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Clinically studied or clinically proven? Memory for claims in print advertisements

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Abstract

Advertisers often use specifically chosen wording to convey the effectiveness of their product and we investigated memory accuracy for the scientific claims put forth by product advertisements. Participants were shown a cognitive enhancement product advertisement and were tested on their memory for various details. Critically, we were interested in participants' memory for a phrase describing the product as either "clinically proven" (indicating the product is effective) or "clinically studied" (which is ambiguous). Generally, both younger and older adults demonstrated poor memory for this detail and were more likely to remember the product as having been "proven" to be effective than to have been "studied". Thus, we demonstrate the fallibility of memory and the potential for reliance on schematic knowledge in the absence of a veridical record of one's memory for the advertisement. We suggest that ambiguous efficacy claims be carefully considered by consumers so as not to be misled.

KEYWORDS
advertising, aging, false memory, metacognition, schematic knowledge

1 | GENERAL AUDIENCE SUMMARY

Advertisers, including those touting enhancement supplements, often use specifically chosen wording to convey the effectiveness of their product (in some cases, regardless of the product's actual efficacy), while maintaining conformity with legal standards – for example, Food and Drug Administration (FDA) regulations. In the current study, we tested how people may remember or misremember a claim regarding a product's efficacy presented in an advertisement for a cognitive enhancement supplement. After viewing the advertisement for 1 min, participants were asked to remember various features such as the name of the brand, the target age group, and whether the product was FDA-approved. Critically, we were interested in participants' memory for a phrase describing the product's efficacy as either "clinically studied" or "clinically proven". Results revealed that both younger and older adults demonstrated poor memory for this detail and were more likely to remember the product as having been "proven" to be effective than to have been "studied", indicating that people's memory for claims made in product advertisements may not always be accurate. We suggest that ambiguous claims of efficacy such as being "scientifically studied" or "clinically studied" be carefully considered by consumers so as not to be misled regarding the product's efficacy.

2 | INTRODUCTION

Many people, from college students to older adults, are interested in ways to enhance memory and cognitive functioning. Over-the-counter dietary supplements have become a popular method of cognitive enhancement (e.g., MemorAll, RediMind, CogniAid),

although there is insufficient evidence that these products improve cognitive functioning in healthy adults (Butler et al., 2017; Gestuvo & Hung, 2012). However, advertisements for dietary supplements often include statements indicating that the product has been empirically studied or validated (e.g., "clinically studied", "clinically tested", "scientifically proven"), signaling to consumers that the product has some degree of effectiveness.

Although many companies use phrases like "clinically studied" in their advertisements to convey a product's efficacy, this phrase is ambiguous. Stating that something has been clinically studied only indicates that a product's effects have been studied in a laboratory; it does not necessarily mean that the product was effective in doing whatever was claimed in the advertisement. For instance, the results could have provided null evidence for the product or even shown that the product has the opposite of the desired effect, but the product was still "clinically studied". Advertisers are likely aware that millions of people may misunderstand or not pay attention to ambiguous claims like "clinically studied" or could even later misremember a product labeled as "clinically studied" as having been "clinically proven". Thus, strategically placing ambiguous phrases implying some degree of efficacy may be a way advertisers take advantage of the fallibility of memory to establish the credibility of their product.

Misremembering certain claims made by product advertisements may reflect people's reliance on schematic knowledge when they cannot successfully retrieve exact perceptual or conceptual information (e.g., Alba & Hasher, 1983). Using schemas—cognitive heuristics based on prior experience that predict what information is likely to be part of a given event—generally aids the encoding and retrieval of memories. However, much like other cognitive heuristics, the usage of schemas can also lead to memory errors. Such errors may be most prevalent for atypical events and information (i.e., information that is inconsistent with a schema), causing individuals to remember an event or certain pieces of information based on expectation rather than how the event was actually experienced (Alba & Hasher, 1983; Brewer & Treyens, 1981; Castel, 2005; Lew & Howe, 2016; Miller & Gazzaniga, 1998). For example, schemas can be beneficial in reducing memory deficits when newly learned information is consistent with schematic knowledge (e.g., Castel, 2005) but can produce false memories when information is inconsistent with one's past experience and schemas (e.g., Brewer & Treyens, 1981; see also Murphy & Castel, 2021). In a marketing context, advertisers may be aware of people's tendency to rely on schemas and strategically pursue advertising options that capitalize on such tendencies to portray their product in a more favorable light.

Prior work has revealed that marketing communications can generate expectations that impact the way purchasers remember their experience with a product (Hoch & Deighton, 1989; LaTour & LaTour, 2012). Additionally, there is evidence that people generate gist-based false memories in the context of advertising due to the reliance on schemas (Braun-LaTour & LaTour, 2004; LaTour et al., 2014). In one case, people thought that they remembered an advertisement for a famous brand name when it was actually a lesser-known brand or even a brand that was entirely fictitious (Braun-LaTour & LaTour, 2004; Holden & Vanhuele, 1999). Furthermore, while people may initially notice, accurately recall, and/or recognize some aspects of visually presented advertisements, the specific details are often rapidly forgotten (Bagozzi & Silk, 1983). Thus, people may be prone to misremembering advertisements and their efficacy.

