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The “Proximal Depiction Effect” of Indulgent (Versus Non-Indulgent) Foods on Consumer Responses

Abstract:

Purpose – This paper examines the effect of proximal (versus distant) depiction of food products within an advertising or online context on consumer responses across food-types (indulgent versus non-indulgent) and display formats that lead to a single exposure (e.g., billboard) versus multiple exposures (e.g., online menu).

Design/methodology/approach – Five experimental studies, using both implicit and explicit-elicitation techniques, demonstrate the effect of proximal food depictions. The paper rules-out alternative explanations (portion-size perception and participants’ bodily distance) and controls for several other factors (e.g., visual crowding, BMI, dietary restrictions, etc.)

Findings – The studies find that proximal food pictures: (a) are implicitly associated with tastiness more for indulgent (vs. non-indulgent) foods, (b) lead to higher purchase intention for indulgent food upon a single exposure driven by enhanced perceived tastiness, and (c) evoke satiation upon multiple exposures.

Research limitations/implications – This research identifies the effect of spatial proximity of food depiction on consumer responses using different stimuli. Future work could explore the effects in alternate consummatory contexts.

Practical implications – Our findings provide clear instructions to marketers and policymakers on how to tailor consumer responses using spatial distance in depiction of food products, depending on the food type and display format. Understanding the effect of visual food cues will

help policymakers devise strategies to counter over-consumption, which increases the risk of non-communicable diseases and reduces consumer well-being (SDG 3, United Nations, 2017).

Originality/value – Introducing a novel pictorial cue (i.e., the spatial distance of product depiction), this paper contributes insights to the literature on implicit associations, visual information processing, satiation, over-consumption, and food marketing.

Keywords: Proximal Food Pictures, Indulgent Food, Implicit & Explicit Beliefs, Food Advertising, Over-consumption

Running Head: The Proximal Depiction Effect

The “Proximal Depiction Effect” of Indulgent (Versus Non-Indulgent) Foods on Consumer Responses

1. Introduction

Apicius, the famed 1st Century Roman connoisseur, purportedly said: “*We eat first with our eyes*” (Spence, Okajima, Cheok, Petit, & Michel, 2016). This phrase sounds true, now more than ever, as pictures of appetizing food beckon us through advertising, restaurant menus, product packaging, billboards, online food ordering websites, and social media. Merely viewing pictures of an indulgent food (e.g., a slice of a cheese-dripping pizza) can elicit taste inferences, trigger consumption intentions, and stimulate the expected enjoyment of the featured food (Raghunathan, Naylor, & Hoyer, 2006; Elder & Krishna, 2012; Krishna, Morrin, & Sayin, 2014; Larson, Redden, & Elder, 2014; Moore & Konrath, 2015). Extending this literature, our research examines a novel pictorial cue (i.e., the spatial distance of food depiction either within an advertisement or on an online ordering platform) and identifies the sensory mechanism driving the effect of such depictions. We address the question: whether, how, and under which conditions do a proximal depiction of food products affect the consumer responses?

This paper has implications for food marketing and the phenomena of over-consumption and obesity. It is estimated that, on average, consumers observe over 5,000 advertisements every day with an increasing proportion featuring food products (Larson et al., 2014). These advertisements typically highlight the sensorial appeal of food products through evocative imagery. Our research examines whether such pictorial cues (in particular, proximity of depiction) influence implicit and explicitly elicited consumer responses. Furthermore, we explore the situational factors (e.g., multiple exposures to similar proximal depictions) that can have an unintended consequence for advertisers due to increased satiation (i.e., a decline in expected enjoyment for a featured food

product). These insights are relevant for not only food advertisers but also policymakers. Evidence suggests that advertising stimuli featuring indulgent foods activate impulse responses (Moore & Konrath, 2015), thereby contributing to the rise in overweight and obesity-related diseases. A better understanding of the effect of such food advertising stimuli is crucial to devise counterstrategies that encourage healthy eating habits, reduce the risk of non-communicable diseases (NCDs), and improve overall well-being (Sustainable Development Goal 3.4.1, United Nations, 2017).

This research makes a few theoretical contributions. First, we suggest that people implicitly associate proximal food depiction with tastiness, especially for indulgent (vs. non-indulgent) foods. Prior research has identified several intuitions and lay beliefs that drive consumers' decision-making. For example, "unhealthy foods are considered tastier" (Raghunathan et al., 2006), "healthy foods are perceived as less filling" (Suher, Raghunathan, & Hoyer, 2016), "unhealthy foods have glossy packaging" (Ye, Morrin, & Kampfer, 2020), and "healthy foods are light weight" (Li, Heuvinck, & Pandelaere, 2021). Our research demonstrates that consumers implicitly believe that "*proximal food depiction is tastier*", and that this learned association along with the explicitly elicited perception of tastiness, shapes their food decision. Second, our research contributes to prior literature on visual information processing, especially the stream of work examining the spatial dimensions of location and spacing between an image element and the observer. Extant work has studied different visuospatial effects (Adaval, Saluja, & Jiang, 2019), such as the physical distance between regular and sales prices (Coulter & Norberg, 2009), between images of cause and effect (Chae, Li, & Zhu, 2013), and between observer and verbal description (Jia, Huang, Wyer, & Shen, 2017). Contributing to this literature, we identify the effects of incidental exposure to food pictures that vary on spatial distance within the visual.

