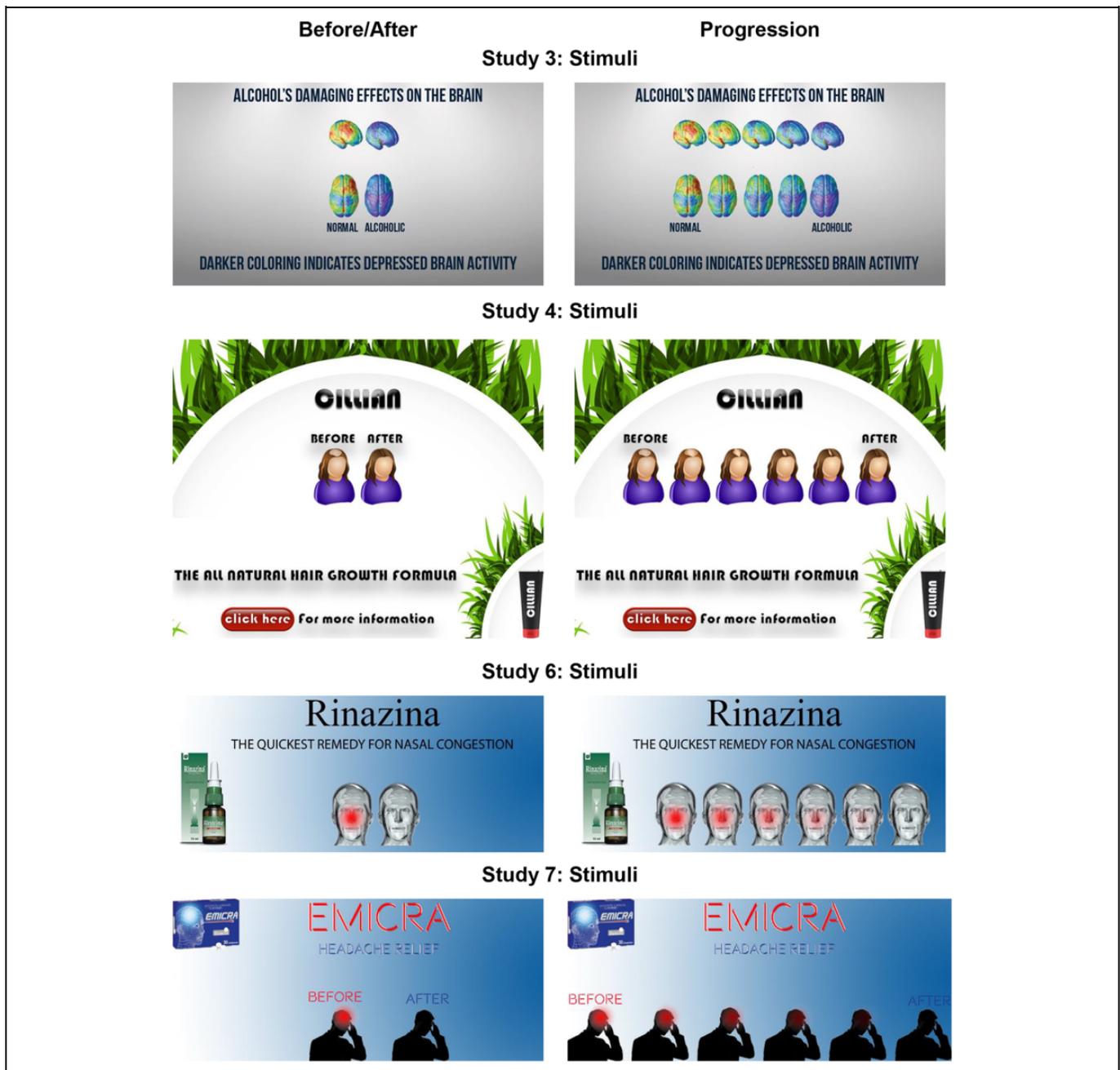
**Process and outcome simulation.** An ANOVA on process simulation revealed that the progression ad generated higher process simulation than the before/after ad ( $M_{b/a} = 4.40$ ,  $M_{prog} = 5.19$ ;  $F(1, 149) = 12.72$ ,  $p < .01$ ). Outcome simulation did not differ between progression and before/after ads ( $M_{b/a} = 6.04$ ,  $M_{prog} = 5.89$ ;  $F(1, 149) = .54$ ,  $p > .4$ ).

**Mediation.** A mediation analysis (Hayes’s [2018] Model 4 with 5,000 bootstrap resamples) using both process and outcome simulation as simultaneous mediators revealed that process simulation (95% CI = [.18, .78]), but not outcome simulation (95% CI = [−.21, .07]), mediated the effect of ad type on persuasion.

Thus, Study 3 provided further evidence that progression ads evoke greater process simulation than before/after ads, which resulted in greater persuasiveness even when the final outcome is undesirable.

### Study 4: Moderation by Cognitive Load

Study 4 tested our mechanism explanation through moderation by directly manipulating process simulation by use of cognitive



**Figure 5.** Studies 3, 4, 6, and 7 stimuli.

load. If spontaneous process simulation drives greater credibility of progression ads, this effect should be eliminated if mental simulation of process is externally inhibited. This could happen if cognitive load prevents people from engaging in process simulation ( $H_2$ ).

