

Superimposed Text Size and Contrast Effects in DTC TV Advertising

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Direct-to-consumer prescription-drug television advertisements often contain superimposed text (supers) to convey information about the advertised product. This randomized experiment examined three size levels of supers and two levels of background contrast in direct-to-consumer advertisements. Participants ($N = 1,272$) watched different versions of a television advertisement for a fictitious asthma drug on either a flat-screen television or a tablet computer. Larger supers were more noticeable and memorable than smaller supers. High-contrast supers were less noticeable. Tablet users had more favorable views of the advertisement. Results have implications for the communication of important medical information in direct-to-consumer advertisements.

INTRODUCTION

Direct-to-consumer prescription-drug advertisements have appeared on U.S. televisions frequently since 1997 (Chandra and Miller, 2005; Gelland and Lyles, 2007). In 2016, 771,368 direct-to-consumer prescription-drug advertisements aired on television (Kaufman, 2017). Unlike other product advertisements, these advertisements are regulated by the U.S. Food and Drug Administration (FDA).

One of the FDA's public health missions is to ensure that the information provided in direct-to-consumer advertisements for prescription drugs is clear and understandable for lay audiences, avoids use of false or misleading claims, and achieves fair balance in the presentation of benefits and risks. The regulations stipulate that the important risk

information must be in at least the audio portion of broadcast advertisements (FDA Prescription Drug Advertising Rule, 21 C.F.R. § 202.1[e][1]). Because of space constraints in a typical 30- or 60-second direct-to-consumer advertisement, however, additional information necessary to provide context to the benefits and risks may be presented in other channels. As a result, these advertisements often include supers—visual presentations of superimposed textual information near the bottom of the screen—as a way of presenting important indication and risk-related information (Murray, Manrai, and Manrai, 1993, 1998).

Factors such as typography, layout, and contrast are potential sources of differential emphasis that can influence fair balance. Varying presentation

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- Formatting features of supers in direct-to-consumer prescription-drug advertising—such as variations in size and contrast—have implications for communicating important drug information.
- Although exposure to low-contrast supers in this study improved awareness and claim recognition, extraneous layout and design features might have confounded the contrast manipulation.
- Super size affects fair-balance-related perceptions. Small supers can minimize the perception of risk relative to presentations of drug effectiveness.

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formats, including type size, bulleting, amount of white space, whether claims are chunked together, and headlines, all can influence consumers' perceptions of information (Baur and Prue, 2014). A systematic review of presentation formats in prescription-drug labeling found that these clear communication characteristics positively influenced consumers' comprehension of information and adherence behavior (Shrank, Avorn, Rolon, and Shekelle, 2007). The FDA recommends that supers should be "reasonably visible to a person under typical viewing conditions" (FDA, 2009, p. 19); however, the organization has not provided specific recommendations for text size or other formatting features of supers in direct-to-consumer commercials. Despite prior research examining the effects of supers in general print and television advertising, questions regarding the parameters of their use in prescription-drug advertising remain unanswered.

Earlier studies on the effects of presentation formats in other consumer settings suggest that increasing the size and contrast of text against backgrounds can influence consumer perceptions, improving awareness and comprehension of information presented in supers and other texts. Whether these findings extend to direct-to-consumer advertising of prescription drugs and whether they remain relevant to advertisement exposures delivered *via* modern viewing devices—such as flat-screen televisions and tablet computers—is an open question. The current study is an update to earlier research concerning the effects of text size and contrast and explores new questions about the presentation of supers on different devices. In addition to informing the field on the topic of presentation formats and consumer perceptions of supers, the findings expand the evidence base from which to draw guidance for advertisers regarding characteristics that affect the visibility of supers.

Supers Presentation Formats: Size, Contrast, and Device Type

Studies conducted in the late 1980s and 1990s specifically examined the cognitive effects of text size in general print and television advertising, but most of these studies occurred before the

advent of direct-to-consumer prescription-drug advertising in the United States (Donohue, 2006) and other promotion based on new technologies. Larger text size positively influences semantic recognition and comprehension of marketing claims appearing in the disclaimer footnotes of print advertisements (Foxman, Muehling, and Moore, 1988). Although it was not specific to direct-to-consumer advertising, some research on text size in drug labeling also provides insight into this topic area.

In one randomized controlled study, young and older adults were presented with 12 otherwise identical over-the-counter drugs bottled with different container labels along various dimensions, one of which was text size (seven-point versus 10-point font). Whereas younger participants performed equally well with both text sizes, elderly populations had significantly reduced recall and comprehension when exposed to the smaller text size (Wogalter and Vigilante, 2003). Another study found that both young and older populations preferred the larger text size, and patients read labels with a larger font more rapidly and accurately than labels with a smaller font (Smither and Braun, 1994). Similar patterns for claims presented as supers in television advertisements also have been found, such that increased text size corresponds to greater comprehension of information (Manrai, Manrai, and Murray, 1994; Murray *et al.*, 1993).

Other factors, such as the amount of visual contrast between text and background, also may influence how information conveyed through supers is understood (Hall and Hanna, 2004). FDA guidance on this topic generally has called for contrast that is sufficient not to detract attention from risk information. In particular, the FDA (2009) suggests "risk disclosures presented in supers should be in a font color that reasonably contrasts with the background visuals" (p. 20), because low contrast may minimize the prominence of disclosures and lead to a misleading risk presentation.

The authors of the current study know of no studies that specifically have examined figure-ground contrast for supers in direct-to-consumer pharmaceutical advertisements. Early research on text readability, however, determined that the contrast between text and background has a consistent but small effect. In particular, although color contrast has a small effect (Hill and Scharff, 1996), contrast in brightness, or luminance, has a larger impact (Shieh and Lin, 2000). These studies showed that black text on a white background results in the highest readability (Tinker and Pater-son, 1931) but that other effects of color contrasts are unclear (Hall and Hanna, 2004). Some studies have demonstrated that contrast interacts with text size, such that contrast becomes a more important discriminator as text size decreases (Blommaert and Timmers, 1987; Legge, Rubin, and Luebner, 1987).