Third, our research adds to prior work on interventions that influence the consumer's food well-being (Batat & Addis, 2021; Machin, Moscato, & Dadzie, 2021). We show that the effect of proximally depicted pictures on explicit consumer responses is specific to indulgent (than non-indulgent) foods, can increase eating intentions, and, by implication, leads to over-consumption. Lastly, this paper builds upon recent research on the conditions under which external food stimuli might drive satiation and variety-seeking (e.g., Larson et al., 2014; Suher, Raghunathan, & Hoyer, 2016; Sevilla, Lu, & Kahn, 2019). We reveal spatial distance as a potential moderator of the effect of indulgent food pictures on satiation. This research demonstrates that exposure to multiple-proximal depictions of indulgent foods (e.g., several up-and-close pictures featured in-store displays of burgers or pizzas) can increase satiation driven by reduced perceived tastiness. We next review the relevant literature leading to our hypotheses.

2. Theory and Conceptual Background

2.1. Proximal Food Depictions are Perceived Tastier

The pictorial and aesthetic representation of food products has been shown to be associated with tastiness (Raghunathan et al. 2006) and evince different physiological and consumer responses (e.g., amount of salivation, appetitive desire, willingness to pay, and satiation; Krishna et al., 2014; Larson et al., 2015). Prior neurophysiological evidence shows that merely viewing pictures of food products can activate multiple regions of the brain – especially, the frontal operculum/ insula (enabling perception of food taste), the orbitofrontal cortex (facilitating inferences of the hedonic value of taste), and the visual cortex (processing the food's shape) – all of which together represent our food knowledge (Simmons, Martin, & Barsalou, 2005). This research proposes that the proximal depiction of food pictures can spontaneously be associated

with tastiness because such pictures improve not only visual information processing but also taste inferences of a featured product. The visual effect of spatial proximity would occur as up-and-close depiction makes the product appear more evocative, vivid, and detailed (Nisbett & Ross, 1980). Furthermore, as actual food eating is itself a proximal experience, consumers are likely to recall their prior eating experience better upon exposure to up-and-close food depictions. Distant food pictures, being less detailed and visually evocative, might not evoke similar details of previous eating experiences. Accordingly, we expect proximal food depictions to activate taste-related inferences for a featured product, as taste is itself a proximal sensory modality (i.e., the taste can only be perceived when an actual (or imagined) stimulus is physically proximal) (Elder, Schlosser, Poor, & Xu, 2017). Proximal depictions bring a food product spatially closer to a consumer without any change in their bodily position. Thus, such depictions would make the food visually evocative and perceived tastier. These multiple sensory influences can have a taste-enhancing effect for proximal (than distant) food depictions.

H_{1a}: Proximal (vs. distant) food depictions are implicitly associated with higher tastiness.

2.2. Indulgent (vs. Non-Indulgent) Foods: The Role of Exposure and Learning

Though proximal food depictions would evoke greater taste inferences, the judgment of such pictures (particularly, of different food-types) is likely to be driven by a consumer's learning and past experiences. That is, the proximal depiction effect would vary depending on the pictured food, as indulgent and non-indulgent food products hold distinct associations/ meanings in the consumer's mind. These associations develop over-time through self-experience, observation, and repeated co-occurrence of stimuli and their behavioral outcome (e.g., aversion or temptation; Morris, Menon, & Ames, 2001; Scott, 2011). Karpinski and Hilton (2001) argue that stronger

implicit associations occur because of high levels of exposure to and awareness of certain phenomena in a person's environment. Building on their work, we suggest that the association of tastiness with proximal pictures of indulgent (vs. non-indulgent) food would be stronger, as consumers are more exposed to proximally depicted indulgent foods. Food companies (e.g., McDonald's, Kraft Foods, etc.) spend huge marketing budgets on advertising, mostly featuring indulgent foods (Larson et al., 2014; Karnani, McFerran, & Mukhopadhyay, 2016) presented through proximal depictions. Therefore, the association of tastiness gets strengthened every time a consumer encounters a proximal depiction of indulgent food as each exposure would bring to the consumer's mind exemplars of taste-inducing products and advertisement visuals encountered over-time. Contrarily, pictures of non-indulgent foods (e.g., fruit salad, lettuce, broccoli etc.) are associated with lack of taste (Raghunathan et al., 2006), less-fulfillment (Suher et al., 2016), and lightness (Li et al., 2021), and not as frequently featured in advertisements, limiting their association with proximal food depiction. As such, we posit that consumers are more likely to generate exemplars of proximally (than distally) depicted indulgent foods that are intuitively associated with tastiness and reward. These exemplars would strengthen the association between proximal food depictions and tastiness for indulgent (more than non-indulgent) foods.

In addition, spatial proximity adds causal strength to an activated concept or abstract judgment (Argo, Dahl, & Morales 2006; Landau, Meier, & Keefer, 2010; Chae, Li, & Zhu, 2013). Therefore, proximal food depictions are likely to heighten the activated concept of tastiness for indulgent foods (i.e., strengthen the "*unhealthy is tasty*" association). Contrarily, non-indulgent food products, due to their lack of strong association with proximal food depictions and tastiness, might not be perceived as tastier when they are proximally depicted.

Therefore, we propose that the proximal depiction of indulgent (vs. non-indulgent) foods would evince higher perceived tastiness. Prior research has shown that higher perceived tastiness can increase expected enjoyment (e.g., Alba & Williams, 2013) and likelihood of purchasing a food product and recommending it to others (Moore, 2014). Therefore, we expect that higher perceived tastiness from proximal (vs. distant) depiction would increase purchase and recommendation likelihood more for indulgent (than non-indulgent) foods.

H_{1b}: Consumers hold a stronger association of proximal food depictions with tastiness for indulgent (vs. non-indulgent) foods.

H₂: Proximal (vs. distant) depiction of indulgent (vs. non-indulgent) foods leads to higher perceived tastiness.

H₃ (Moderated Mediation): The positive effect of proximal (vs. distant) depiction on purchase and recommendation intentions will be mediated by perceived tastiness for indulgent (vs. non-indulgent) food.