Memory for features of a product depicted in an advertisement may also be susceptible to misinformation. For example, Braun and Loftus (1998) demonstrated that recollection of a chocolate bar's packaging color was influenced by misleading information contained in the advertisement. Similarly, Sherman et al. (2015) reported that presenting participants with similar television advertisements created false memories for competitor brands. Other research has shown that the visual/pictorial component of a print advertisement is encoded more elaboratively and distinctively than the verbal component and the verbal aspects may be more prone to false memories (Childers, 1986). Furthermore, one's goals, age, and interest when studying an advertisement can also bias memory (e.g., Fung & Carstensen, 2003; Martín-Luengo et al., 2015). Other individual differences, such as one's level of commitment to a particular brand, have also been shown to influence memory, with committed brand consumers more likely to form false memories about a product experience than less-committed consumers (Montgomery & Rajagopal, 2018). As a result, consumers may misremember an experience with a product that was similar to what the advertisement suggested rather than recalling their own experience (Braun, 1999; Cowley & Mitchell, 2003). Taken together, these findings suggest that several traits and environmental factors can influence memory accuracy for advertisements.

Evidence indicating that advertisements can lead to the expression of false memories fits with the general notion that memory retrieval is a reconstructive process (Hasher & Griffin, 1978). Specifically, when a memory is retrieved, it is a reconstruction that blends elements of what truly happened with what we believe happened. These reconstructive processes may be further distorted by other intervening cognitive functions such as prior retrieval attempts, distraction, imagination, and social influences (Roediger & McDermott, 2000; Schacter, 1999; see also Gallo, 2010). Thus, through reconstructive memory processes, familiarity, and the spreading of semantic activation (Collins & Loftus, 1975), advertisement information likely influences consumers' memory. We sought to determine if people—specifically younger and older adults—are prone to misremembering certain scientific terms, claims, and research conclusions when presented with an advertisement that uses vague wording to support the product's efficacy.

3 | THE CURRENT STUDY

In the current study, we examined how younger and older adults (those over age 65 who may be especially interested in consuming memory-enhancing supplements) would remember or misremember different types of information depicted in a cognitive enhancement product advertisement. We also investigated how the information that was remembered would affect perceptions of the product. Participants viewed a product advertisement and then completed a questionnaire containing a series of multiple-choice questions regarding

the advertisement. Questions covered aspects of the advertisement like the name of the brand, the presence or absence of a medical doctor in the advertisement, and how much they expected the product to cost. The primary question of interest tested whether participants could correctly identify whether the phrase "clinically studied" or "clinically proven" was included within the advertisement.

Consistent with the idea that memory for product features can be biased by advertisements (e.g., Braun & Loftus, 1998), we predicted that participants would often misremember the phrase "clinically studied" as "clinically proven", indicating that consumers may be prone to misremembering products as being more effective than they were advertised. Previous work has established that the commonality of words in the English language can impact how consumer-related information is processed and subsequently remembered in both an explicit and implicit manner (Krishnan & Shapiro, 1996; Shapiro & Krishnan, 2001), and this may be more pronounced in older age. As such, in addition to younger adults, we were also interested in investigating memory for product claims in older adults who may be both consumers of these types of products (i.e., cognitive enhancement supplements) and more prone to reconstructive memory biases like relying on gist-based memory (generally remembering the main message but misremembering details) and schematic knowledge (Castel, 2005; Flores et al., 2017; Gallo et al., 2019; Schacter et al., 1997; Umanath, 2016; Umanath & Marsh, 2014).

Older adults are particularly prone to falsely remember verbal information and rely on gist-based memory (Devitt & Schacter, 2016). For example, fuzzy-trace theory suggests that older adults have memory impairments for verbatim details (the exact content and details associated with a memory) but can access and retrieve more gist-based information in a variety of circumstances (Brainerd & Reyna, 2004; Reyna, 2012; Reyna et al., 2016). Moreover, prior knowledge and schematic support can enhance memory as older adults often use schemas that may lead to accurate memory for schema-consistent information (Castel, 2005; Flores et al., 2017; Gallo et al., 2019; Hess, 2005). However, schemas can also be misleading, causing inaccuracies that may be consistent with prior knowledge when to-be-remembered information is schema-inconsistent (Umanath, 2016).

There is also evidence suggesting that older adults' gist-based memory for health-related information can be differentially influenced by certain factors relative to their verbatim memory (Friedman et al., 2015; Hargis & Castel, 2018; Morrow et al., 2019). Specifically, older adults may hold specific schemas for health-related information that can aid or hinder their memory (Heller et al., 2017; Morrow et al., 1991; Rice & Okun, 1994). Older adults may also be more likely to form false memories due to their reduced ability to bind information to its source (e.g., the context in which the information was learned; Lyle et al., 2006; Mitchell et al., 2000). Given this reliance on gist-based memory and propensity to falsely remember information, older adults may be particularly prone to misremembering the precise terms used to describe the claims regarding a product, consistent with gist-based memory reliance in older age (e.g., Gallo et al., 2019). This could provide important insight regarding how aging influences what information is retained when presented with a product's claims in an applied context.

3.1 | Method

3.1.1 | Participants

An a priori power analysis was conducted using G*Power (Faul et al., 2007). For a 2 (age: *old*, *young*) × 3 (label: *clinically studied*, *clinically proven*, *control* [i.e., *none*]) between-subjects ANOVA, assuming alpha = .05 and power = .95, 297 participants would be needed to reliably detect a medium effect size ($\eta_p^2 = .05$). A total sample of 316 younger ($n = 150$; $M_{age} = 24.79$, $SD_{age} = 3.60$) and older adults ($n = 166$; $M_{age} = 72.42$, $SD_{age} = 5.29$) was recruited from CloudResearch (www.cloudresearch.com), a website that allows users to complete small tasks for pay (Chandler et al., 2019). Participants were required to have normal or corrected to normal vision (self-reported) to participate. Participants were excluded from analysis if they admitted to cheating (e.g., writing down answers) in a post-task questionnaire (they were told they would still receive payment if they cheated). This exclusion process resulted in three exclusions from the younger adult group and two exclusions from the older adult group. Informed consent was acquired and the study was completed in accordance with the UCLA Institutional Review Board.