### Procedure

Three hundred fifty-one respondents from MTurk participated in exchange for monetary compensation. We employed a 2 (cognitive load: induced vs. control)  $\times$  2 (ad type: before/after vs. progression) between-subjects design. Consistent with

previous literature (Fukawa and Niedrich 2015; Pontari and Schlenker 2000; White and Willness 2009), we manipulated cognitive load by asking participants to memorize a nine-digit number (324578014). We instructed participants to keep the number in mind throughout the experiment without writing anything down. We also informed them that they would be asked to recall this number at the end of the experiment. In the control condition, this instruction was not present. Immediately afterward, participants viewed one of two ads (before/after vs. progression) for a hair growth treatment (Figure 5). After viewing the ad, participants read that they could click on a button on the ad to obtain more information about the

product and the ingredients it used to improve the quantity and quality of hair. Once the button was clicked, a JavaScript automatically opened another tab and redirected interested participants to a fictitious blog page that we had created and that provided information about the product and its ingredients. On the next screen, participants rated ad credibility on the same scale used in Study 2 (1 = “unlikeable/ineffective/useless/bad/not credible/not believable,” and 7 = “likable/effective/useful/good/credible/believable”;  $\alpha = .98$ ). Participants then rated process simulation by reporting the extent to which the ad evoked images related to the process of achieving the desired results (“the process needed for hair to regrow,” “the steps one has to take to regrow hair,” “the means by which one regrows hair”; 1 = “this statement does not at all fit the images that the ad evokes,” and 7 = “this statement perfectly fits the images that the ad evokes”;  $\alpha = .91$ ). Finally, participants in the cognitive load condition wrote down the number they memorized.

## Results and Discussion

**Manipulation check.** In the cognitive load conditions, 62.7% of the participants recalled the nine numbers they were asked to memorize in the correct order; 74.6% of the participants recalled at least the first five numbers they were asked to memorize in the correct order. These error rates are consistent with previous literature (Fukawa and Niedrich 2015) and suggest that the manipulation was effective (Pontari and Schlenker 2000; White and Willness 2009). The ratio of correct recall did not differ between ad types ( $B = .02$ , Wald = .02, 1 d.f.,  $p > .8$ ); we used the entire sample in the analyses (as in Pontari and Schlenker [2000], Van Dillen, Papies, and Hofmann [2013], and White and Willness [2009]).

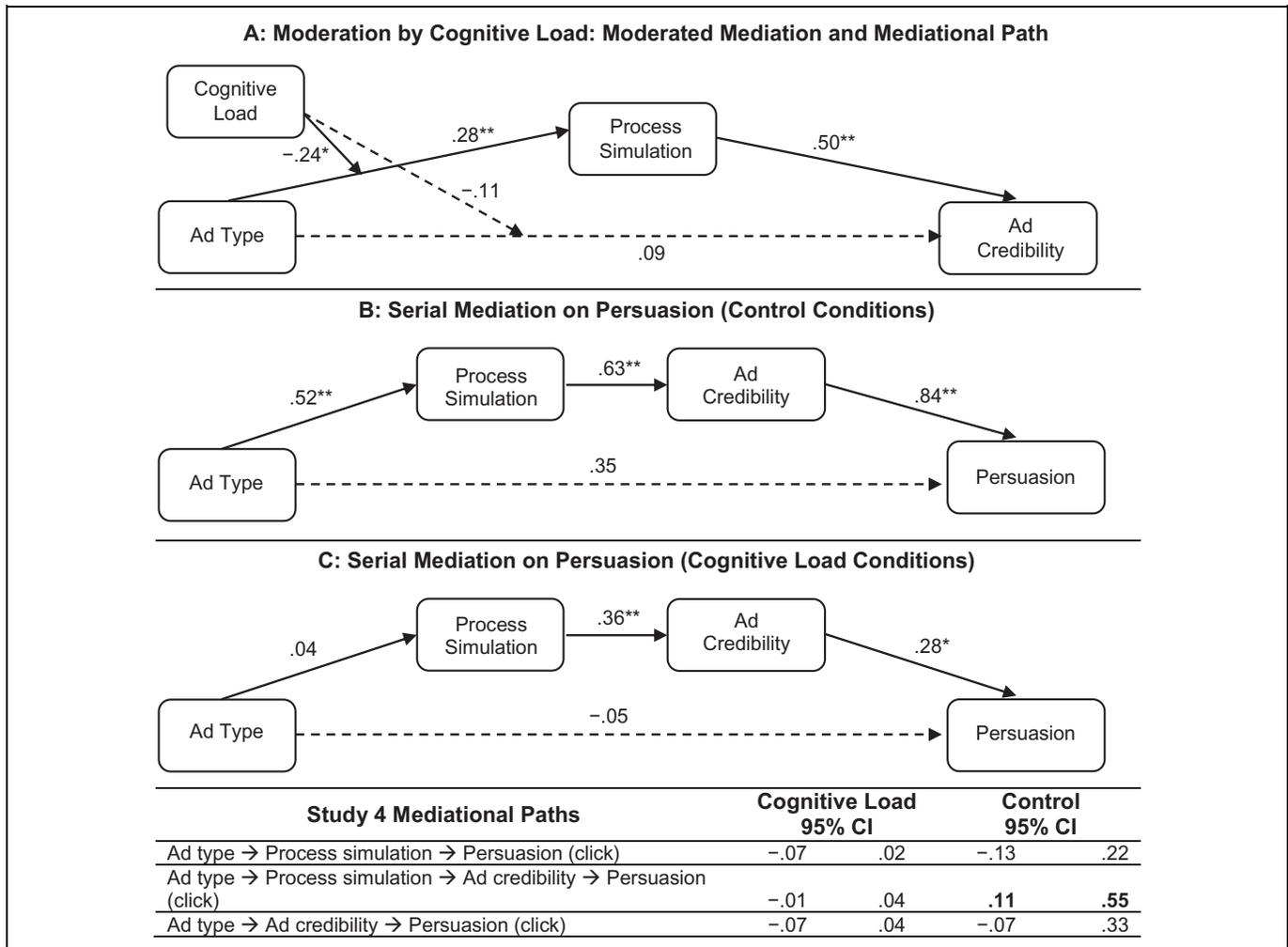
**Persuasion (click-through).** We used the number of participants who decided to click (vs. not click) on the link in the ad as a measure of persuasion. To analyze the data, we used a logistic regression with ad type, cognitive load, and their interaction as independent variables, and click-through (1 = click, 0 = no click) as the dependent variable. Ad type had a significant effect on click-through ( $M_{b/a} = 47\%$ ,  $M_{prog} = 61\%$ ;  $B = .30$ , Wald = 7.29, 1 d.f.,  $p < .05$ ), as did cognitive load ( $M_{control} = 60\%$ ,  $M_{load} = 48\%$ ;  $B = -.25$ , Wald = 5.14, 1 d.f.,  $p < .05$ ); the interaction between ad type and cognitive load on click-through was also significant ( $B = -.26$ , Wald = 5.66, 1 d.f.,  $p < .05$ ). To analyze the contrasts, we ran a moderation model using a bootstrapping method with 5,000 resamples (PROCESS Model 1, Hayes 2018; PROCESS allows for the dependent variable to be binary). This analysis corroborated the main and interaction effects and further revealed that in the control conditions, the progression ad led to more clicks than the before/after ad ( $M_{b/a} = 47\%$ ,  $M_{prog} = 73\%$ ; 95% CI = [.24, .88]). However, and as predicted, in the cognitive load conditions there was no difference between the ads in terms of clicks ( $M_{b/a} = 47\%$ ,  $M_{prog} = 49\%$ ; 95% CI = [-.26, .33]).