Through H₁ – H₃, we argue that the effect of proximal food depictions will be significantly higher for indulgent (vs. non-indulgent) foods. We next draw upon the satiation literature to develop our conceptualization of multiple (vs. single) proximal depictions – specifically focusing on indulgent foods.

2.3. Multiple Proximal Depictions and Satiation

Although the proximal depiction of indulgent foods might evince higher consumer responses upon a single exposure, we suggest that multiple exposures to proximal (versus distant) depictions may result in satiation. Prior research has defined satiation as a decline in sensory enjoyment of a pleasurable product due to repeated consumption (Redden & Haws, 2012; Larson et al., 2014). The effect of satiation is experienced upon exposure to external food cues (e.g.,

labels, food color, shape, etc.) that make the composition and quantity of the product salient (Cornil, 2017). Satiating may be driven by a consumer's awareness and perception of their own bodily (or physiological) states, lay beliefs and associations, contextual factors, and individual differences. For example, people may experience slower satiation when the food is portrayed as non-indulgent due to the "healthy is less filling" association (Suher et al., 2016) when attention is hindered by distractions (e.g., watching television while eating; Higgs & Woodward, 2009), and meal consumption is difficult to track (e.g., due to amnesia; Rozin et al., 1998). We contribute to this literature by investigating an important, hitherto unexplored pictorial format that can affect the rate of satiation i.e., proximal (vs. distant) depiction of indulgent foods.

Larson and colleagues (2014) found that repeatedly evaluating food pictures that shared a taste-characteristic (e.g., sweet, or salty) led to a drop in the enjoyment of a subsequently presented product. In general, consumers are likely to experience higher satiation for the sensory characteristics of products (e.g., taste). Inman (2001) showed that consumers experienced a substantial decline in pleasantness for the taste attribute (vs. brand or category) of food products consumed. This decline, then, led to more satiation on the tastiness inferences. Our research suggests that multiple exposures to pictures of indulgent food would lead to a higher decline in perceived tastiness and expected enjoyment, depending on the proximity of the product picture. That is, whereas exposure to a single proximal (vs. distant) depiction of indulgent food may increase the perceived tastiness, multiple proximal (vs. distant) exposures will lead to a greater decline in perceived tastiness.

H4: Multiple-proximal (vs. multiple-distant) depictions of indulgent food products will lead to higher satiation through lower perceived tastiness.

We next investigate these predictions across five studies. In study 1, we explore our hypothesis that people implicitly associate proximal food depictions with tastiness (H_{1a}) and that their association is stronger for indulgent (vs. non-indulgent) products (H_{1b}). In study 2, we test the proximal depiction effect on perceived tastiness for several indulgent (vs. non-indulgent) foods using a within-subjects experimental design (H_2). Studies 3 and 4 examine the conditional indirect effect of proximal food depictions on purchase and recommendation intentions through perceived tastiness (H_3). Finally, in study 5, we investigate the effect of multiple-proximal (vs. multiple-distant) indulgent food depictions on the rate of satiation (H_4). The conceptual framework for the research is presented in Figure 1.

----- INSERT FIGURE 1 HERE -----

3. Study 1: *Proximal Food Depictions are Associated with Tastiness*

In this study, we explore whether the proximal depiction of food products within an advertisement leads to a stronger implicit association of tastiness for indulgent (vs. non-indulgent) product pictures (H_{1a} & $1b$) through two Implicit Association Tests (IAT¹; Greenwald, McGhee, and Schwarz, 1998).

¹ IAT is a computer-based procedure that is used to examine the automaticity of associations between target categories and attributes. The standard IAT protocol uses two binary categorization tasks to infer the response time difference between congruent (i.e., category items match the attributes) and incongruent (i.e., mismatch of category items and attributes) associations. The results of IAT are shown by the D -effect, which indicates the difference in response times for the congruent and the incongruent associations divided by the pooled standard deviation for the pair of blocks.

3.1. Sample, Design, and Procedure

Participants were recruited from Spain ($N = 159$ students; $M_{age} = 20$; 44.93% female) and the United States ($N = 144$ participants from Prolific Academic; $M_{age} = 38.42$; 44.1% female). The participants were randomly assigned to either the indulgent or the non-indulgent IAT. Like recent work in consumer psychology (Ye et al., 2020; Hagen, 2021), we utilized the IATGen software (Carpenter et al., 2019) to administer the IAT. Six participants were dropped from the student sample and one participant from the Prolific Academic sample, as they were either extremely slow (i.e., speed of response $> 10,000$ ms.; making response cognitive rather than intuitive) or excessively fast (i.e., participants having $> 10\%$ of responses < 300 ms.; avoiding “button mashing”; Carpenter et al., 2019). The drop rate of 3.77% (student sample) and 0.7% (Prolific sample) is much lower than that reported in previous studies (11-18% on MTurk samples; Carpenter et al., 2019). According to the IAT protocol, participants categorized the stimuli, appearing in the middle of the screen, to either a binary pair on the top-left or top-right. The binary pairs had combinations of the following stimuli: (1) proximal food depiction; (2) distant food depiction; (3) words related to more tastiness (e.g., delicious, flavorful, etc.); and (4) words related to less tastiness (e.g., flavorless, unappetizing, etc.; adapted from Raghunathan et al., 2006; Suher et al., 2016; refer Appendix for the example stimuli).