3.1.2 | Materials

The advertisement used was for a cognitive enhancement product from a popular nutritional supplement company. The advertisement was obtained from the back cover full-page format of *Psychology Today* published in 2018 (and has also appeared in other similar periodicals) and was displayed to participants on their computer screens in a similar full-page format.

Within the advertisement are various features describing the product and its uses. At the top is the company logo and product line "Dr. Formulated Brain Health". Just below, the main slogan reads "Sharpen your memory & focus" with three boxes of the relevant products presented underneath. Below the boxes and presented in a green font is the critical phrase of interest in the current study. The phrase either states "Clean, clinically studied whole food ingredients to support brain health at three stages of life", "Clean, clinically proven whole food ingredients to support brain health at three stages of life", or "Clean, whole food ingredients to support brain health at three stages of life" (i.e., the control condition). Beneath the critical phrase, the target demographic is identified as "Kids · Young Adults · Adults 40+". In the bottom left-hand corner is the image of a physician and his credentials and in the bottom right-hand corner are the symbols designating the product as United States Department of Agriculture (USDA) Organic and non-genetically modified-organism (non-GMO) project verified. Finally, the background in the top half of the advertisement contains a greyscale, stylized image of neurons while the bottom half is a plain white background.

The questionnaire contained multiple-choice questions asking about the name of the brand, the main caption/slogan, the number of boxes of the product visible in the advertisement, whether a doctor

was present, whether the product was USDA organic, the target age group(s), the presence and identity of a background image, and whether they would purchase the product. The critical question asked, "Which of the following phrases was present?" with the following answer choices: "Clinically studied whole food ingredients to support brain health", "Clinically proven whole food ingredients to support brain health", "Scientifically studied whole food ingredients to support brain health", "Scientifically proven whole food ingredients to support brain health", and "None of these". For each multiple-choice response, participants were also asked to indicate their confidence in the correctness of their response on a scale from 1 (low confidence) to 10 (high confidence). Next, participants were asked to describe the product in a free-response format and to provide an estimate of the cost of the product (i.e., one box of the product as shown in the advertisement).

After answering questions about the product, we asked participants questions about how seriously they took the advertisement as well as their beliefs in their memory abilities. Specifically, on a 5-point Likert scale, we asked participants "How seriously did you engage with the advertisement?", "In general, how is your overall memory ability relative to other people your age?", and "How worried/concerned are you about changes in your memory abilities?". Finally, we administered Obermiller and Spangenberg's (1998) Advertising Skepticism (SKEP) scale, which is comprised of nine questions with responses on a 5-point Likert scale. On all questionnaires, the order of questions and choices within each question was the same for every participant, and each question was presented sequentially with participants responding at their own pace.

3.1.3 | Procedure

After completing an initial demographics questionnaire, participants were instructed that they would be viewing an advertisement for a product. They were told "In this task, you will be shown an advertisement for a product for 1 min. After viewing the advertisement, you will be asked some questions about it, including the specific content shown." When participants indicated that they understood the instructions, they advanced to the next page where the advertisement was displayed. The advertisement remained on the screen for 1 min at which point the screen automatically progressed. Participants then completed a 1-min distractor task where they were asked to rearrange the digits of several three-digit numbers in descending order (e.g., "456" would be rearranged to "654"; adapted from Rohrer & Wixted, 1994; Unsworth, 2007). Participants were given 5 s to view each of the 12 three-digit numbers and subsequently rearrange the digits. After completing this distractor task, participants completed the questionnaire. Participants were required to answer all questions and provide confidence ratings (where applicable) before advancing to the next question. Data were collected online using *Collector*, an open-source program for presenting web-based psychological experiments (Garcia & Kornell, 2015). All materials and procedures used in the current study were approved by the UCLA Institutional Review Board.

3.2 | Results

Descriptive statistics for responses to each question in the questionnaire are shown in Table 1. The results are divided into three primary sections. First, we examined memory accuracy and confidence for the phrase "clinically studied", "clinically proven", or neither within the advertisement. Next, we investigated the propensity to remember the advertisement containing the word "proven". Finally, we examined differences in confidence as a function of participants' answer selection and accuracy. We provide the full dataset including responses to the other questions as well as exploratory correlations between age, the correctness of memory for the critical phrase, whether participants remembered the phrase "proven", price estimations, SKEP scores, self-reported worry about cognitive decline, and participants' ratings of how seriously they engaged with the advertisement on OSF. An examination of participants' responses regarding purchasing behavior and price estimation is also available on OSF.

3.2.1 | Critical phrase memory and confidence

The frequency of selected choices on the critical question "Which of the following phrases was present?" is depicted in Figure 1. To examine the accuracy of participants' memory for the critical phrase in the advertisement (see Figure 2a),[1] we conducted a 2 (age: *old*, *young*) × 3 (label: *clinically studied*, *clinically proven*, *none*) between-subjects ANOVA. Results revealed a main effect of the label used in the advertisement [$F(2, 310) = 9.25$, $p < .001$, $\eta_p^2 = .06$] such that participants who were shown the advertisement with the phrase "clinically proven" were more accurate ($M = .38$, $SD = .49$) than participants who were shown the advertisement with the phrase "clinically studied" ($M = .27$, $SD = .44$), [$p_{holm} = .049$, $d = .28$] and participants who were shown the control advertisement with neither phrase ($M = .14$, $SD = .25$), [$p_{holm} < .001$, $d = .59$]; additionally, participants who were shown the advertisement with the phrase "clinically studied" were more accurate than participants shown the advertisement with neither phrase [$p_{holm} = .049$, $d = .31$]. Moreover, younger ($M = .31$, $SD = .46$) and older adults ($M = .22$, $SD = .42$) were similarly accurate [$F(1, 310) = 3.12$, $p = .078$, $\eta_p^2 = .01$]. Label interacted with age group [$F(2, 310) = 4.67$, $p = .010$, $\eta_p^2 = .03$] but no comparisons of interest reached significance.