Much of the previous research examining the effects of text size and contrast was conducted before flat-screen televisions, smartphones, and tablets were widely available, which could affect perceptions of supers appearing on screen. Although positive relationships between font character size and recall have been found when participants viewed expository text on a 19-inch desktop device and a smaller smartphone-sized display (Sanchez and Goolsbee, 2010), it is largely unknown how well previously observed effects of size and contrast generalize to the current direct-to-consumer advertisement-viewing context.

By 2014, LCD-based flat-screen technology largely had replaced traditional cathode-ray tube televisions (Komando, 2017). Typical screen resolution has improved, and the average television screen size is now 47 inches (Halzack, 2015). By 2016, 58 percent of U.S. homes had at least one tablet computer, and people spent 31 minutes per day, on average, consuming media on tablets (Koblin, 2016). Today, only 59 percent of U.S. adults still watch television *via* cable or satellite, as opposed to online streaming or digital antenna (Rainie, 2017).

Although earlier research on the effects of supers in other product categories suggests that altering text size can influence consumer comprehension of information (Foxman *et al.*, 1988; Manrai *et al.*, 1994; Murray *et al.*, 1993), it is unclear whether these findings are still applicable, given prevalent use of modern technologies such as large-screen televisions and personal tablets for online viewing. Television screens are larger than they were in the past, but the typical viewing distance is farther than that used for watching videos on a tablet computer held in one's hands. As a result, the proportion of the visual field taken up by a tablet computer can be greater, in effect, than for a flat-screen television viewed from afar.

The current study sought to expand on previous research on the effects of supers in general print and television advertising to modern direct-to-consumer pharmaceutical promotion. Earlier studies did not focus specifically on prescription-drug advertising but explored the effects of supers in a variety of social and consumer-advertising contexts. There nevertheless is reason to expect that variations in text size and contrast will cue supers as being more or less important in an advertisement. To account for the wide variation in screen specifications across televisions and tablets (*e.g.*, size, dimensions, resolution), the device models and settings used in this study were held constant.

Effects of Visual Prominence from an Information-Processing Perspective

A cornerstone of the information-processing perspective in cognitive psychology and communication theory is that attentional,

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working-memory, and other processing resources are limited (Cowan, 2010, 2015; Fiske and Taylor, 2017; Kahneman, 1973; Lang, 2000). People generally are not able to focus on more than a few visual or semantic elements at a time (Ju and Johnson, 2010). Especially when advertisements are complex, these elements compete with each other for attention and other cognitive resources needed to encode, rehearse, and retrieve information (Lang, 2000). Top-down and bottom-up attention models suggest that two classes of factors determine how people make trade-offs when allocating limited attentional resources (Corbetta and Shulman, 2002; Rosbergen, Pieters, and Wedel, 1997):

- top-down factors, which are controlled by the consumer (*e.g.*, consumer's goals, experience, capacity, and motivation), and
- bottom-up factors, which are specific to the stimulus and controlled by the creator of the stimulus (*e.g.*, color, contrast, text size, imagery, and characters).

Bottom-up factors can draw attention to advertisement elements even when the consumer is not searching actively for them (Wolfe, 1998; Yantis and Jonides, 1984).

Perceptual features of a message element can affect its prominence relative to other parts of the message (Guido, 2001). Advertising researchers have found evidence that text size is related to attention, such that increased size results in proportionate increases in attention to both the text element and the advertisement as a whole (Pieters and Wedel, 2004). More prominent risk disclosures in print direct-to-consumer advertising—manipulated through the use of color, larger text size, a box border, bulleting, and location—also have been shown to enhance perceived attention to that information, which in turn mediates the effects of prominence on recognition and recall (Ju, 2014). Variations in text size and contrast enhance or diminish the visual prominence of superimposed text relative to other parts of an advertisement.

On the basis of a cognitive perspective of message processing, more prominent features more likely will draw attention. This, in turn, affects memory and the likelihood that people will use information conveyed by supers to form beliefs and judgments

about an advertised product. In sum, larger text size and more drastic visual contrast should contribute to greater prominence, visual awareness, and semantic recognition of advertising claims expressed in supers. The latter hypothesis is a function both of increased attention to the text that facilitates low-level encoding of the information and of improved readability. On the basis of this literature, the following hypotheses and research questions guided the current study:

- H1: Super size will influence positively awareness and encoding of supers in a direct-to-consumer video prescription-drug advertisement, such that awareness, recognition, self-reported attention, and perceived visual clarity will increase as super size increases.
- H2: 1 Level of contrast will influence positively awareness and encoding of supers in a direct-to-consumer video prescription-drug advertisement, such that awareness, recognition, self-reported attention, and perceived visual clarity will increase with greater contrast.
- RQ1: 1 Does device type influence awareness, recognition, self-reported attention, and perceived visual clarity (*i.e.*, awareness and encoding) of supers in a direct-to-consumer video prescription-drug advertisement?
- RQ2: 1 Does super size, level of contrast, or device type influence risk and benefit recall, perceived risk, and perceived risk-benefit balance (*i.e.*, fair-balance-related perceptions) concerning a prescription drug promoted with a direct-to-consumer video advertisement?
- RQ3: 1 Does super size, level of contrast, or device type influence attitudes toward a direct-to-consumer video advertisement or attitudes toward the advertised prescription drug?

METHOD

This study was an in-person, $2 \times 2 \times 3$ factorial experiment varying the type of device on which participants viewed a fictitious direct-to-consumer advertisement (television, tablet) and the level of contrast (low, high) and super size (small, medium, large).