The IAT counterbalanced the starting position for the congruent [i.e., pairing of proximal (vs. distant) depictions with tastiness (vs. lack of taste)] and incongruent blocks [i.e., pairing of distant (vs. proximal) depictions with tastiness (vs. lack of taste)]. The indulgent and non-indulgent stimuli were chosen based on pre-tests and prior research (e.g., Raghunathan et al., 2006). These food pictures, representing the two IAT categories, differed only on the spatial distance of depiction. We used photo manipulation software to mimic the actual size of the

featured food product – had it been placed proximal (i.e., up-and-close to an observer) or distant (about one foot away from an observer) on a flat surface. In doing so, we preserved the perceived size that forms the basis of perceptual constancy in everyday life (e.g., Amit, Algom, & Trope, 2009). The IAT included the practice (28 trials) and critical blocks (48 trials) and followed the protocol (Greenwald et al., 1998). Table 1 summarizes the schematic design of the IAT. On each trial, a fixation symbol appeared for 250 ms., followed by either a food picture or word related to tastiness. The stimuli remained on-screen till keypress with an instruction prompt to expedite the response after 250 ms.

----- INSERT TABLE 1 -----

Upon completing the IAT, participants were explicitly asked whether they believed in “*proximal depiction being tastier*”. For the indulgent IAT, the participants elicited their agreement with the statement “how strongly do you associate up-and-close proximal pictures of indulgent foods (e.g., chocolate cake) with tastiness?” anchored on 1 = not at all to 7 = very much. The instructions were altered for the non-indulgent IAT by mentioning non-indulgent foods (e.g., lettuce). Finally, participants reported their gender and age, which were included as control variables for the analysis of explicit beliefs.

3.2. Results

The findings revealed a positive and significant *D*-effect for proximal (vs. distant) depiction of indulgent [$D_{indulgent} > .69$] and non-indulgent foods [$D_{non-indulgent} > .58$; refer Table 2 for the results]. This finding suggests that people implicitly associate proximal food depictions with

tastiness across different type of products (H_{1a}). We then conducted an independent sample *t*-test to determine whether people hold a stronger association for proximal depiction of indulgent (vs. non-indulgent) foods (H_{1b}). The findings revealed that the association for proximal depiction was significantly stronger for indulgent (vs. non-indulgent) food across samples – for Spain [$t_{(151)} = 2.04, p = .04, CI = (.01, .23)$] and the U.S. [$t_{(141)} = 1.99, p = .05, CI = (.001, .23)$]. Next, we conducted an ANCOVA to test whether people explicitly acknowledge the “*proximal food depiction is tastier*” association and the relative strength for indulgent (vs. non-indulgent) food within proximal depiction condition. The results, adjusted for age and gender, showed that the participants expected indulgent proximal depictions to evoke significantly higher tastiness than similar depictions of non-indulgent foods across samples – Spain ($M_{indulgent} = 5.27, M_{non-indulgent} = 4.19; F_{(1,148)} = 10.18, p < .01, partial-\eta^2 = .06$) and the U.S. ($M_{indulgent} = 5.13, M_{non-indulgent} = 4.41; F_{(1,139)} = 6.73, p = .01, partial-\eta^2 = .05; H_{1b}$).

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Study 1 revealed that people implicitly associate proximal food depictions with tastiness and that this association is stronger for indulgent versus non-indulgent foods. As participants are more repeatedly exposed to proximal-indulgent depictions, the implicit association is stronger and more salient in the neural network. In Study 1, we measured participants’ implicit associations and explicit acknowledgment of the “*proximal food depiction is tastier*” association. From Study 2 onwards, we capture perceived tastiness using a well-developed scale for explicit elicitation of tastiness and study its effects on consumer responses.

4. Study 2: Proximal Depiction of Indulgent (vs. Non-Indulgent) Foods

This study validates the effect of proximal depictions on the perceived tastiness of indulgent (vs. non-indulgent) foods (H₂). In addition, the study examines the alternative explanations of whether proximal (vs. distant) depiction leads to an: (a) over-estimation of the portion size and (b) alteration in the participant's bodily position. Prior research shows that people misjudge proximal representations in 2-D pictures – for example, perceiving closely pictured lines as longer (Samuel et al., 2021). Furthermore, misrepresentation of size is likely to be higher for indulgent food as these products evoke an attitude ambivalence due to the co-existence of desire and health-threat (Cornil, Ordabayeva, Kaiser, Weber, & Chandon, 2014). Such attitude ambivalence may in turn increase an individual's visual sensitivity to increasing portion sizes. Therefore, we examine the possibility that proximal (vs. distant) depictions lead to an inaccurate portion-size perception of the featured food. Prior research also suggests that pictures of indulgent products may elicit an approach behavior and, thus, spontaneously increase food craving (Kemps, Tiggemann, Martin, & Elliott, 2013). Hence, in Study 2, we test whether people change their bodily position (i.e., approach or lean forward) upon observing a proximal indulgent food picture.

4.1. Sample, Design, and Procedure

One hundred and eighty-nine MTurk participants (60.3% female; $M_{age} = 49.4$) completed this study. We tested the proposed effects using a 2x2x5 mixed design, with the distance of depiction (proximal vs. distant) and product-type (indulgent vs. non-indulgent) as between-subject factors and stimuli (five food pictures; same as IAT study) as the within-subjects factor. The food pictures differed only on the spatial distance of depiction (refer to Appendix). We used photo

manipulation software to mimic the actual size of the featured food product – had it been placed proximal (i.e., up-and-close to an observer) or distant (about one foot away from an observer) on a flat surface. In doing so, we preserved the perceived size that forms the basis of perceptual constancy in everyday life (e.g., Amit, Algom, & Trope, 2009). The participants read a scenario of a hypothetical café introducing new food products to its menu. Subsequently, each participant saw five randomly presented food pictures depending on their assigned between-subjects condition. After viewing each picture, participants were asked about their perceived tastiness (2 items; “how do you think the food product tastes?” and “I would describe this food item as: not at all tasty --- very tasty”; Irmak, Vallen, & Robinson, 2011) anchored from 1 (very bad/not at all) to 7 (very good/very much) to measure the participants’ explicit taste perceptions.