Next, to examine participants' confidence in their selection of the critical phrase in the advertisement (see Figure 2b), we conducted a 2 (age: *old*, *young*) × 3 (label: *clinically studied*, *clinically proven*, *none*) between-subjects ANOVA. Results did not reveal a main effect of the label used in the advertisement [$F(2, 310) = .48$, $p = .618$, $\eta_p^2 < .01$] such that participants shown the advertisement with the phrase "clinically proven" ($M = 5.89$, $SD = 2.32$), "clinically studied" ($M = 5.77$, $SD = 2.47$), or neither phrase ($M = 5.57$, $SD = 2.32$) were similarly confident in their memory for the phrase. Furthermore, younger ($M = 5.89$, $SD = 2.40$) and older adults ($M = 5.61$, $SD = 2.33$) were similarly confident in their memory [$F(1, 310) = .99$, $p = .320$, $\eta_p^2 < .01$]. Label did not interact with age group [$F(2, 310) = 1.63$, $p = .197$, $\eta_p^2 = .01$].

TABLE 1 Means and standard deviations (in parentheses) for responses to each question in the questionnaire.

	Clinically proven	Younger adults clinically studied	Control	Clinically proven	Older adults clinically studied	Control
Brand name accuracy	45% (50%)	45% (50%)	36% (49%)	66% (48%)	57% (50%)	37% (49%)
Brand name confidence	6.51 (2.75)	6.69 (2.64)	6.00 (2.47)	7.00 (2.89)	6.83 (2.99)	6.04 (3.06)
Slogan accuracy	51% (51%)	41% (50%)	54% (50%)	61% (49%)	60% (49%)	61% (49%)
Slogan confidence	7.75 (2.21)	7.10 (2.50)	7.56 (2.29)	7.30 (2.26)	7.15 (2.46)	7.19 (2.58)
Critical efficacy phrase accuracy	45% (50%)	39% (49%)	8% (27%)	32% (47%)	15% (36%)	19% (40%)
Critical efficacy phrase confidence	6.26 (2.15)	5.55 (2.59)	5.84 (2.45)	5.55 (2.42)	5.96 (2.37)	5.33 (2.20)
Number of boxes accuracy	75% (44%)	65% (48%)	74% (44%)	80% (40%)	79% (41%)	83% (38)
Number of boxes confidence	7.55 (2.69)	7.65 (2.87)	7.94 (2.37)	8.59 (2.19)	8.49 (2.04)	8.60 (2.11)
Doctor pictured accuracy	75% (44%)	63% (49%)	70% (46%)	71% (46%)	83% (38%)	72% (45%)
Doctor pictured confidence	8.26 (2.36)	8.24 (2.47)	8.26 (2.02)	8.49 (1.80)	9.14 (1.48)	8.62 (1.81)
Organic accuracy	67% (48%)	59% (50%)	58% (50%)	48% (50%)	42% (50%)	47% (50%)
Organic confidence	8.40 (2.06)	7.70 (2.56)	7.24 (2.29)	7.73 (2.35)	7.76 (2.07)	7.90 (2.29)
Target age accuracy	69% (47%)	69% (47%)	70% (46%)	73% (45%)	77% (42%)	72% (45%)
Target age confidence	8.51 (2.13)	7.96 (2.61)	8.12 (2.40)	8.66 (1.87)	8.74 (2.16)	8.39 (2.45)
Would buy	29% (46%)	33% (47%)	38% (49%)	9% (29%)	25% (43%)	14% (35%)
Product price	$47 ($113)	$83 ($212)	$57 ($198)	$25 ($20)	$25 ($17)	$33 ($23)

3.2.2 | Selecting "proven"

We next examined participants' propensity to select either "scientifically proven" or "clinically proven" as the critical phrase present in the advertisement. We believed remembering that the product has been "proven" is more critical to viewers' opinions of the product than whether the product was examined "scientifically" versus "clinically", which are essentially synonyms in this instance. To examine the likelihood of participants selecting a phrase containing the word "proven" (see Figure 3), we conducted a 2 (age: *old*, *young*) × 3 (label: *clinically studied*, *clinically proven*, *none*) between-subjects ANOVA. Results did not reveal a main effect of the label used in the advertisement [$F(2, 310) = .75$, $p = .475$, $\eta_p^2 = .01$] such that participants shown the advertisement with the phrase "clinically proven" ($M = .56$, $SD = .50$), "clinically studied" ($M = .49$, $SD = .50$), or neither phrase ($M = .50$, $SD = .50$) were similarly likely to select an option containing the term "proven". Moreover, younger ($M = .51$, $SD = .50$) and older adults ($M = .52$, $SD = .50$) were similarly likely to select an option that used the term "proven" [$F(1, 310) = .01$, $p = .915$, $\eta_p^2 < .01$]. Label did not interact with age group [$F(2, 310) = 1.41$, $p = .245$, $\eta_p^2 = .01$].

We were also interested in whether participants were more likely to remember the word "proven" or "studied" in the advertisement (again, we collapsed across responses containing the term "clinically" and "scientifically"). Among participants whose advertisement included the claim "clinically proven", selecting a response using the phrase "proven" (56%) was more likely than selecting a response using the phrase "studied" (34%), [$\chi^2(1) = 8.07$, $p = .004$]. Similarly, among participants whose advertisement included the claim "clinically studied", selecting a response using the phrase "proven" (49%) was more likely than selecting a response using the phrase "studied" (39%), [$\chi^2(1) = 3.93$, $p = .048$]. Additionally, among participants whose advertisement did not include the claim "clinically proven" or "clinically studied" (i.e., the control group), selecting a response using the phrase "proven" (50%) was more likely than selecting a response using the phrase "studied" (36%), [$\chi^2(1) = 4.19$, $p = .041$]. Thus, participants were more likely to remember the product as being "proven" than to have been "studied", regardless of the claim actually present in the ad (and even if there was not an efficacy claim present in the ad). However, this tendency does not appear to differ as a function of the label used in the ad because each group demonstrated a similar propensity to select an option containing "proven".