Participants

The authors of the current study worked with market research firms Schlesinger and L&E Research to recruit a diverse convenience sample of U.S. adults in three cities: Tampa, FL; Cincinnati,

OH; and Los Angeles. The authors selected these three cities to provide geographic variation, with the additional aim of recruiting diverse participants with regard to gender, race and ethnicity, education, and age characteristics. The research firms identified prospective participants from proprietary contact databases and screened them for eligibility *via* phone or e-mail. People who were younger than 18 years; had participated in market-research interviews, such as focus groups or one-on-one interviews, in the past three months; or ever had been employed in the pharmaceutical, marketing, or health care industries were excluded from the study. All participants were required to read and speak English.

Of the 2,307 prospective participants who were contacted, 2,176 were eligible. Of those, 1,618 participants (74 percent) were scheduled to participate in the study. The study had 298 cancellations or no shows, resulting in a show rate of 82 percent. Forty-eight of those who showed up were paid the incentive and sent home because participation targets already had been met. An additional 62 were replaced or omitted because of technical failures or other issues during the study. The resulting analytic sample was 1,210 participants.

Procedure

The authors administered the study in person at the research firms' facilities from January 16, 2018, through February 2, 2018. The authors assigned participants to one of 12 study conditions using permuted-block randomization (Chow and Liu, 2004). Under this method, the authors partitioned participants into a set of predefined blocks based on study location and the order in which they arrived at the study site.

Once participants consented to the study, a research assistant escorted them to a designated media-viewing room and gave them a unique ID number that had been prandomized to a study condition. Participants viewed the advertisements on the same television (*i.e.*, a 46-inch RCA 1,080-pixel LED high-definition television) and DVD/Blu-Ray player models (*i.e.*, Sony Blu-Ray Disc™ player) to ensure a consistent viewing experience in all three cities. Participants assigned to the tablet conditions in all cities used iPad Air 2 tablets with 9.7-inch "retina" displays (*i.e.*, $2,947 \times 1,536$ pixel resolution at 264 pixels per inch).

To replicate optimal viewing conditions, participants assigned to television conditions sat five feet away from the television screen, whereas participants assigned to the tablet conditions held the tablet in their hands at a screen distance most comfortable for them. The five-foot television distance falls between recommended viewing-angle limits proposed by THX and the Society for Motion Picture and Television Engineers (Collins, 2011). Participants, who were instructed to wear their glasses or contact lenses while

Table 1 Content of Supers with Corresponding Audio and Visual Advertisement Elements

Supers	Audio	Visuals
Results may vary. Available by prescription only.	FATHER: ... But now my asthma is manageable thanks to ZARINS, a new prescription asthma drug.	CUT TO: Father helping his daughter up onto her horse; he is addressing the camera.
ZARINS combines two medicines in one product.	NARRATOR: ZARINS combines two medicines — that are inhaled and work together to reduce inflammation and keep air flowing in and out of your lungs.	CUT TO: Logo for ZARINS, followed by an animated graphic of a pair of lungs with air flowing in and out.
Use ZARINS only once a day, every day.	NARRATOR: ZARINS reaches full effectiveness within 15 minutes. Taken on a daily basis, ZARINS controls or eliminates breathing difficulty, chest tightness, wheezing, and coughing.	CUT TO: Interior doctor's office. Various shots of the father getting examined by a doctor, checking lungs.
ZARINS won't replace rescue inhalers for sudden symptoms.	NARRATOR: ZARINS also helps stop asthma attacks or flare-ups but should not be used as a rescue inhaler.	CUT TO: Father buttons shirt. Doctor hands the father a pamphlet with info about ZARINS.
Increased risk of death	NARRATOR: One of the medicines in ZARINS is known to increase the risk of death from asthma problems.	CUT TO: Exterior riding ring at horse barn. Daughter is riding her horse in the ring, practicing. Father looks on. We see him shout some encouraging words. Mother walks up and joins the father; they look happy and healthy.
ZARINS can cause severe allergic reactions.	NARRATOR: ZARINS can cause a severe allergic reaction with sudden swelling of the lips, tongue, and throat.	Father greets mother, and she puts her arm in his as they lean on the fence.
Rapid heart rate, temporary blindness, and brittle bones	NARRATOR: Rare but serious side effects include problems with heart rhythm, eyes, and bone density.	Mother and father proudly watch the daughter ride. Close-up of horse's hooves and legs.

Note: Supers appeared at the bottom of the video frame in a white, sans-serif italicized font. The first super appeared 10 seconds into the advertisement, with subsequent supers cycling through the 52-second mark. The advertisement had four characters shown on screen: father, mother, daughter, and doctor.

viewing the advertisement if they typically wore corrective lenses while watching television, viewed the advertisement alone in a room.

When the advertisement ended, a research assistant escorted the participant to an adjacent survey room containing 10 laptops so that multiple participants could complete the online questionnaire at the same time. Participants used the same unique ID number given to them in the viewing room to log on to the survey, ensuring concordance between the participants' data and experimental condition. All study procedures were designed to be completed within 25 minutes.

After completing the questionnaire, participants completing the study in Tampa or Cincinnati received an incentive of \$40 cash, whereas participants in Los Angeles received prepaid debit cards worth \$75. Incentive rates varied according to the industry standards by location. All study materials and procedures were approved by the institutional review board at [institution redacted for blind review].

Materials

The study used six versions of an advertisement featuring a fictitious prescription-drug product called ZARINS, which was indicated to treat asthma. The authors used a fictitious drug rather than one currently on the market to minimize the potential impact of prior judgments and perceptions of the drug or advertisement

on study effects. The advertisements were designed to mimic typical 60-second direct-to-consumer television advertisements and were found in cognitive interviewing to be indistinguishable from real advertisements. Each version of the advertisement included identical audio, visuals, and risk and benefit information; they varied only in the size of the supers appearing at the bottom of the video frame and the contrast of this text relative to the background.