**Ad credibility.** A  $2 \times 2$  ANOVA on ad credibility showed a significant main effect of ad type ( $M_{b/a} = 4.10$ ,  $M_{prog} = 4.55$ ;  $F(1, 347) = 6.08$ ,  $p < .05$ ), a nonsignificant main effect of cognitive load ( $M_{control} = 4.43$ ,  $M_{load} = 4.23$ ;  $F(1, 347) = 1.17$ ;  $p > .2$ ), and a significant two-way interaction ( $F(1, 347) = 6.50$ ,  $p < .05$ ). Planned contrasts revealed that in the control conditions, the progression ad was more credible than the before/after ad ( $M_{b/a} = 3.97$ ,  $M_{prog} = 4.89$ ;  $F(1, 347) = 12.47$ ,  $p < .01$ ). However, in the cognitive load conditions, there was no difference in credibility between the ads ( $M_{b/a} = 4.24$ ,  $M_{prog} = 4.22$ ;  $F(1, 347) = .01$ ,  $p > .9$ ).

**Process simulation.** A  $2 \times 2$  ANOVA on process simulation revealed a significant main effect of ad type ( $M_{b/a} = 3.43$ ,  $M_{prog} = 3.99$ ;  $F(1, 347) = 9.00$ ,  $p < .01$ ), a marginally significant main effect of cognitive load ( $M_{control} = 3.89$ ,  $M_{load} = 3.53$ ;  $F(1, 347) = 3.47$ ,  $p = .06$ ), and a significant two-way interaction ( $F(1, 347) = 6.63$ ,  $p < .05$ ). Planned contrasts revealed that in the control conditions, the progression ad elicited more process simulation than the before/after ad ( $M_{b/a} = 3.36$ ,  $M_{prog} = 4.41$ ;  $F(1, 347) = 15.41$ ,  $p < .01$ ), replicating prior results. However, as predicted, in the cognitive load conditions, process simulation was the same in progression and before/after ads ( $M_{b/a} = 3.49$ ,  $M_{prog} = 3.57$ ;  $F(1, 347) = .09$ ;  $p > .7$ ).

**Moderated mediation on ad credibility.** To test the hypothesis that ad type affected process simulation, which in turn affected ad credibility, and that cognitive load moderated the effect of ad type on process simulation, we ran a moderated mediation model using a bootstrapping method with 5,000 resamples (PROCESS Model 8; Hayes 2018). In this model, the moderating effect of cognitive load takes place before the mediator (process simulation). As predicted, the indirect effect of ad type on credibility through process simulation was significant (95% CI = [.13, .41]) in the control conditions. However, the indirect effect of ad type on credibility was not significant when process simulation was inhibited by cognitive load (95% CI = [-.11, .16]). In addition, the interaction between ad type and cognitive load was significant (95% CI = [-.43, -.06]) in the path between the independent variable and the mediator, but not in the path between the independent variable and the dependent variable (95% CI = [-.27, .05]; Figure 6).

**Serial mediations on persuasion.** We ran two serial mediations to explore the relationship between process simulation, ad credibility, and persuasion (click-through). In the control conditions, we expected results consistent with the previous studies: that ad type leads to process simulation, which in turn affects credibility, which ultimately should lead to persuasion. Indeed, a test for serial mediation in the control conditions (5,000 resamples; Hayes 2018, PROCESS Model 6) showed that the relationship of ad type  $\rightarrow$  process simulation  $\rightarrow$  ad credibility  $\rightarrow$  persuasion was significant (95% CI = [.11, .55]). In the cognitive load conditions, as process simulation was inhibited by cognitive load, we expected the serial



**Figure 6.** Study 4 (boundary conditions): mediation and moderation paths.

\* $p < .05$ .

\*\* $p < .01$ .

Notes: Numbers = B. Cells in boldface indicate that the CI does not include zero.

mediation to be nonsignificant. Indeed, a test for a serial mediation in the cognitive load conditions (5,000 resamples; Hayes 2018, PROCESS Model 6) showed that the relationship of ad type → process simulation → ad credibility → persuasion was not significant (95% CI = [-.01, .04]; Figure 6).