Then, the participants reported perceived portion-size (“how small or big do you think is the portion-size of the burger depicted in this picture?”) anchored at 1 (small portion-size) to 7 (big portion-size) and bodily distance (“when seeing this picture, how close or far are you from the computer screen relative to your normal position?”) rated from 1 (closer than normal) to 7 (farther than normal; Thomas & Tsai, 2011). Lastly, participants responded to several control variables. First, they responded to the 10-item restrained eating sub-scale of the Dutch Eating Behavior Questionnaire (DEBQ; Van Strien, Frijters, Bergers, & Defares, 1986). The items included questions such as “when you have put on weight, do you eat less than you usually do?” and “how often do you try not to eat between meals because you are watching your weight?” anchored from 1 (never) to 5 (very often). We controlled for this individual difference as restrained (vs. unrestrained) eaters hold higher visual sensitivity for indulgent food cues (Cornil et al., 2014). Second, participants reported the hours since the last eating (“how many hours ago did you last eat something?”; Krishna et al, 2014), as a proxy for the hunger level. Third, we

asked participants about their dietary restrictions (“do you have any dietary restrictions?”; coded on a binary scale: (0) No, (1) Yes - with options such as diabetic, gluten-free, kosher, lactose intolerance, vegetarian, etc.). Fourth, participants shared their time of day by answering “what is the time in your city right now?” We considered the participants’ time of day because it may influence food acceptability and behavioral outcomes (Birch, Billman, & Richards, 1984). Lastly, they reported their demographic details. We controlled for the influence of age across all experiments as visuospatial perception has been shown to vary by age, with younger children more likely to misrepresent proximally depicted stimuli than adults (Shallo & Rock, 1988).

4.2. Results

We conducted a repeated measures ANCOVA with spatial distance of depictions and product-type as the between-subject factors and perceived tastiness of five different stimuli as a within-subjects factor including all covariates (i.e., restrained eating, dietary restrictions, hours since last eating, time of day, age, and gender). The between-subjects analysis revealed a significant main effect of product-type ($F_{(1,179)} = 58.70, p < .01, \text{partial-}\eta^2 = .05$) but not spatial distance ($F_{(1,179)} = .20, p = .66, \text{partial-}\eta^2 < .01$). Importantly, a significant spatial distance \times product-type interaction emerged ($F_{(1,179)} = 5.08, p = .03, \text{partial-}\eta^2 = .03$). Paired comparisons, across the five-tested stimuli, showed that proximal depiction led to an increase in perceived tastiness for indulgent foods ($M_{\text{Indulgent-proximal}} = 5.78$ vs. $M_{\text{Indulgent-distant}} = 5.41$) but not for non-indulgent foods ($M_{\text{Non-indulgent-proximal}} = 4.43$ vs. $M_{\text{Non-indulgent-distant}} = 4.67$; figure 2). The interaction effect remained significant after excluding the covariates ($F_{(1,185)} = 6.62, p = .01, \text{partial-}\eta^2 = .04$; $M_{\text{Indulgent-proximal}} = 5.82$ vs. $M_{\text{Indulgent-distant}} = 5.38$ and $M_{\text{Non-indulgent-proximal}} = 4.42$ vs. $M_{\text{Non-indulgent-distant}} = 4.69$). Among the covariates, restrained eating ($p = .02$) and dietary restrictions ($p < .01$)

were significant. This was expected as restrained eaters have been shown to evince greater preference and taste perception for high-fat foods (Roefs & Jansen, 2002). However, these covariates did not interact with factors to influence perceived tastiness across stimuli (p 's > .50).

Follow-up analysis, by product-type, showed that proximal (vs. distant) depiction of indulgent foods ($F_{(1,87)} = 5.00, p = .03, partial-\eta^2 = .05$) led to a significant increase in perceived tastiness across stimuli. However, the effect of proximal depiction was not significant for non-indulgent foods ($F_{(1,86)} = 1.85, p = .18, partial-\eta^2 = .02$). This analysis also suggested stimuli-level differences as the interaction of between-subject factors (i.e., spatial distance x product-type) and within-subjects factor (stimuli pictures) was not significant ($F_{(1,179)} = 0.08, p = .78$). We expected the stimulus-level differences in perceived tastiness to be driven by participants' prior experiences of being exposed to similar product visuals. Overall, this analysis suggests that, across multiple stimuli, the average effect of proximal depictions is specific to indulgent (but not non-indulgent) foods.

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4.3. Alternate Explanations

A repeated measures ANCOVA with portion-size perception of stimuli pictures as a within-subject factor revealed a non-significant main effect of spatial distance ($p = .91$), product-type ($p = .34$) and their interaction ($p = .36$) suggesting that participants did not perceive a significant difference in portion-size for the proximal (vs. distant) depiction.

However, a repeated-measures ANCOVA with bodily distance as a within-subjects factor revealed a significant effect of spatial distance ($p < .01$), non-significant effect of product-type (p

= .12) and non-significant interaction effect ($p = .93$). Paired contrasts found that the proximal depiction led to perceived change in the bodily-position for both indulgent ($M_{Indulgent-proximal} = 3.71$ vs. $M_{Indulgent-distant} = 4.22$) and non-indulgent foods ($M_{Non-indulgent-proximal} = 3.46$ vs. $M_{Non-indulgent-distant} = 4.00$). Prior research alludes to an approach bias towards highly desired (alternately, indulgent) foods (Kemps et al., 2013). Contrarily, our analysis found that the proximal depictions led to a bodily approach across the product types. Hence, we controlled for this variable in a follow-up study.