The supers were designed to be congruent with audio narration in the advertisement, with four out of seven directly corresponding to risk information presented in the major statement (See Table 1). The authors determined the three super sizes by varying the height of the supers, measured from the font's baseline to the top of a capital letter "H" (*i.e.*, cap height) relative to the length of the video frame's vertical edge (*i.e.*, display height). At all sizes, the supers were required to fit on a single line of text to control against differences in formatting (*e.g.*, line breaks), so the maximum cap height could be no larger than would result in the longest of the seven supers matching the display width.

Before administering the current study, the authors conducted a pretest with a total of 242 participants to test consumers' perceptions of five alternative levels of super size with the aim of identifying three perceptibly distinct sizes to use in the main study. On the basis of the results of the pretest, the cap height of the small supers was set at one-fiftieth of the display height; the medium supers were one-thirtieth of the display height; and the large supers

were one-twentieth of the display height. The high-contrast versions of the advertisements used white supers set against a solid black field that spanned the bottom of the frame. In the low-contrast versions, the black field was removed, and the white supers were given a dark-gray hairline outline and subtle drop shadow. Although lower contrast might have been possible, for example, with a transparency filter applied to the supers, a minimum threshold was selected that still could be considered reasonably visible to reinforce the practical implications of the findings. Still frames showing the variations in super size and contrast are presented (See Figure 1).

Measures

The study tested the effects of device type, level of contrast, and super size on several outcome measures, which are organized into three broad categories for presentation purposes. The first set of outcomes emphasizes low-level cognitive processing of the supers as a message element (*i.e.*, awareness and encoding of the supers). The second set focuses on memory and interpretation of risk and benefit information included in the advertisement (*i.e.*, fair-balance-related perceptions). The third set is a pair of measures assessing the degree to which participants evaluated the advertisement and drug as something favorable (*i.e.*, attitudes). When referring to supers, the questionnaire used the phrase “words at the bottom of the screen,” which was defined with the aid of a visual example.

Awareness and Encoding of Supers

The awareness and encoding category comprised four outcomes. Awareness of supers was measured with a single item asking participants whether they remembered seeing words at the bottom of the screen during the ZARINS advertisement, coded as 1 (“yes”) or 0 (“no or don’t know”). Across all conditions, 75.7 percent ($n = 916$) of participants reported having seen the supers.

To measure recognition of supers ($M = 9.90$, $SD = 1.86$), participants selected all the claims they remembered seeing in the ZARINS advertisement from a list of 13 possible selections. The list included seven claims that corresponded to the supers, and the remaining six were foils. The final scale was a count of the number of correct selections, ranging from 0 to 13. Participants received one point for each claim they selected that had appeared as a super in the advertisement and one point for each foil they did not select. The measure for self-reported attention to supers ($M = 3.13$, $SD = 0.94$) asked participants who reported being aware of the words at the bottom of the screen in the ZARINS advertisement to rate how much attention they paid to it, on a scale from 1 (“none”) to 5 (“a great deal”).

Perceived visual clarity was a multi-item scale composed of seven 7-point semantic-differential items that asked participants to reflect on the visual characteristics of the supers at the bottom of the screen in the advertisement. The anchors for the semantic-differential pairs were “blurry”–“sharp,” “blended into the background”–“stood out from the background,” “difficult to see”–“easy to see,” “not at all visually clear”–“very visually clear,” “unreadable”–“readable,” “low quality”–“high quality,” and “not at all noticeable”–“very noticeable.” A composite scale took the average score of the seven items ($\alpha = 0.91$; $M = 5.51$, $SD = 1.29$). The questionnaire was programed with skip logic, so that only participants who reported being aware of the supers were asked the self-reported attention and perceived visual-clarity questions.

Fair-Balance-Related Perceptions

Six outcomes addressed perceptions of risk and benefit. Two open-ended questions measured risk and benefit recall, asking participants to list as many risks and side effects and as many benefits as they could remember from the ZARINS advertisement. Two independent coders classified the verbatim responses.

Participants’ responses were coded into eight categories for the risk recall question and five categories for the perceived drug-benefit question. Intercoder reliability for all categories met or exceeded a Krippendorff’s alpha threshold of 0.80 (Hayes and Krippendorff, 2007). The authors summed the number of responses in each risk category to obtain a single risk-recall score, with values ranging from 0 to 8 ($M = 2.21$, $SD = 1.29$). The authors similarly summed benefit responses to create a benefit-recall variable with a possible range of 0 to 5 ($M = 1.19$, $SD = 0.58$).

A single Likert-type item measured perceived risk severity ($M = 5.18$, $SD = 1.61$; “How serious are the side effects or risks of taking ZARINS?”) on a scale from 1 (“not serious at all”) to 7 (“extremely serious”). To measure perceived risk likelihood ($M = 4.12$, $SD = 1.62$), a single Likert-type item asked participants how likely they were to experience at least one side effect if they took ZARINS, from 1 (“not at all likely”) to 7 (“extremely likely”). Participants rated the perceived benefits of the advertised drug ($M = 5.28$, $SD = 1.20$) with a single Likert-type item asking how effective ZARINS would be in managing asthma, from 1 (“not very effective”) to 7 (“extremely effective”). Last, participants rated the perceived risk–benefit balance ($M = 3.32$, $SD = 1.32$) with a single five-point question with response options ranging from 1 (“the risks greatly outweigh the benefits”) to 5 (“the benefits greatly outweigh the risks”). The response label for the midpoint of the scale (3) designated balance between risks and benefits (“the benefits and risks are about the same”).