These results ruled out a potential alternative explanation. That is, that the lack of difference in click-throughs in the cognitive load conditions was due to participants not wanting to click on the ad (regardless of ad type) to get as quickly as possible to the phase in which they had to recall the number. This alternative explanation is at odds with the results for process simulation and ad credibility, neither of which was different in the cognitive load conditions. These results and mediation are instead compatible with the hypothesis that process simulation drives ad credibility and persuasion. In the control conditions, the progression ad facilitated spontaneous process simulation more than the before/after ad, fostering credibility and persuasion. However, when process simulation was inhibited by cognitive load, neither process simulation nor

persuasion differed between ad types. Study 5 explored another boundary condition.

### Study 5: Moderation by Skepticism

Study 5 tested whether the ad-type effect is stronger when consumers are highly skeptical of achieving the desired results ( $H_3$ ). In the case of high skepticism, a progression ad should better assuage one’s skepticism, as the associated process simulation offers more evidence of the process through which a certain transformation might indeed happen. As such, the differential credibility of progression and before/after ads should be higher in case of high (vs. low) skepticism.

### Procedure

Three hundred twenty-five participants from MTurk completed the study in exchange for monetary compensation. We employed a 2 (skepticism: low vs. high) × 2 (ad type:

before/after vs. progression) between-subjects design. In the low- (high-) skepticism condition, participants read that recent research had shown that 70% to 80% of ads promoting hair-growth products were (were not) truthful—that is, they were (were not) able to keep the advertised promise thanks to (despite) the numerous warnings and actions taken by the American Academy of Dermatology and the Food and Drug Administration in recent years. We enclosed the American Academy of Dermatology logo and a link to its website to increase the veracity of the statement. After reading the scenario, participants viewed either a before/after ad or a progression ad for a hair-growth treatment (same stimuli as Study 4, without the “click here” button). Participants rated ad credibility (ad  $\alpha = .98$ ) and process simulation ( $\alpha = .94$ ) on the same scales used previously.

### Results and Discussion

**Ad credibility.** A  $2 \times 2$  ANOVA on ad credibility revealed a significant main effect of ad type ( $M_{b/a} = 3.70$ ,  $M_{prog} = 4.62$ ;  $F(1, 321) = 22.60$ ,  $p < .01$ ), a significant main effect of skepticism ( $M_{high} = 3.59$ ,  $M_{low} = 4.72$ ;  $F(1, 321) = 33.53$ ,  $p < .01$ ), and a significant interaction ( $F(1, 321) = 4.18$ ,  $p < .05$ ). Planned contrasts revealed that in the low-skepticism conditions, the progression ad was marginally more credible than the before/after ad ( $M_{b/a} = 4.46$ ,  $M_{prog} = 5.01$ ;  $F(1, 321) = 3.66$ ,  $p = .06$ ). However, as we predicted, the difference between progression and before/after ads was even higher in the high-skepticism conditions ( $M_{b/a} = 2.89$ ,  $M_{prog} = 4.25$ ;  $F(1, 321) = 23.19$ ,  $p < .01$ ).

**Process simulation.** A  $2 \times 2$  ANOVA on process simulation revealed a significant main effect of ad type ( $M_{b/a} = 3.17$ ,  $M_{prog} = 4.55$ ;  $F(1, 321) = 40.57$ ,  $p < .01$ ), no significant main effect of skepticism ( $F(1, 321) = 2.00$ ,  $p > .1$ ), and no significant interaction ( $F(1, 321) = 1.60$ ,  $p > .2$ ). Thus, and as predicted, the progression ad evoked greater process simulation than the before/after ad.

**Moderated mediation.** Per our hypotheses, ad type affects process simulation, which in turn affects ad credibility, with skepticism moderating the effect of process simulation on ad credibility. We tested this moderated mediation model using PROCESS Model 15 (Hayes 2018), with 5,000 resamples. In this model, the moderating effect of skepticism takes place after the mediator (process simulation). The indirect effect of ad type  $\rightarrow$  process simulation  $\rightarrow$  ad credibility was significant both in the high- (95% CI = [.57, 1.28]) and low- (95% CI = [.34, .85]) skepticism conditions. The mediation in the low-skepticism conditions was unexpected; we speculate that it is because, in these conditions, the progression ad was marginally more credible than the before/after ad. More importantly, and as we predicted, the interaction of process simulation and skepticism (95% CI = [.08, .42]) was significant. Furthermore, when controlling for this interaction (process simulation  $\times$  skepticism on ad credibility), the interaction of ad type and

skepticism on ad credibility was no longer significant (95% CI = [−.49, .88]; Figure 7).

Thus, Study 5 showed that progression ads are particularly critical for credibility in conditions of high skepticism. The next two studies tested under what circumstances the ad-type effect reverses; that is, under what circumstances process simulation may backfire.