4.4. Discussion

In Study 2, we provided evidence that proximal (vs. distant) depictions of indulgent (vs. non-indulgent) food products lead to higher perceived tastiness. Study 3 replicates these findings and demonstrates that the proximal depiction of indulgent (vs. non-indulgent) food evinces higher purchase intention through the sensory mechanism of perceived tastiness.

5. Study 3: Indulgent vs. Non-Indulgent Food Depictions – Advertising Context

In study 3, we investigate whether the proximity of depiction has a higher positive influence on perceived tastiness and consequently purchase intention for indulgent foods (vs. non-indulgent) foods (H_3). We test the conditional indirect effect of proximal depictions in an advertisement using different stimuli and background contexts. Whereas the previous studies depicted the food product on a flat table (either placed proximal or distant), the stimuli in the current study created a perception of depth without any background details (refer to Appendix for the stimuli).

5.1. Sample, Design, and Procedure

In this study, participants ($N = 182$ MTurk respondents, 56.60% females, $M_{age} = 38.73$) read that DoEat, a cafeteria, is planning to introduce appetizing food products in the U.S. and that its management team wants to understand how consumers perceive its advertisement visuals. Participants were randomly assigned to four conditions in a 2 (spatial distance: proximal vs. distal) x 2 (product-type: indulgent vs. non-indulgent) between-subjects design. Immediately after viewing the advertisement picture, participants indicated their purchase intention, perceived tastiness, perceived spatial distance (manipulation check), and control variables (i.e., restrained eating, dietary restrictions, hours since last eating, time of day, age, and gender). We measured the participant's purchase intention by asking the question: "how likely would you be to purchase this food product?" (adapted from Elder et al., 2012) on a scale ranging from 1 (not at all) to 7 (very much). Perceived tastiness (2-item; $\alpha = .88$; $r = .93$; Irmak et al., 2011) and the control variables were measured using the same scales as the study 2. To confirm our manipulation of spatial distance and product-type (i.e., perceived healthiness), participants were asked to indicate "how spatially close or far do you think the food product is to you?" on a 7-point scale ranging from 1 (very close spatially) to 7 (very far spatially) and "how healthy do you consider the food product?" rated from 1 (not at all healthy) to 7 (very healthy).

5.2. Results

The ANCOVA results, adjusted for the covariates, confirmed our manipulation of spatial distance of depiction ($M_{proximal} = 3.44$, $M_{distant} = 4.33$, $p < .01$) and product-healthiness ($M_{non-indulgent} = 6.62$ vs. $M_{indulgent} = 2.53$; $p < .01$) manipulations. Next, we conducted a 2x2 ANCOVA

on purchase intention controlling for the covariates. The results revealed a significant main effect of proximity ($F_{(1,173)} = 5.85, p = .02, \text{partial-}\eta^2 = .03$) and product-type ($F_{(1,173)} = 6.49, p = .01, \text{partial-}\eta^2 = .04$) but a non-significant interaction effect ($F_{(1,173)} = 2.27, p = .13, \text{partial-}\eta^2 = .01$). Based on our conceptualization (H₂ - H₃) and the findings of Study 2, we expected to observe the effect of proximal versus distant depictions on consumer responses, specifically within the indulgent food condition. Therefore, we conducted planned contrasts, which revealed that participants expressed marginally higher purchase intention when they viewed a proximal (vs. distant) depiction of indulgent food ($M_{\text{proximal}} = 5.16$ vs. $M_{\text{distant}} = 4.24; p = .06$) but not non-indulgent food ($M_{\text{proximal}} = 5.47$ vs. $M_{\text{distant}} = 5.21; p > 0.50$). We obtained similar results without the model covariates – with a significant main effect of proximity ($p = .02$) and product-type ($p < .01$) but a non-significant interaction ($p = .17$).

Subsequently, another ANCOVA test on perceived tastiness yielded a significant main effect of product-type ($F_{(1,173)} = 19.44, p < .01, \text{partial-}\eta^2 = .10$), non-significant effect of proximity ($F_{(1,173)} = 1.68, p = .20, \text{partial-}\eta^2 = .01$) and a significant interaction of spatial distance and product-type ($F_{(1,173)} = 5.52, p = .02, \text{partial-}\eta^2 = .03$). Only hours since last eating had a marginally significant effect ($p = .08$) but its two-way and three-way interaction with the factors was not significant ($p > .15$). Planned contrasts showed a marginally significant difference in perceived tastiness for indulgent ($M_{\text{proximal}} = 5.77$ vs. $M_{\text{distant}} = 5.24, p = .06$) but not for non-indulgent depictions ($M_{\text{proximal}} = 6.18$ vs. $M_{\text{distant}} = 6.32, p = .42$). The interaction effect remained significant without the covariates ($p = .04$). This analysis replicated our findings of Study 2 on the effect of proximal depictions on perceived tastiness for indulgent (vs. non-indulgent) foods (H₂) with different stimulus, background context, and sample. Taken together,

these results indicated that the influence of spatial distance of depictions was significantly higher for indulgent (not non-indulgent) food products.