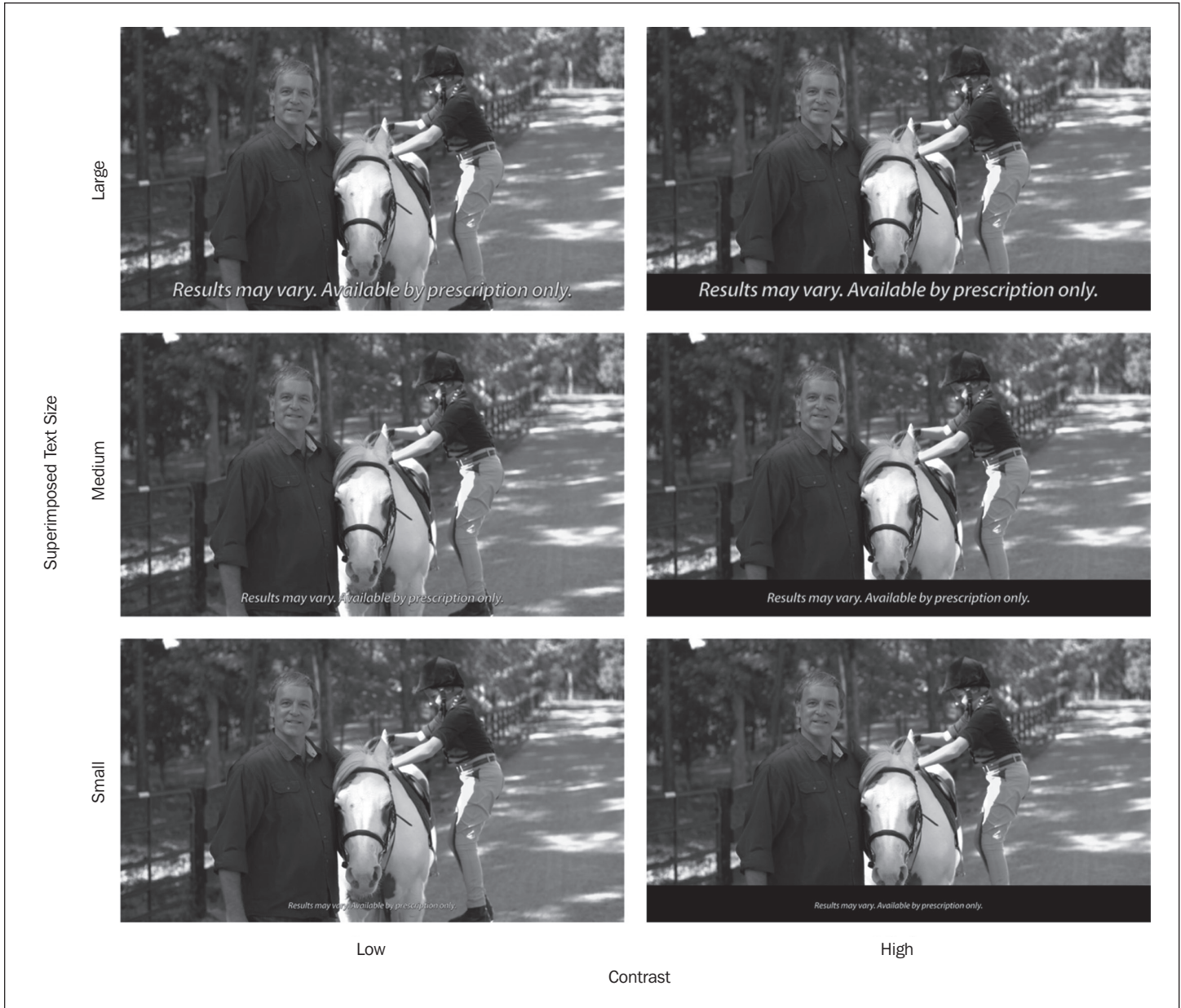


Figure 1 Still frames from the six versions of the ZARINS television advertisement, showing the different levels of superimposition size and contrast

Attitudes

A composite measure representing overall attitude toward the advertisement took the average score of three 7-point semantic-differential items, with numerical scores ranging from 1 to 7 ($\alpha = 0.87$; $M = 5.69$, $SD = 1.29$). Response anchors of the original items were “bad”–“good,” “low quality”–“high quality,” and “unprofessional looking”–“professional looking.” Likewise, attitude toward the drug used three 7-point items on which participants rated ZARINS as “bad”–“good,” “unpleasant”–“pleasant,” and “dislike”–“like.” The composite scale took the average score over the three items

($\alpha = 0.93$; $M = 4.59$, $SD = 1.50$). For both attitude measures, higher values indicate a more favorable attitude toward the advertisement or drug, respectively.

Analysis

Before conducting the main analyses, the authors assessed associations between outcome variables and potential covariates, looking for moderate or stronger bivariate correlations (absolute $r > 0.30$). The 10 potential covariates were asthma diagnosis, self-reported attention toward the advertisement, visual acuity, health literacy,

English as a second language, general perceptions of drug advertising, sex, age, race and ethnicity, and educational attainment. Because of the experimental design of the study, random assignment largely should have eliminated the need to include covariates in the analyses.

Even with proper randomization, however, statistically controlling for extraneous variables that are associated at least moderately with the outcome variable can help reduce within-group error variance and partial out the influence of covariates from the effects of manipulated variables. Only general perceptions of drug advertising had an association with attitude toward the advertisement that exceeded the threshold for inclusion as a covariate ($r = 0.33$). Final models predicting attitude toward the advertisement reflect covariate-adjusted statistics that account for general perceptions of drug advertising.

The distribution of residuals for three outcome variables (perceived visual clarity, perceived benefits, and attitude toward the advertisement) was skewed slightly. To avoid violating normality assumptions of statistical tests involving these variables, the authors applied a power transformation by squaring the original values to normalize their distributions (Box and Cox, 1964; Tabachnick and Fidell, 2012). Although inferential statistics (*e.g.*, F or t tests and related p values) reported here derive from the transformed variables, the descriptive statistics (*e.g.*, group means) are based on the original measurement scale to facilitate interpretation of differences.