### Study 6: Reversal—When Process Simulation Lowers Credibility

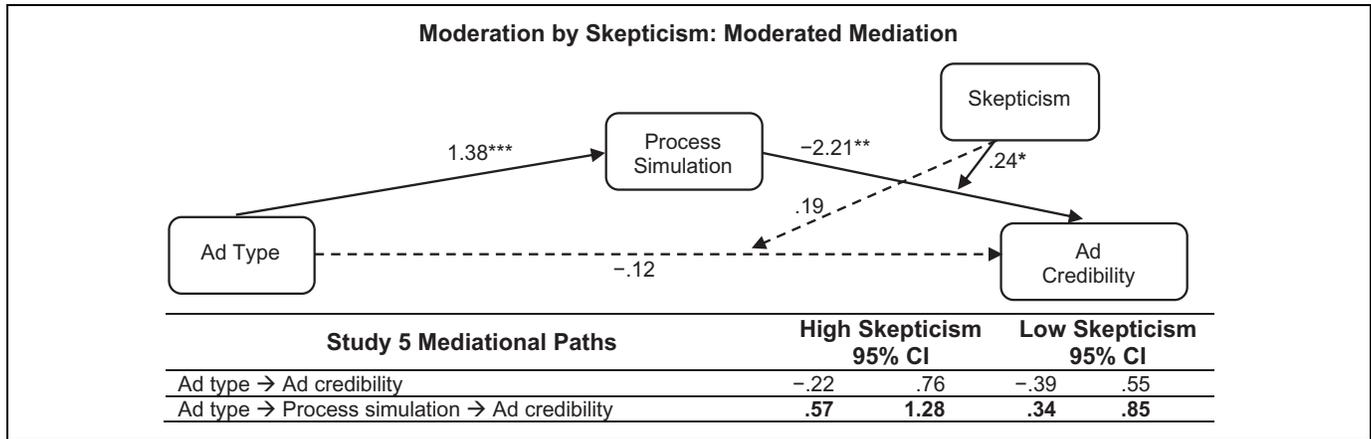
Study 6 examined under what conditions process simulation is detrimental for ad credibility ( $H_4$ ). Progression ads are less credible than before/after ads when two conditions are met: (1) the desired results can be achieved quickly, and (2) consumers focus on achieving quick results. With respect to Condition 1, we used a domain (nasal decongestion<sup>4</sup>) in which it is believable that results can be achieved quickly, in contrast to the domains considered so far (i.e. at-home teeth whitening, hair growth treatment, and weight loss) in which achieving results typically takes a long time. With respect to Condition 2, we manipulated whether consumers were focused on getting quick results versus not. We predicted that when people were not focused on getting quick results, progression ads would be more credible than before/after ads, an effect mediated by process simulation. By contrast, we predicted that when people were focused on getting quick results, progression ads would be less credible than before/after ads, an effect serially mediated by process simulation and time perceptions.

### Procedure

Four hundred twelve respondents from MTurk participated in exchange for monetary compensation. We used a  $2$  (ad type: before/after vs. progression)  $\times 2$  (time focus: yes vs. no) between-subjects design. Participants viewed either a before/after ad or a progression ad for a nasal decongestant spray called Rinazina (Figure 5).

To manipulate whether the focus was on time (vs. not), participants were asked to imagine that they were either looking for a product that would deliver the desired results quickly (“Imagine you had the goal of finding a product/brand that seems to work the fastest in giving you relief from nasal congestion; that is, you want a product you think is quick to act”) or simply delivered the desired results (“Imagine you had the goal of finding a product/brand that seems to work the

<sup>4</sup> To select a domain in which the desired results may be achieved quickly, we measured perceptions of the time necessary to achieve the desired results in the following domains: nasal congestion, sore throat, and sore muscles. We asked respondents from MTurk ( $N = 88$ ), “How long do you think it would take before you feel all right if you are suffering from [domain] and take a medicine for it?” (1 = “a very short time,” and 7 = “a very long time”). The means were 3.35 (SD = 1.37) for nasal congestion, 3.65 (SD = 1.55) for sore throat, and 4.41 (SD = 1.51) for sore muscles. We chose relief from nasal congestion as a domain in which the desired results can be achieved quickly because it had a low mean and a low standard deviation.



**Figure 7.** Study 5: moderated mediation.

\* $p < .05$ .

\*\* $p < .01$ .

Notes: Numbers = B. Cells in boldface indicate that the CI does not include zero.

best in giving you relief from nasal congestion, i.e. you want a product you think works well”). Participants rated ad credibility ( $\alpha = .96$ ) on the six-item scale used previously and process simulation ( $\alpha = .80$ ) on a three-item scale also used previously and adapted to this domain (“the process of getting relief from nasal decongestion,” “the steps involved in getting relief from nasal decongestion,” “the means by which one gets relief from nasal decongestion”; 1 = “this statement does not at all fit the images that the ad evokes,” and 7 = “this statement perfectly fits the images that the ad evokes”). Participants then rated time perceptions (“in the scenario we asked you to imagine, how long would it take to get relief from nasal congestion using Rinazina?” 1 = “a very short time,” 7 = “a very long time”).

**Results and Discussion**

**Ad credibility.** A  $2 \times 2$  ANOVA on ad credibility revealed a significant main effect of time focus ( $M_{\text{time focus}} = 5.59$ ,  $M_{\text{no time focus}} = 5.24$ ;  $F(1, 408) = 8.56$ ,  $p < .05$ ) and a significant interaction between time focus and ad type ( $F(1, 408) = 10.56$ ,  $p < .01$ ); the main effect of ad type was not significant ( $F(1, 408) = .17$ ;  $p > .6$ ). Planned contrasts revealed that when the focus was not on time, the progression ad was more credible than the before/after ad ( $M_{\text{b/a}} = 5.03$ ,  $M_{\text{prog}} = 5.46$ ;  $F(1, 408) = 6.75$ ,  $p < .05$ ). However, when the focus was on time, the before/after ad was more credible than the progression ad ( $M_{\text{b/a}} = 5.75$ ,  $M_{\text{prog}} = 5.42$ ;  $F(1, 408) = 4.01$ ,  $p < .05$ ).

**Process simulation.** A  $2 \times 2$  ANOVA on process simulation revealed a significant main effect of ad type ( $M_{\text{b/a}} = 4.20$ ,  $M_{\text{prog}} = 4.83$ ;  $F(1, 408) = 18.63$ ,  $p < .01$ ), no significant main effect of time focus ( $F(1, 408) = .71$ ,  $p > .3$ ), and no significant two-way interaction ( $F(1, 408) = 1.97$ ,  $p > .1$ ). Thus, a

progression ad evoked greater process simulation than a before/after ad, irrespective of time focus.