5.3. Moderated Mediation Analysis

We next conducted a moderated-mediation analysis (Model 7; Hayes, 2013), with 5,000 bootstrapped samples using spatial distance as the predictor variable (-1 = proximal, 1 = distal), product-type as moderator (-1 = non-indulgent, 1 = indulgent), perceived tastiness as mediator, and purchase intention as the dependent variable. The results showed that the effect of spatial distance on perceived tastiness was significantly moderated by the product-type ($\beta = -.19$, $SE = .08$, $t(173) = -2.35$, $p = .02$) with significant effect for indulgent food depictions varying on spatial distance ($\beta = -.30$, $SE = .12$, $95\% CIs = -.54$ to $-.65$) but not for non-indulgent food depictions ($\beta = .09$, $SE = .11$, $95\% CIs = -.14$ to $.31$). Furthermore, controlling for spatial distance, the perceived tastiness of the depicted food product significantly influenced the purchase intention ($\beta = 1.02$, $SE = .08$, $t(174) = 13.36$, $p < .01$). Lastly, after including the mediator, the effect of spatial distance on the desire to eat was not significant ($\beta = -.11$, $SE = .08$, $t(173) = -1.29$, $p = .19$). The index of moderated mediation was $-.40$ ($SE = .18$ and $95\% CIs = -.74$ to $-.05$; figure 3). These results supported our conjecture that the food product type moderates the effect of proximal depictions on perceived tastiness and, thus, the consumer responses (H_3).

----- INSERT FIGURE 3 -----

5.4. Discussion

Study 3 revealed that exposure to proximal depiction of an indulgent (vs. non-indulgent) food in an advertisement affects purchase intentions through perceived tastiness. Stated simply, we

show that the proximal depiction effect is specific to indulgent foods. The study enabled us to generalize our findings to different food products and background contexts. In Study 4, we replicate the effect within another managerially relevant context i.e., online food ordering.

6. Study 4: Indulgent vs. Non-Indulgent Food Depictions – Online Ordering Context

This study investigates our prediction that proximity of depiction elicits higher perceived tastiness and consequently consumer responses to indulgent foods (vs. non-indulgent) foods (H₃). We also demonstrate that the effect holds irrespective of whether the consumers make food-related decisions for themselves or others. Unlike the previous studies, in which participants shared their own consumption decisions, in Study 4, we asked participants to make food ordering decisions for someone else. This indirect approach is aimed at alleviating potential self-presentation concerns for indulgent food decisions (Liu & Baskin, 2021). Prior research has shown that consumers tend to actively self-regulate/ manage their food-related decisions - choosing more healthy food options for themselves (than for others; Laran, 2010). Furthermore, Study 4 uses different food stimuli (especially, cooked non-indulgent food) to address the potential concern that uncooked food (e.g., salad; used in Study 2 and 3) is less desirable than cooked options. Lastly, we control for additional influences i.e., participants' bodily distance from the screen, body-mass index (calculated from self-reported weight and height), and visual crowding. BMI was included as a control variable because it represents one of the most used indicators of obesity and over-consumption (Kernani, McFerran, & Mukhopadhyay, 2016). The inclusion of bodily distance from screen was based on our findings in Study 2. In addition, we consider the potential influence of visual crowding i.e., difficulty to distinguish an object from its background due to visual clutter (Harrison & Bex, 2017). It is plausible that perceived tastiness

for distant (vs. proximal) food depiction was lower because the participants failed to perceptually identify the stimulus within the wider visual field of distant food depictions and consequently found such pictures harder to process.

6.1. Sample, Design, and Procedure

In the study, participants ($N = 200$ U.S. respondents from the Prolific Academic platform, 48.0% females, $M_{age} = 36.99$) were randomly assigned to four conditions in a 2 (spatial distance: proximal vs. distal) x 2 (product-type: indulgent vs. non-indulgent) between-subjects design. The participants were asked to imagine the scenario about Taylor [pre-tested as gender-neutral name; $N = 101$ U.S. participants from Prolific Academic platform; $t_{(100)} = -1.08$, $p = .29$, $M = 3.84$; rated from 1 = very feminine to 7 = very masculine] surfing online for ordering food at home and coming across the website of a new cafeteria chain ‘My Café’ in the neighborhood. Then, the participants viewed the picture of a burger (indulgent) or cooked quinoa bowl (non-indulgent food), depicted either proximally or distally with a caption at the bottom “home delivery available”. Upon viewing the picture, participants were asked to consider the online purchase intention: “how likely would Taylor order the burger after seeing this advertisement?” anchored by not at all order (1) and definitely order (7) and recommendation likelihood: “how likely would Taylor recommend it to family and friends?”, rated from not at all recommend (1) to very much recommend (7). Then, the participants indicated their perceived tastiness ($\alpha = .96$; $r = .89$; Poor, Duhachek, & Krishnan, 2013) on 3 attributes: flavor, deliciousness, and overall taste (1 = flavorless/ not at all delicious/ bad taste and 7 = flavorful/ very delicious/ good taste) and responded to the manipulation checks. Specifically, participants shared their perception of healthiness [“how healthy is the burger/ quinoa bowl depicted on the ordering website?” rated

from very healthy (1) very unhealthy (7)], perceived spatial distance [“how spatially close or far do you think the food product is to you?” ranging from very close spatially (1) to very far spatially (7)], and bodily distance from screen (same measure as study 2).

Subsequently, we asked the participants about their dietary habits using a 10-item revised restrained scale (Herman et al., 1978). The scale included items such as “how often are you dieting?” rated from never (0) to always (4); “do you eat sensibly in front of others and splurge alone?” rated from never (0) to always (3). We averaged the scale items ($\alpha = .77$; $r = .58$). We also included control variables including the participant’s perception of the picture’s visual crowding, dietary restrictions, hours since last eating, gender, age, weight (pounds), height (feet and inches), and time of day. Visual crowding ($\alpha = .78$; $r = .65$; adapted from Cian, Krishna, & Elder, 2014) was measured on a 2-item scale “how would you rate the depiction of this visual?” - visually crowded/ visually complex rated from not at all (1) to very much (7). Furthermore, self-reported weight and height were used to calculate each participant’s body-mass index (BMI). Finally, this study included two attention check questions. None of the participants failed these checks and, thus, no participant was excluded.