3.2.3 | Differences in confidence based on selections and accuracy

We were also interested in differences in confidence based on participants' answer selection. We conducted a one-way ANOVA which revealed differences in confidence between groups [$F(4, 311) = 5.41$, $p < .001$, $\eta_p^2 = .07$] such that participants selecting "none of the above" were less confident than participants selecting any other answer [all $p_{holm} < .025$]; there were no other pairwise differences [all $p_{holm} > .902$]. We also looked at differences in confidence based on accuracy; however, participants who selected the correct phrase from the advertisement were similarly confident as those who were incorrect [$F(1, 314) = 1.00$, $p = .317$, $\eta_p^2 < .01$].

4 | GENERAL DISCUSSION

The current study aimed to examine how people remember specific aspects of advertisements. Specifically, we used a cognitive enhancement supplement advertisement to determine if people misremember a critical efficacy phrase that is often common when presenting

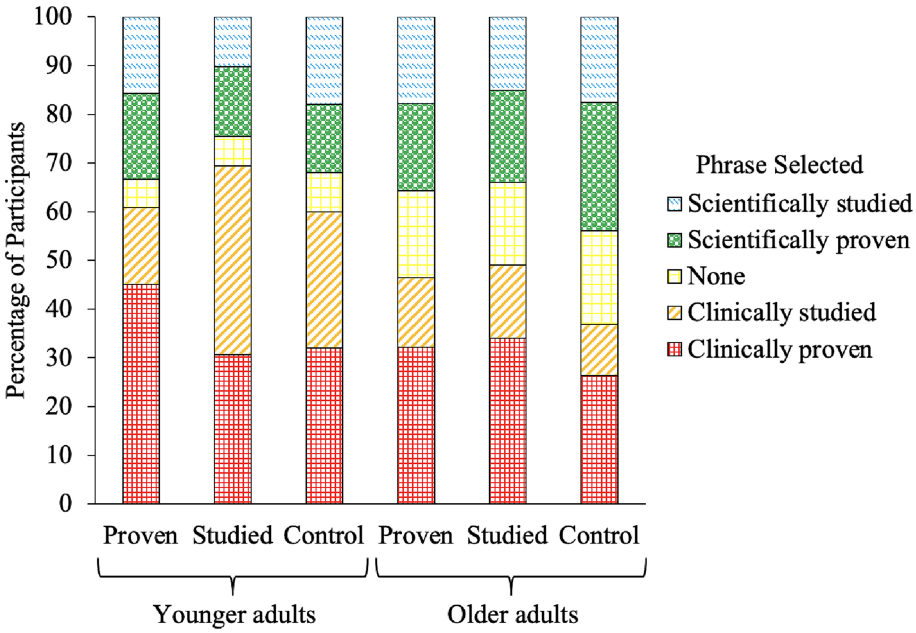

FIGURE 1 The percentage of participants in each condition (whether the studied advertisement contained the phrase "Proven", "Studied", or no efficacy phrase (control condition)) selecting each of the options on the questionnaire regarding the advertisement.

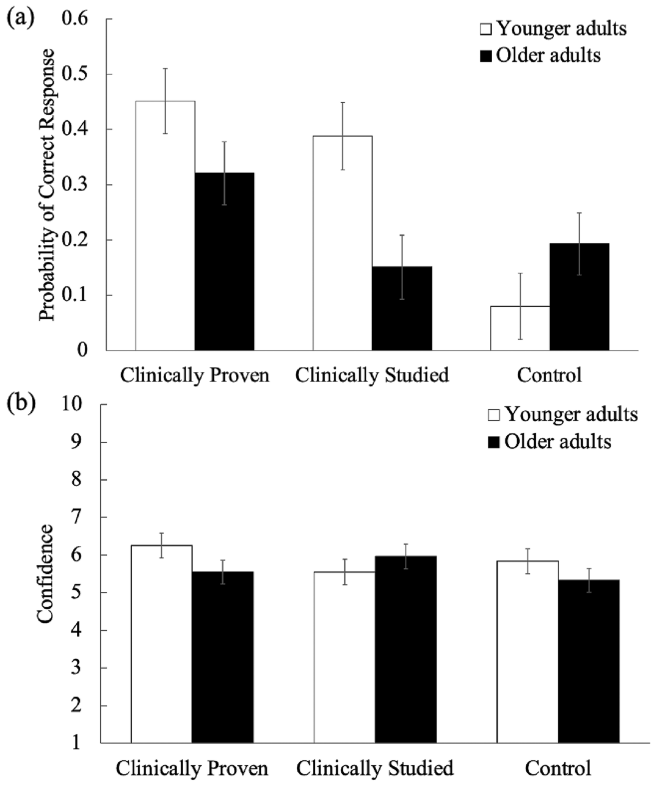

FIGURE 2 The probability of selecting the correct answer regarding which phrase was present in the advertisement (a) as well as confidence in participants' responses (b) as a function of age and the phrase present when viewing the advertisement. Error bars reflect the standard error of the mean.