One of the models involved a binary outcome (*i.e.*, awareness of supers), for which a stepwise hierarchical logistic regression tested overall effects of device type, contrast, and super size. For the remaining outcomes, the authors took a staged approach, conducting three-way analyses of variance (or analyses of covariance when a covariate was included), first testing a model that included all main effects and interactions. There were no significant two- or three-way interaction effects for any of the outcomes, and the final models presented here include only main effects. For significant effects by super size, pairwise comparisons tested for differences among the three size levels, with Bonferroni-adjusted p values of 0.0167. Separate follow-up pairwise comparisons were not necessary to interpret significant main effects of superimposed-text contrast and device type, because these variables had only two levels apiece; a significant F test for these main effects is evidence that one level was different from the other.

RESULTS

Participant Characteristics

Participant characteristics are summarized overall and by location (See Table 2).

Awareness and Encoding of Supers

Awareness of Supers. Device type, level of contrast, and super size influenced awareness of the supers, $\chi^2(4, N =) = 17.27, p = .002$. Participants who viewed the advertisements on television more likely reported being aware of the supers (78.4 percent) than those who watched the advertisement on a tablet (73.3 percent; odds ratio [OR] = 1.33, 95 percent confidence interval [CI] [1.02, 1.74], $p = 0.036$).

The authors were surprised that participants in the low-contrast condition more likely reported being aware of the supers (78.9 percent) than those in the high-contrast condition (72.5 percent; OR = 1.43, 95 percent CI [1.09, 1.86], $p = 0.009$). Participants who watched the advertisement with small supers less likely reported being aware of the supers (71.6 percent) than participants who watched the advertisement with large text (78.9 percent; OR = 0.67, 95 percent CI [0.48, 0.92], $p = 0.014$). The percentage of participants who watched the advertisement with medium supers and remembered seeing the words at the bottom of the screen did not differ from the small or large size conditions ($p = 0.084$ and $p = 0.459$, respectively).

Recognition of Supers. The test of the overall model examining recognition of the supers was significant, $F(4, 1,205) = 6.40, p < 0.001, \eta^2 = 0.02$. As with the awareness outcome, participants in the low-contrast condition accurately recognized significantly more claims appearing in the supers ($M = 10.04, SE = 0.07$) than those in the high-contrast condition ($M = 9.76, SE = 0.08$), $F(1, 1,205) = 6.97, p = 0.008, \eta^2 = 0.01$. Pairwise comparisons revealed that participants who viewed the large supers accurately recognized significantly more claims ($M = 10.20, SE = 0.09$) than those who viewed the medium ($M = 9.87, SE = 0.09$), $t(796) = 2.54, p = 0.011$, or the small versions of the supers ($M = 9.64, SE = 0.09$), $t(808) = 4.32, p < 0.001, F(2, 1,205) = 9.42, p < 0.001, \eta^2 = 0.02$. Device type did not influence participants' recognition of supers, $F(1, 1,205) = 0.02, p = 0.902$.

Self-Reported Attention to Supers. The model examining attention to the supers was not significant, $F(4, 911) = 1.03, p = 0.391$. The results provided no evidence that device type, level of contrast, or size influenced attention.

Perceived Visual Clarity of the Supers. Among participants who were aware of the supers ($n = 916$), device type, contrast, and size influenced overall perceived visual clarity of the text, $F(4, 911) = 18.69, p < 0.001, \eta^2 = 0.08$. Participants who viewed the advertisement on television ($M = 5.40, SE = 0.06$) rated the supers significantly less visible than those who viewed the advertisement

Table 2. Participant Characteristics

Variable	Location							
	Tampa, FL (n = 381)		Cincinnati, OH (n = 413)		Los Angeles, CA (n = 416)		Total	
	n	%	n	%	n	%	n	%
Gender								
Male	195	51.2	176	42.6	201	48.3	572	47.3
Female	186	48.8	237	57.4	215	51.7	638	52.7
Age								
18–29	57	15.0	63	15.3	84	20.2	204	16.9
30–44	122	32.0	157	38.0	112	26.9	391	32.3
45–59	124	32.6	123	29.8	148	35.6	395	32.6
60+	78	20.5	70	17.0	72	17.3	220	18.2
Race/ethnicity								
White only, non-Hispanic	237	62.2	293	71.1	267	64.2	797	65.9
Black only, non-Hispanic	75	19.7	90	21.8	66	15.9	231	19.1
Other, non-Hispanic	18	4.7	20	4.9	28	6.7	66	5.5
Hispanic	51	13.4	9	2.2	55	13.2	115	9.5
Educational attainment								
High school graduate or less	43	11.3	52	12.6	19	4.5	114	9.5
Associate degree	153	40.2	163	39.5	142	34.1	458	37.9
Bachelor's degree	125	32.8	116	28.1	182	43.8	423	35.0
Advanced degree	60	15.8	82	19.9	73	17.6	215	17.8

Note: N = 1,210. One study participant declined to provide race/ethnicity information.

on a tablet ($M = 5.62$, $SE = 0.06$), $F(1, 911) = 7.21$, $p = 0.007$, $\eta^2 = 0.01$. Those who viewed the high-contrast version of the advertisement ($M = 5.66$, $SE = 0.06$) reported significantly greater perceived visual clarity of the text than those who viewed the low-contrast version of the advertisement ($M = 5.36$, $SE = 0.06$), $F(1, 911) = 13.25$, $p < 0.001$, $\eta^2 = 0.01$.

Pairwise comparisons revealed that participants who viewed the large text ($M = 5.89$, $SE = 0.07$) reported significantly greater perceived visual clarity than those who viewed the medium ($M = 5.46$, $SE = 0.07$), $t(914) = 4.38$, $p < 0.001$, or the small version ($M = 5.19$, $SE = 0.07$), $t(914) = 7.07$, $p < 0.001$. Those who viewed the medium supers reported significantly greater perceived visual clarity than those who viewed the small version, $t(914) = 2.72$, $p = 0.007$, $F(2, 911) = 25.57$, $p < 0.001$, $\eta^2 = 0.05$.