**Time perceptions.** A  $2 \times 2$  ANOVA on time perceptions revealed a significant main effect of ad type: the progression ad led to higher time perceptions than the before/after ad ( $M_{\text{prog}} = 3.06$  vs.  $M_{\text{b/a}} = 2.50$ ;  $F(1, 408) = 15.22$ ,  $p < .01$ ), consistent with our predictions. There was no significant main effect of time focus ( $F(1, 408) = 2.44$ ,  $p > .1$ ), and the interaction between ad type and time focus was not significant ( $F(1, 408) = .68$ ;  $p > .4$ ).

**Serial mediations.** Per our pretesting, nasal decongestion is a domain in which it is possible to achieve the desired results quickly. When the focus was not on time, we expected results consistent with what we found in the previous studies: ad type leads to process simulation, which in turn affects ad credibility, with no indirect effect of time perceptions on ad credibility (as consumers do focus on time unless prompted to do so<sup>5</sup>). However, when the focus was on time, we expected process simulation to backfire, given that a long time is not necessary to achieve results in this domain. In this case, we expected time perceptions to have a negative indirect effect on ad credibility, making a progression ad less credible than

<sup>5</sup> Indeed, when considering a product advertised in a change ad, people typically focus on achieving the desired results rather than on the time it takes to do so. To validate this assumption, we asked MTurk respondents ( $N = 100$ ) to what extent they would focus on achieving the desired results (1 = “not at all,” and 7 = “very much”) and to what extent they would focus on the time it would take to achieve the desired results (1 = “not at all,” and 7 = “very much”) in the following domains: a weight-loss program, a hair-growth treatment, an at-home teeth-whitening treatment, a nasal decongestant spray, and a headache medication. In all of these domains, participants reported focusing more on achieving the advertised results (means ranged from to 6.13 to 6.42) than the time it would take to do so (means ranged from to 3.80 to 4.33; all  $ps < .01$ ; see Web Appendix C for details).

**Table 2.** Studies 6 and 7 (Effect Reversals): Mediation and Moderation Paths.

Study 6: Effect Reversal—When Process Simulation Lowers Credibility (Holding Constant Whether Desired Results Can Be Achieved Quickly)	Time Focus (Focus on Getting Quick Results)		No Time Focus (Focus on Getting Results)	
	95% CI		95% CI	
Serial Mediation Paths				
Ad type → Process simulation → Ad credibility	-.01	.14	.17	.57
Ad type → Process simulation → Time perceptions → Ad credibility	-.08	-.01	-.01	.03
Ad type → Time perceptions → Ad credibility	-.22	.01	-.20	.01
Study 7: Effect Reversal—When Process Simulation Lowers Persuasion (Holding Constant Whether Focus Is on Time)	Time to Achieve Results: Long		Time to Achieve Results: Short	
	95% CI		95% CI	
Serial Mediation Paths				
Ad type → Process simulation → Persuasion (click)	-.08	.47	-.27	-.01
Ad type → Process simulation → Time perceptions → Persuasion (click)	-.09	.01	-.04	.01
Ad type → Process simulation → Ad credibility → Persuasion (click)	.03	.51	-.01	.05
Ad type → Process simulation → Time perceptions → Ad credibility → Persuasion (click)	-.01	.03	-.02	-.01
Ad type → Time perceptions → Persuasion (click)	-.01	.19	-.12	.04
Ad type → Time perceptions → Ad credibility → Persuasion (click)	-.07	.01	-.06	.01
Ad type → Ad credibility → Persuasion (click)	-.13	.06	-.30	.01

a before/after ad. We tested these predictions in two serial mediation models using PROCESS Model 6 (5,000 resamples; Hayes 2018). The indirect effect of ad type → process simulation → time perceptions → ad credibility was significant when the focus was on time (95% CI = [-.08, -.01]), but not when the focus was not on time (95% CI = [-.01, .03]). Conversely, the indirect effect of ad type → process simulation → ad credibility was significant (95% CI = [.17, .57]) when the focus was not on time (consistent with the previous studies), but not when the focus was on time (95% CI = [-.01, .14]; Table 2).

Thus, Study 6 showed that when consumers focus on attaining the desired results quickly and doing so is possible, progression ads and process simulation lower ad credibility.

### Study 7: Reversal—When Process Simulation Lowers Persuasion

Study 7 further examined under what conditions the ad-type effect reverses, such that process simulation is detrimental for credibility and persuasion ( $H_4$ ). Progression ads are less credible and persuasive than before/after ads when two conditions are met: (1) the desired results can be achieved quickly, and (2) consumers focus on achieving quick results. In Study 6, with respect to Condition 1, we examined a domain in which results may be achieved quickly, and, with respect to Condition 2, we manipulated whether participants were focused on time. In Study 7, we manipulated Condition 1—whether it was believable (vs. not believable) that results could be achieved quickly. Specifically, we selected a domain (headache medication) in which results (pain relief) could be achieved in a short time (in case of a mild headache) or required a long time (in case of a

severe headache).<sup>6</sup> With respect to Condition 2, in Study 7 all participants were under time focus, as we instructed all participants to evaluate the ad as though they were looking for a headache medication that delivered quick results.

We expected the progression ad to be more credible and persuasive than the before/after ad in case of a severe headache—when achieving the desired results required a long time. In this case, even though process simulation evokes long time perceptions, time does not detract from persuasion, as it is an inevitable downside to achieving results (getting rid of the headache). By contrast, we expected the progression ad to be less credible and persuasive than the before/after ad in case of a mild headache—when achieving the desired results did not require a long time. In this case, the fact that process simulation evokes long time perceptions is detrimental for persuasion.