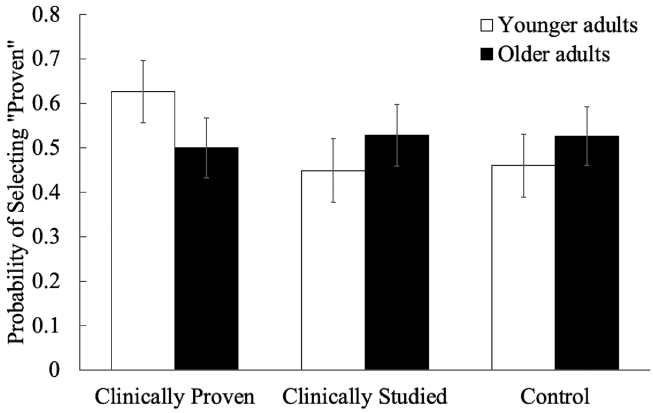

FIGURE 3 The probability of selecting an answer containing the term "proven" as a function of age and the phrase present when viewing the advertisement. Error bars reflect the standard error of the mean.

scientific information in consumer settings. To test this, we had participants view an ad containing a claim regarding the product's efficacy (either "clinically studied" or "clinically proven"); we also included a control group with no efficacy claim. We then asked participants whether they believed that the claim that was present in the advertisement was "scientifically studied", "scientifically proven", "clinically studied", "clinically proven", or none of these. Despite being able to remember certain aspects of the advertisement (such as visual information regarding the layout of the ad and the presence of a photo of a doctor), participants demonstrated poor memory for this critical efficacy phrase (only 26% of participants accurately remembered the phrase) which was also reflected in their confidence ratings (i.e., participants were similarly confident whether they accurately remembered the critical phrase or not). Most importantly, regardless of which ad participants studied, participants demonstrated a greater propensity to remember the critical phrase as containing the word "proven" than "studied" which may represent a greater reliance on gist-based memory and schematic knowledge over the precise recollection of the exact phrase that was in the ad.

Regarding participants' confidence ratings, the lack of differences in confidence for the various answer choices suggests that participants were generally unsure of which phrase was present. We found it especially surprising that participants who were correct were no more confident in their memory than those who remembered a phrase including entirely absent words, providing evidence of the frailty of memory. The present results are also consistent with the fuzzy-trace theory such that biases may influence the reconstruction of one's memory for this type of advertising claim (Brainerd & Reyna, 2002, 2004; Reyna, 2012; Reyna et al., 2016).

It could be the case that participants misremembered the critical phrase in the advertisement because they may not have attended to and/or encoded the phrase in the first place. Interestingly, we found that many participants remembered other visual aspects of the ad, such as whether a picture of a doctor was present or the number of boxes presented in the ad, although participants showed poorer memory performance for more specific verbal information such as the brand name and slogan. Specifically, as can be observed in Table 1, some questions were answered much more accurately (e.g., the target age groups were correctly remembered by 72% of participants). Thus, participants did accurately remember certain contents of the advertisement but memory for the critical efficacy phrase was relatively poor (26%). As such, the efficacy phrase was not well encoded (or perhaps even received no top-down attentional allocation at all), leading to poor memory for this information.

In terms of potential age-related differences and similarities for various aspects of the ad, both younger and older adults were similarly inaccurate in their memory for the critical phrase and were also similarly likely to remember the term "proven" in the advertisement. Older adults remembered information fairly well relative to younger adults, and this may be due to experience and the use of context that can help older adults remember relevant information, perhaps by relying on schematic support (Castel, 2005; Hess, 2005). However, age-related differences may emerge if memory were tested at a longer delay and/or involved remembering specific associations between similar advertisements (Naveh-Benjamin, 2000). In general, older adults may remember gist information as well as certain aspects that are important and this could be useful in terms of making informed decisions regarding consumer products, but future research is needed to determine how well older adults can accurately remember specific details that may be relevant to consumer behavior.

Future work should aim to replicate these findings in a more diverse array of advertising phrases and contexts. However, we anticipate that similar results would be found with other advertisements such that participants would demonstrate poor memory for many specific details of the ad—particularly efficacy claims—and generally rely on schematic knowledge in the absence of verbatim memory for certain pieces of information. It would also be informative to implement eye-tracking technology to study how top-down and bottom-up attention predicts subsequent memory for components of a product advertisement (Bott et al., 2017; Hervet et al., 2011; Wedel & Pieters, 2007). We also note that the fixed order with which participants viewed the multiple-choice options for each question may be a limitation; future work could randomize the order of the options to avoid potential confounds.

In sum, understanding memory for health-relevant information is critical given the prevalence of health information (and misinformation) abound on news and social media platforms that could have adverse effects on public health (Bode & Vraga, 2018; Chou et al., 2018; Wang et al., 2019). In the present study, we examined memory for an efficacy claim in a health-related product advertisement. Results indicated that advertisers may be able to take advantage of people's poor memory when attempting to convince consumers of the efficacy of health products. Specifically, if a product has been "scientifically" or "clinically" proven, this implies that the product has been tested for effectiveness and the results indicated that the product yielded benefits compared to controls or competing products. However, simply stating that something has been "studied" only implies that a study was conducted—the results could have indicated that the product does not work or even has negative effects. Yet, even if this is the case, the product has still been "studied". Importantly, if consumers are unable to differentiate between this terminology ("studied" versus "proven") in their memory for a product, advertisers may be able to mislead consumers regarding the efficacy of the product. We suggest that ambiguous claims of efficacy such as being "scientifically studied" or "clinically studied" be carefully considered by consumers so as not to be misled regarding a product's efficacy. While the present results may be limited to a particular domain (i.e., memory for dietary supplement information), we highlight the way human memory—even for consequential health-related information—may be malleable and inaccurate.

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CONFLICT OF INTEREST STATEMENT

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this manuscript.