Fair Balance–Related Perceptions

Risk Recall. This study found several significant effects on participants' risk recall, $F(4, 1,205) = 4.29$, $p = 0.002$, $\eta^2 = 0.01$. Those who viewed the advertisements on television ($M = 2.14$, $SE = 0.05$) recalled fewer risks than those who viewed the advertisements on a tablet ($M = 2.29$, $SE = 0.05$), $F(1, 1,205) = 4.25$, $p = 0.039$, $\eta^2 < 0.01$. Level of contrast did not have a significant effect on risk recall, $F(1,$

$1,205) = 1.11$, $p = 0.292$, but super size did have a main effect on this outcome, $F(2, 1,205) = 5.84$, $p = 0.003$, $\eta^2 = 0.01$. Pairwise comparisons revealed that those who viewed the small supers ($M = 2.04$, $SE = 0.06$) recalled fewer risks than those who saw the medium ($M = 2.27$, $SE = 0.06$), $t(810) = -2.55$, $p = 0.011$, or the large version ($M = 2.33$, $SE = 0.06$), $t(808) = -3.23$, $p = 0.001$.

Benefit Recall. Device type, level of contrast, and size did not influence significantly participants' memory for drug benefits expressed in the advertisement, $F(4, 1,205) = 0.42$, $p = 0.795$.

Perceived Risk. Neither device type, level of contrast, nor size significantly influenced perceived risk severity, $F(4, 1,204) = 1.83$, $p = 0.120$, or how likely participants thought they would be to experience at least one side effect if they took the advertised drug, $F(4, 1,204) = 1.22$, $p = 0.299$.

Perceived Benefits and Risk–Benefit Balance. Neither device type nor level of contrast influenced participants' perceptions of the drug's benefits (device type: $F[1, 1,204] = 1.75$, $p = 0.186$; contrast: $F[1, 1,204] = 0.50$, $p = 0.480$) or their perceptions of the risk–benefit balance (device type: $F[1, 1,204] = 2.67$, $p = 0.103$;

Those who saw the small supers thought the advertised drug would be more effective than those who saw the large version.

contrast: $F[1, 1,204] = 0.04, p = 0.848$). It is interesting that the size of the supers influenced both perceptions of the drug's benefits, $F(2, 1,204) = 4.71, p = 0.009, \eta^2 = 0.01$, and risk-benefit balance, $F(2, 1,205) = 6.14, p = 0.002, \eta^2 = 0.01$, even though text size did not influence participants' benefit recall, as previously described.

In particular, those who saw the small supers ($M = 5.41, SE = 0.06$) thought the advertised drug would be more effective than those who saw the large version ($M = 5.14, SE = 0.06$), $t(807) = 3.04, p = 0.002$. Similarly, those who saw the small supers ($M = 3.49, SE = 0.06$) thought the benefits of the drug outweighed the risks to a greater extent than those who saw the large text ($M = 3.17, SE = 0.07$), $t(808) = 3.50, p < 0.001$. For context, a score of 3 on the risk-benefit balance scale means that "the benefits and risks are about the same," whereas a score of 4 on the scale means that the "benefits somewhat outweigh the risks."

Attitudes

Attitude toward the Advertisement. The overall main-effects model for attitude toward the advertisement was significant, $F(5, 1,202) = 35.60, p < 0.001, \eta^2 = 0.13$. This analysis included a covariate—general perceptions toward drug advertising. Device type influenced attitude toward the advertisement, such that participants who viewed the advertisement on television ($M = 5.52, SE = 0.05$) had a less-favorable attitude than those who viewed the advertisement on a tablet ($M = 5.85, SE = 0.05$), $F(1, 1,202) = 21.71, p < 0.001, \eta^2 = 0.02$. Participants who saw the small supers ($M = 5.78, SE = 0.06$) had a significantly more favorable attitude toward the advertisement than participants who saw the medium-sized text ($M = 5.58, SE = 0.06$), $t(809) = 2.50, p = 0.013, F(2, 1,202) = 3.13, p = 0.044, \eta^2 = 0.01$. Level of contrast did not influence attitude toward the advertisement, $F(1, 1,202) = 1.03, p = 0.310$.

Attitude toward the Drug. Participants who saw the small version of the supers ($M = 4.82, SE = 0.07$) reported a more-favorable attitude toward the drug than those who saw the medium ($M = 4.52, SE = 0.07$), $t(810) = 2.85, p = 0.005$, or the large version ($M = 4.43, SE = 0.07$), $t(808) = 3.75, p < 0.001, F(2, 1,205) = 7.70, p < 0.001, \eta^2 = 0.01$. Device type and level of contrast did not affect participants'

attitude toward the drug (device type: $F[1, 1,205] = 1.03, p = 0.309$; contrast: $F[1, 1,205] = 0.53, p = 0.467$).

DISCUSSION

The objective of this study was to examine the effects of super size and contrast on consumer processing and understanding of information in prescription-drug advertisements. This study also examined the effect of technology by presenting the advertisement on either a 46-inch television or a 9.7-inch tablet computer. To the authors' knowledge, this study is the only scholarly work to examine the effects of device on consumer understanding of supers in direct-to-consumer prescription-drug advertisements.

Overall, viewing the advertisement on television versus a tablet did not yield a consistent pattern of results concerning consumers' processing or comprehension. Participants found the supers more visually clear and reported more favorable attitudes toward the advertisement when they saw them on a tablet. Awareness of the supers, though, was greater when viewed on a television.