### Procedure

Three hundred fifty respondents from MTurk participated in exchange for monetary compensation. We used a 2 (ad type: before/after vs. progression) × 2 (time to achieve results: long [severe headache] vs. short [mild headache]) between-subjects design. Participants viewed one of two ads (before/after vs. progression) for a headache medication (Figure 5).

Participants imagined that they had a severe (vs. mild) headache and that they were looking for headache pill that would

<sup>6</sup> To validate this assumption, we asked respondents from MTurk ( $N = 100$ ) to rate how long they thought that it would take to get relief from a mild headache and from a severe headache (random order; 1 = “a very short time,” and 7 = “a very long time”). Indeed, getting relief from a mild headache was expected to take a short time ( $M = 2.45$ ), whereas getting relief from a severe headache was expected to take a long time ( $M = 5.12$ ;  $t(99) = -17.22$ ,  $p < .01$ ).

give them relief from their headache in the shortest time possible (“Imagine you had the goal of finding a product/brand that seems to work the fastest in giving you relief from your [mild/severe] headache”). Participants were only told that they had a mild (or severe) headache; there was no mention of how long it would take to get relief from the headache. We measured persuasion through rate of click-through: participants read that if they wanted, they could click on a button below the ad to obtain more information about the product and suggestions about how to prevent headaches. If participants clicked on the button, a JavaScript automatically opened another tab and redirected interested participants to a fictitious blog page that we had created. Participants then rated ad credibility on the same scale used previously ( $\alpha = .97$ ) and process simulation ( $\alpha = .79$ ) on a three-item scale comprising the following items: “the process of getting relief from a headache,” “the steps involved in getting relief from a headache,” and “the means by which one gets relief from a headache” (1 = “this statement does not at all fit what I considered when examining this ad,” and 7 = “this statement perfectly fits what I considered when examining this ad”). Participants then rated time perceptions by reporting how long they thought it would take to get relief from the headache described in the scenario by taking the advertised medication (1 = “a very short time,” and 7 = “a very long time”).

## Results and Discussion

**Persuasion (click-through).** We used the number of participants who decided to click (vs. not click) on the link in the ad as a measure of persuasion. To analyze the data, we used a logistic regression with ad type, time to achieve results, and their interaction as independent variables, with click-through (1 = click, 0 = no click) as the dependent variable. We found no significant main effect of time to achieve results ( $B = -.09$ , Wald = .53, 1 d.f.,  $p > .4$ ) or ad type ( $B = .06$ , Wald = .22, 1 d.f.,  $p > .6$ ). Importantly, we found a significant interaction between ad type and time to achieve results ( $B = .39$ , Wald = 10.47, 1 d.f.,  $p < .01$ ). To analyze the contrasts, we ran a moderation model using PROCESS Model 1 (5,000 resamples Hayes 2018). This corroborated the interaction effect and further revealed that when achieving results required a long time (in case of a severe headache), the progression ad led to more clicks than the before/after ad ( $M_{b/a} = 20\%$ ,  $M_{prog} = 38\%$ ; 95% CI = [.10, .79]). However, when achieving results required a short time (in case of a mild headache), the before/after led to more clicks than the progression ad ( $M_{b/a} = 40\%$ ,  $M_{prog} = 25\%$ ; 95% CI = [-.64, -.01]).

**Ad credibility.** A  $2 \times 2$  ANOVA on ad credibility revealed no significant main effect of time to achieve results ( $F(1, 346) = .88$ ,  $p > .3$ ) or ad type ( $F(1, 346) = .03$ ,  $p > .8$ ), and a significant interaction ( $F(1, 346) = 30.46$ ,  $p < .01$ ). Planned contrasts reveal that when achieving results required a long time (in case of a severe headache), the progression ad was more credible than the before/after ad ( $M_{b/a} = 4.51$ ,  $M_{prog} = 5.36$ ;  $F(1, 346) = 13.70$ ,  $p < .01$ ). Even when people were focused on quick results, it remained unlikely that they could achieve

quick results with a severe headache. As a result, the progression ad was more credible than before/after ad. However, when achieving results required a short time (in case of a mild headache), the before/after ad was more credible than the progression ad ( $M_{b/a} = 5.54$ ,  $M_{prog} = 4.63$ ;  $F(1, 346) = 16.92$ ,  $p < .01$ ). Thus, the ad-type effect reversed when a long time was not necessary to achieve the desired results.

**Process simulation.** A  $2 \times 2$  ANOVA on process simulation revealed a significant main effect of ad type ( $M_{b/a} = 4.14$ ,  $M_{prog} = 5.14$ ;  $F(1, 346) = 38.75$ ,  $p < .01$ ), no significant main effect of time to achieve results ( $F(1, 346) = .20$ ,  $p > .6$ ), and no significant interaction ( $F(1, 346) = 1.39$ ,  $p > .2$ ). Thus, a progression ad evoked greater process simulation than a before/after ad, irrespective of time to achieve results.

**Time perceptions.** A  $2 \times 2$  ANOVA on time perceptions revealed a significant main effect of ad type: the progression ad led to perceptions of more time necessary to achieve results than the before/after ad ( $M_{prog} = 3.43$  vs.  $M_{b/a} = 2.89$ ;  $F(1, 346) = 8.37$ ,  $p < .05$ ), consistent with what we predicted. In addition, there was a significant main effect of time to achieve results: relief from the mild headache was indeed perceived to take less time than relief from the severe headache ( $M_{short\ time} = 2.79$ ,  $M_{long\ time} = 3.55$ ;  $F(1, 346) = 16.86$ ,  $p < .01$ ). The interaction between time to achieve results and ad type was not significant ( $F(1, 346) = .60$ ,  $p > .4$ ).