DATA AVAILABILITY STATEMENT

The stimuli and data from the present study have been made available on the Open Science Framework: https://osf.io/6hya3/?view_only=503efdc974d54e83879c8bbfdb3abb2b.

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ENDNOTE

[1] Across all participants and conditions, memory accuracy for the critical phrase ($M = .26$, $SD = .44$) was better than chance (.20), [$t(315) = 2.53$, $p = .012$, $d = .14$].

REFERENCES

Alba, J. W., & Hasher, L. (1983). Is memory schematic? *Psychological Bulletin*, *93*, 203–231.

Bagozzi, R. P., & Silk, A. J. (1983). Recall, recognition, and the measurement of memory for print advertisements. *Marketing Science*, *2*, 95–134.

Bode, L., & Vraga, E. K. (2018). See something, say something: Correction of global health misinformation on social media. *Health Communication*, *33*, 1131–1140.

Bott, N. T., Lange, A., Rentz, D., Buffalo, E., Clopton, P., & Zola, S. (2017). Web camera based eye tracking to assess visual memory on a visual paired comparison task. *Frontiers in Neuroscience*, *11*, 370.

Brainerd, C. J., & Reyna, V. F. (2002). Fuzzy-trace theory and false memory. *Current Directions in Psychological Science*, *11*, 164–169.

Brainerd, C. J., & Reyna, V. F. (2004). Fuzzy-trace theory and memory development. *Developmental Review*, *24*, 396–439.

Braun, K. (1999). Postexperience advertising effects on consumer memory. *Journal of Consumer Research*, *25*, 319–334.

Braun, K. A., & Loftus, E. F. (1998). Advertising's misinformation effect. *Applied Cognitive Psychology*, *12*, 569–591.

Braun-LaTour, K. A., & LaTour, M. S. (2004). Assessing the long-term impact of a consistent advertising campaign on consumer memory. *Journal of Advertising*, *33*, 49–61.

Brewer, W. F., & Treyens, J. C. (1981). Role of schemata in memory for places. *Cognitive Psychology*, *13*, 207–230.

Butler, M., Nelson, V. A., Davila, H., Ratner, E., Fink, H. A., Hemmy, L. S., McCarten, J. R., Barclay, T. R., Brasure, M., & Kane, R. L. (2017). Over-the-counter supplement interventions to prevent cognitive decline, mild cognitive impairment, and clinical Alzheimer-type dementia: A systematic review. *Annals of Internal Medicine*, *168*, 52–62.

Castel, A. D. (2005). Memory for grocery prices in younger and older adults: The role of schematic support. *Psychology and Aging*, *20*, 718–721.

Chandler, J., Rosenzweig, C., Moss, A. J., Robinson, J., & Litman, L. (2019). Online panels in social science research: Expanding sampling methods beyond mechanical Turk. *Behavior Research Methods*, *51*, 2022–2038.

Childers, T. L. (1986). Memory for the visual and verbal components of print advertisements. *Psychology & Marketing*, *3*, 137–149.

Chou, W. S., Oh, A., & Klein, W. M. P. (2018). Addressing health-related misinformation on social media. *Jama*, *320*, 2417–2418.

Collins, A. M., & Loftus, E. F. (1975). A spreading-activation theory of semantic processing. *Psychological Review*, *82*, 407–428.

Cowley, E., & Mitchell, A. A. (2003). The moderating effect of product knowledge on the learning and organization of product information. *Journal of Consumer Research*, *30*, 443–454.

Devitt, A. L., & Schacter, D. L. (2016). False memories with age: Neural and cognitive underpinnings. *Neuropsychologia*, *91*, 346–359.

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G* power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*, 175–191.

Flores, C. C., Hargis, M. B., McGillivray, S., Friedman, M. C., & Castel, A. D. (2017). Gist-based memory for prices and "better buys" in younger and older adults. *Memory*, *25*, 565–573.

Friedman, M. C., McGillivray, S., Murayama, K., & Castel, A. D. (2015). Memory for medication side effects in younger and older adults. *Memory & Cognition*, *43*, 206–215.

Fung, H. H., & Carstensen, L. L. (2003). Sending memorable messages to the old: Age differences in preferences and memory for advertisements. *Journal of Personality and Social Psychology*, *85*, 163–178.

Gallo, D. A. (2010). False memories and fantastic beliefs: 15 years of the DRM illusion. *Memory & Cognition*, *38*, 833–848.

Gallo, H. B., Hargis, M. B., & Castel, A. D. (2019). Memory for weather information in younger and older adults: Tests of verbatim and gist memory. *Experimental Aging Research*, *45*, 252–265.

Garcia, M., & Kornell, N. (2015). Collector [Computer software]. Retrieved from https://github.com/gikeymarica/Collector

Gestuvo, M. K., & Hung, W. W. (2012). Common dietary supplements for cognitive health. *Aging Health*, *8*, 89–97.

Hargis, M. B., & Castel, A. D. (2018). Younger and older adults' associative memory for medication interactions of varying severity. *Memory*, *26*, 1151–1158.

Hasher, L., & Griffin, M. (1978). Reconstructive and reproductive processes in memory. *Journal of Experimental Psychology: Human Learning and Memory*, *4*, 318–330.

Heller, M. K., Chapman, S. C. E., & Horne, R. (2017). No blank slates: Pre-existing schemas about pharmaceuticals predict memory for side effects. *Psychology & Health*, *32*, 402–421.

Hervet, G., Guérard, K., Tremblay, S., & Chtourou, M. S. (2011). Is banner blindness genuine? Eye tracking internet text advertising. *Applied Cognitive Psychology*, *25*, 708–716.

Hess, T. M. (2005). Memory and aging in context. *Psychological Bulletin*, *131*, 383–406.