This study revealed two unexpected results concerning the effect of contrast on awareness and recognition. In particular, a larger percentage of participants in the low-contrast condition reported being aware of the supers than those in the high-contrast condition. Also, participants in the low-contrast condition reported greater recognition of claims expressed in the supers than participants in the high-contrast condition. This finding runs counter to expectations from prior research, which has shown that adequate contrast (e.g., light letters on a dark background for video) improves legibility (Moriarty and Duncan, 1989) and therefore should have a positive impact on awareness and recognition. A potential explanation for this result is related to the specific way contrast was manipulated in this study. Because current direct-to-consumer advertisements use this format, the high-contrast versions of the direct-to-consumer advertisement had a solid black field at the bottom of the screen, serving as a background to white supers. This format resembled the black bars left when letterboxing is used to reframe movies to fit television screens with a different aspect ratio. If one assumes that people are accustomed to seeing these black bars and, more important, to ignoring them (Cardwell, 2015), it is possible that participants in the high-contrast arms of the study in effect were conditioned to disregard the solid black field and, by proxy, the information contained within it. In the low-contrast versions of the advertisement, however, the disclosure statements were superimposed directly over the advertisement visuals, similar to the way subtitles typically are presented. Alternatively, the low-contrast text might have drawn greater attention because it was more difficult to read, prompting participants to exert more effort to interpret what it said.

Future research should examine alternative contrast formats, drawing on the variety of approaches used in direct-to-consumer prescription-drug advertisements. For instance, some advertisements use dark letters on white backgrounds or apply a transparency gradient so that no distinct hard edge separates the text box from underlying visuals. Additionally, although supers typically are presented at the bottom of the frame (Murray *et al.*, 1993), some advertisers place them elsewhere or leave a margin of clear space at the bottom of the screen.

The results of the impact of super size are particularly noteworthy. In particular, text size affected recall of risks: Those who viewed the smallest supers recalled fewer risks than those who saw the larger versions. Super size had no effect on benefit recall, which is not surprising because no benefit or indication information was included as a super. Super size influenced benefit perceptions, however: Those who saw the small version versus the large had more positive perceptions regarding drug effectiveness and more likely believed that the benefits outweighed the risks. Additionally, participants exposed to small supers had more favorable attitudes toward the drug.

Although nine out of 10 participants were able to recall the drug indication—that it provides relief for asthma symptoms—regardless of super size, those in the small condition did not recall risk information as effectively as those in the large condition. This finding has important implications for fair-balance presentation. Risk information conveyed using small supers may not be processed as effectively or may be interpreted as being less important as the same information presented in larger font; whether a direct consequence of this or not, smaller text also enhances perceived drug benefit and overall favorability. Future research should examine the causal link between information formats that minimize risk and exaggerate benefit.

Implications for Practice

The Federal Trade Commission's (FTC's) "clear and conspicuous" standard states that disclosures presented in the video portion of an advertisement "should be of 'sufficient' size, such that viewers can see the disclosure regardless of television screen size" (FTC, 1970, p. 1). Because neither the FDA nor the FTC provides specific ranges for what constitutes sufficiently large supers, pharmaceutical companies have exercised their own discretion in choosing the text size they use. The authors of a content analysis (Hoy and Andrews, 2004) operationally defined sufficient size for supers as one-twenty-fifth of the screen size and found that only 31 percent of the advertisements included in their analysis met that standard. This level of nonadherence is particularly concerning given the potential effect of smaller supers on fair balance presentations.

In comparison, the small text in the current study was one-fiftieth the screen height, medium text was one-thirtieth, and large was one-twentieth.

From a consumer's perspective, prominent disclosures are important because they can correct misbeliefs and provide essential drug information (Andrews, Burton, and Netemeyer, 2000; Hoy and Stankey, 1993), but from an advertiser's perspective, disclosing drug risks can result in unfavorable consumer drug perceptions that may run counter to advertisers' intent (Kavadas, Katsanis, and LeBel, 2007). Small supers do not present disclosures with sufficient prominence to secure consumers' attention to risk information; thus, the disclosures may be ineffective in encouraging consumers to consider potential health risks of the drug or overeffective in asserting the drug's benefits. Larger supers may improve risk recall and help prevent consumers from forming misperceptions about a drug's efficacy.

Limitations

Although this study was a well-controlled experiment, it has some limitations. First, the study was conducted with one medical condition; when researchers examine the effects of super size and contrast in relation to a different medication, the results could vary. Future research should attempt to replicate the results in the context of other illnesses. Furthermore, the authors limited their examination to only two aspects of supers; others are important to investigate, such as time on screen and dual-modality issues.

Second, the current study also was limited to comparing two devices, a television versus a tablet. Prescription-drug advertisements can be viewed on other devices as well, including smartphones. The effects of the main variables therefore may differ if viewed on a larger variety of devices, screen sizes, or screen resolutions.

Finally, the authors operationalized high contrast as light letters on a black field at the bottom of the screen and low contrast as light letters over the video images. Direct-to-consumer prescription-drug advertisements use a variety of approaches to create contrast, including light letters on colored backgrounds and dark letters on a light background; the location of the text also varies. The effects of the contrast thus may vary depending on the execution. Future research may examine various contrast executions to determine their effectiveness in providing clear information.

Conclusion

The results described here suggest that device type, level of contrast, and text size influence how information conveyed through supers in a direct-to-consumer prescription-drug advertisement is processed. Whereas viewing the advertisement on a television

was related to greater awareness of the supers, viewing the advertisement on a tablet improved the perceived visual clarity of the text and resulted in more favorable attitudes toward the advertisement. The level of contrast used in displaying supers can affect consumers' awareness and recognition of disclosure claims, albeit in unexpected ways. The low-contrast manipulation in this study improved awareness and recognition of claims relative to the high-contrast version of the advertisement. This finding should be generalized with caution given the confluence of screen layout and design features involved in the contrast manipulation.

Super size also influenced consumers' recall of risks and perceptions of benefit. Reducing the size of supers displayed on screen can hinder risk recall and result in an exaggerated sense of the drug's benefits. The impact of super size on these fair-balance-related perceptions also was reflected in participants' attitude toward the advertised drug. People who watched the advertisement containing small supers saw the drug more favorably than those who watched the advertisements with medium or large text. Using small supers alters the physical and psychological prominence of risk information and side effects relative to drug benefits in direct-to-consumer advertisements. **JAR**

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