**Serial mediations.** When achieving results required a long time (in case of a severe headache), we expected results consistent with the previous studies: that ad type leads to process simulation, which in turn affects credibility, with no indirect effect of perceived time on credibility. Credibility, ultimately, should lead to persuasion. A test for serial mediation in the severe headache conditions (5,000 resamples; Hayes 2018, PROCESS Model 6) showed that the relationship of ad type  $\rightarrow$  process simulation  $\rightarrow$  ad credibility  $\rightarrow$  persuasion was significant (95% CI = [.03, .51]). The indirect effect of ad type  $\rightarrow$  process simulation  $\rightarrow$  time perceptions  $\rightarrow$  ad credibility  $\rightarrow$  persuasion (95% CI = [-.01, .03]) was not significant. Time is a necessary downside to get rid of a severe headache and has no effect on persuasion.

However, when achieving results required a short time (in case of a mild headache), we expected time perceptions to have an indirect, negative effect on persuasion, making a progression ad less persuasive than a before/after ad. Testing for a serial mediation in the mild headache conditions (5,000 resamples; Hayes 2018, PROCESS Model 6), the relationship of ad type  $\rightarrow$  process simulation  $\rightarrow$  ad credibility  $\rightarrow$  persuasion was not significant (95% CI = -.01 to .05). However, as we predicted, the indirect effect of ad type  $\rightarrow$  process simulation  $\rightarrow$  time perceptions  $\rightarrow$  ad credibility  $\rightarrow$  persuasion (95% CI = [-.02, -.01]) was significant (Table 2). Overall, these results supported our prediction that when people are focused on getting results quickly and doing so is possible, progression ads are less credible and persuasive than before/after ads, reversing the ad-type effect ( $H_4$ ).

## General Discussion

Ads promising change are ubiquitous in the marketplace. For these ads to be credible and persuasive, consumers must be able to simulate the process underlying the change. Across eight studies and several consumer domains, we showed that progression ads are more credible and, thus, more persuasive. Studies 1–3 focused on the ad-type effect and the underlying mechanism. Studies 1a and 1b showed that ad type influences actual behavior and product choice. Study 2 showed that progression ads are more credible than before/after ads because of process simulation, and it ruled out amount of information as an alternative explanation. Study 3 further tested the ad-type effect when the final outcome is undesirable and showed that ad type leads to shifts in beliefs. This study corroborated that progression ads affect ad credibility and not the time required for the outcome to occur, as its results are consistent with ad type → process simulation → ad credibility → persuasion (people believe that alcohol negatively affects the brain) rather than ad type → process simulation → time perceptions (people believe that alcohol takes a long time to negatively affect the brain, in turn believing the message less). Studies 4 and 5 demonstrated that impaired process simulation and high skepticism moderated the ad-type effect. Studies 6 and 7 showed effect reversals: when the focus was on achieving the desired results quickly, and it was possible to do so, progression ads backfired.

## Theoretical Contributions

Our research adds to existing literature streams on mental simulation in general as well as on the more specific literature on process and outcome simulation (Escalas and Luce 2003, 2004; Nielsen, Escalas, and Hoeffler 2018; Thompson, Hamilton, and Petrova 2009; Ulkūmen and Thomas 2013; Zhao, Hoeffler, and Zauberma 2007). First, we contribute to the literature on mental simulation by identifying a novel antecedent of simulation of process. Even though progression ads include only visuals of outcomes, they spontaneously facilitate simulation of the dynamic development of the process leading to the final transformation.

Second, we contribute to the literature on process and outcome simulation by identifying and testing conditions under which process simulation has particularly beneficial effects and conditions under which process simulation has disadvantageous effects. Process simulation seems to be particularly beneficial under conditions of high skepticism, as it offers more evidence that the desired results may indeed be achieved. However, when the focus is on achieving results quickly (and it is possible to do so), progression ads may have negative consequences on credibility and persuasion. These results are especially noteworthy, as most of the literature has shown instances in which process simulation fosters credibility and aids persuasion (for an exception, see Thompson, Hamilton, and Petrova [2009]).

## Practical Implications, Limitations, and Future Research

Our results have managerial implications given that current marketing practices indicate that progression ads are systematically neglected in favor of before/after ads. Many products and services promise change and, as such, our results apply quite broadly for the development of marketing and public policy messages across media, including digital advertisements, websites, product packages, and public health messages. Our findings suggest that different types of change ads are not equivalent and that choosing the right type of visuals is critical for credibility and persuasion.

Despite the robustness of the phenomenon documented and the converging process evidence, our research has limitations that offer several opportunities for future research. One particularly fruitful avenue to extend the current work would be to consider whether the number of intermediate steps correlates with persuasion. We distinguished between before/after and progression ads by the presence of intermediate steps rather than by the number of steps—we consider an ad with at least one intermediate step a progression ad. However, the impact of progression ads on process simulation may taper off after a certain number of steps. How many steps are needed for the effect to taper off may depend on the exact context and the stimuli used.

Another fruitful avenue for future research would be to explore whether the connection between process simulation and persuasion varies across consumer domains. Thompson, Hamilton, and Petrova (2009) found that process thinking systematically increased decision difficulty when people face substantial trade-offs between means and end benefits. In the context of change ads, what would happen if the salient means were undesirable (e.g., not eating one's preferred foods) and therefore represented a trade-off with the end benefits (e.g., losing weight)? Exploring implications and downstream consequences of process simulation in different contexts should prove valuable from theoretical and practical perspectives. We hope that our work will spur further exploration of this topic.

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