Hoch, S. J., & Deighton, J. (1989). Managing what consumers learn from experience. *Journal of Marketing*, *53*, 1–20.

Holden, S. J. S., & Vanhuele, M. (1999). Know the name, forget the exposure: Brand familiarity versus memory of exposure context. *Psychology and Marketing*, *16*, 479–496.

Krishnan, H. S., & Shapiro, S. (1996). Comparing implicit and explicit memory for brand names from advertisements. *Journal of Experimental Psychology: Applied*, *2*, 147–163.

LaTour, K. A., & LaTour, M. S. (2012). Can advertising change memory for even a really discrepant experience? Paradigm issues in the study of post-experience advertising. *Journal of Current Issues and Research in Advertising*, *33*, 210–226.

LaTour, K. A., LaTour, M. S., & Brainerd, C. C. (2014). Fuzzy trace theory and "smart" false memories: Implications for advertising. *Journal of Advertising*, *43*, 3–17.

Lew, A. R., & Howe, M. L. (2016). Out of place, out of mind: Schema-driven false memory effects for object-location binding. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *43*, 404–421.

Lyle, K. B., Bloise, S. M., & Johnson, M. K. (2006). Age-related binding deficits and the content of false memories. *Psychology and Aging*, *21*, 86–95.

Martín-Luengo, B., Luna, K., & Migueles, M. (2015). Effects of interest, thematic congruence, and typicality on memory for television, radio, and press advertisements of new products. *Applied Cognitive Psychology*, *29*, 560–572.

Miller, M. B., & Gazzaniga, M. S. (1998). Creating false memories for visual scenes. *Neuropsychologia*, *36*, 513–520.

Mitchell, K. J., Johnson, M. K., Raye, C. L., Mather, M., & D'Esposito, M. (2000). Aging and reflective processes of working memory: Binding and test load deficits. *Psychology and Aging*, *15*, 527–541.

Montgomery, N. V., & Rajagopal, P. (2018). Motivated reconstruction: The effect of brand commitment on false memories. *Journal of Experimental Psychology: Applied*, *24*, 159–179.

Morrow, D., Azevedo, R. F. L., Garcia-Retamero, R., Hasegawa-Johnson, M., Huang, T., Schuh, W., Gu, K., & Zhang, Y. (2019). Contextualizing numeric clinical test results for gist comprehension: Implications for her patient portals. *Journal of Experimental Psychology: Applied*, *25*, 41–61.

Morrow, D., Leirer, V., Altieri, P., & Tanke, E. (1991). Elders' schema for taking medication: Implications for instruction design. *Journal of Gerontology: Psychological Sciences*, *46*, 378–385.

Murphy, D. H., & Castel, A. D. (2021). Tall towers: Schemas and illusions when perceiving and remembering a familiar building. *Applied Cognitive Psychology*, *35*, 1236–1246.

Naveh-Benjamin, M. (2000). Adult age differences in memory performance: Tests of an associative deficit hypothesis. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *26*, 1170–1187.

Obermiller, C., & Spangenberg, E. R. (1998). Development of a scale to measure consumer skepticism toward advertising. *Journal of Consumer Psychology*, *7*, 159–186.

Reyna, V. F. (2012). A new intuitionism: Meaning, memory, and development in fuzzy-trace theory. *Judgment and Decision Making*, *7*, 332–359.

Reyna, V. F., Corbin, J. C., Weldon, R. B., & Brainerd, C. J. (2016). How fuzzy-trace theory predicts true and false memories for words, sentences, and narratives. *Journal of Applied Research in Memory and Cognition*, *5*, 1–9.

Rice, G. E., & Okun, M. A. (1994). Older readers' processing of medical information that contradicts their beliefs. *Journal of Gerontology: Psychological Sciences*, *49*, 119–128.

Roediger, H. L., III, & McDermott, K. B. (2000). Tricks of memory. *Current Directions in Psychological Science*, *9*, 123–127.

Rohrer, D., & Wixted, J. T. (1994). An analysis of latency and interresponse time in free recall. *Memory & Cognition*, *22*, 511–524.

Schacter, D. L. (1999). The seven sins of memory: Insights from psychology and cognitive neuroscience. *American Psychologist*, *54*, 182–203.

Schacter, D. L., Koutstaal, W., & Norman, K. A. (1997). False memories and aging. *Trends in Cognitive Sciences*, *1*, 229–236.

Shapiro, S., & Krishnan, H. S. (2001). Memory-based measures for assessing advertising effects: A comparison of explicit and implicit memory effects. *Journal of Advertising*, *30*, 1–13.

Sherman, S. M., Follows, H., Mushore, A. B., Hampson-Jones, K., & Wright-Bevans, K. (2015). Television advertisements create false memories for competitor brands. *Journal of Applied Research in Memory and Cognition*, *4*, 1–7.

Umanath, S. (2016). Age differences in suggestibility to contradictions of demonstrated knowledge: The influence of prior knowledge. *Aging, Neuropsychology, and Cognition*, *23*, 744–767.

Umanath, S., & Marsh, E. J. (2014). Understanding how prior knowledge influences memory in older adults. *Perspectives on Psychological Science*, *9*, 408–426.

Unsworth, N. (2007). Individual differences in working memory capacity and episodic retrieval: Examining the dynamics of delayed and continuous distractor free recall. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *33*, 1020–1034.

Wang, Y., McKee, M., Torbica, A., & Stuckler, D. (2019). Systematic literature review on the spread of health-related misinformation on social media. *Social Science & Medicine*, 112552.

Wedel, M., & Pieters, R. (2007). A review of eye-tracking research in marketing. In N. K. Malhotra (Ed.), *Review of marketing research* (pp. 123–147). M.E. Sharpe.

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