6.2. Results

The results of ANCOVA, controlling for the covariates, confirmed our manipulation of spatial distance ($M_{proximal} = 2.65$, $M_{distant} = 4.21$, $p < .01$) and food-type ($M_{burger/indulgent} = 4.71$, $M_{quinoa/non-indulgent} = 3.48$, $p < .01$). We then conducted a 2x2 ANCOVA on online purchase intention with spatial distance (proximal vs. distant) and product-type (indulgent/ burger vs. non-indulgent/ quinoa) as between-subject factors and including all covariates. The results showed a significant effect of spatial distance ($F_{(1,187)} = 15.16$, $p < .01$, $partial-\eta^2 = .08$), product-type

($F_{(1,187)} = 32.30, p < .01, \text{partial-}\eta^2 = .15$) and spatial distance x product-type interaction ($F_{(1,187)} = 25.45, p < .01, \text{partial-}\eta^2 = .12$). Gender was a marginally significant covariate ($p = .09$) but its 2-way and 3-way interaction effect with the two factors was not significant (p 's $> .21$) (See Table 3 for the means). Next, we analyzed the effect of proximal (vs. distant) food depictions on recommendation likelihood. The results showed a significant effect of spatial distance ($F_{(1,187)} = 5.29, p = .02, \text{partial-}\eta^2 = .03$), product-type ($F_{(1,187)} = 15.32, p < .01, \text{partial-}\eta^2 = .08$), and the interaction ($F_{(1,187)} = 19.48, p < .01, \text{partial-}\eta^2 = .09$). Among the covariates, only gender had a marginally significant effect ($p = .07$) but did not interact with the factors ($p > .11$).

Lastly, we analyzed the between-subjects effect on perceived tastiness and found a significant effect of spatial distance ($F_{(1,187)} = 16.26, p < .01, \text{partial-}\eta^2 = .08$) and product-type ($F_{(1,187)} = 84.11, p < .01, \text{partial-}\eta^2 = .31$) and a significant interaction effect ($F_{(1,187)} = 30.38, p < .01, \text{partial-}\eta^2 = .14$). None of the control variables were significant (p 's $> .23$). The interaction effect on online purchase intention, recommendation likelihood, and perceived tastiness remained significant without the model covariates (p 's $< .01$). These findings replicated the results of Study 2 and 3 on the effect of proximal depiction of indulgent (vs. non-indulgent) foods on perceived tastiness (H_2) and purchase intentions (H_3).

----- INSERT TABLE 3 -----

6.3. Moderated Mediation Analysis

Like Study 3, we conducted a moderated-mediation analysis (Model 7; Hayes, 2013), with spatial distance as the predictor (-1 = proximal, 1 = distal), product-type as moderator (-1 = non-indulgent, 1 = indulgent), perceived tastiness as mediator, and online purchase intention as the

dependent variable. The interaction effect of spatial distance and food-type on perceived tastiness was significant ($\beta = -.52$, $SE = .09$, $t_{(187)} = -5.51$, $p < .01$) – with a significant effect of proximal depiction for indulgent foods ($\beta = .89$, $SE = .13$, $95\% CIs = .63$ to 1.16) but not for non-indulgent food depictions ($\beta = -.14$, $SE = .13$, $95\% CIs = -.39$ to $.12$). Furthermore, perceived tastiness (mediator) had a significant effect on online purchase intentions after controlling for spatial distance ($\beta = .74$, $SE = .04$, $t_{(188)} = 18.79$, $p < .01$). Lastly, the effect of spatial distance on online purchase intentions became non-significant after including perceived tastiness in the model ($\beta = .10$, $SE = .06$, $t_{(188)} = 1.47$, $p = .14$). The index of moderated mediation was $-.76$ ($SE = .14$ and $95\% CIs = -1.03$ to $-.48$; figure 4). Likewise, the conditional indirect effect of spatial distance on recommendation intention through perceived tastiness significantly differed by the product-type. We found a significant effect only for indulgent food ($\beta = .90$, $SE = .13$, $95\% CIs = .63$ to 1.16) but not for non-indulgent food ($\beta = -.14$, $SE = .13$, $95\% CIs = -.39$ to $.12$). The index of moderated mediation was $-.67$ ($SE = .13$ and $95\% CIs = -.93$ to $-.42$).

----- INSERT FIGURE 4 -----

6.4. Discussion

Study 4 provided replicating evidence for the conditional indirect effect of proximal depictions of indulgent (vs. non-indulgent) foods on consumer responses through the sensory mechanism of perceived tastiness (H_3). This study enabled us to generalize our findings to another managerially relevant context of online food ordering. We repetitively demonstrate that the effect of proximity of depiction is specific to indulgent food, and not for non-indulgent food.

Hence, in Study 5, we focus on indulgent food depictions to decipher the effect of multiple (vs. single) depictions of similar indulgent foods on another consumer response i.e., satiation.

7. Study 5: Multiple Indulgent Food Depictions and Satiation

This study extends our prior findings to whether people might experience a difference in their satiation levels when they are exposed to multiple proximal (vs. distant) depictions of similar indulgent food (e.g., variety of different burgers, sharing a taste attribute/ characteristic, featured on an online menu of McDonald's). We examine this effect because advertising and display formats tend to widely differ in the number of exposures, they allow to food pictures. Accordingly, in study 5, we consider the effect of exposure to both single and multiple proximal depictions of indulgent foods. Like study 3, the experimental stimuli depicted the food product, either proximally or distally, by creating a perception of depth and distance. Lastly, Study 5 considers the influence of mood as an additional control variable.

7.1. Sample, Design, and Procedure

MTurk participants ($N = 146$; 52.05% female, $M_{age} = 37.74$) were assigned to the spatial distance condition in a between-subjects design. On the opening screen, participants were informed that they would view 20 different food advertisement pictures (each for 3 seconds). The first and last picture (hereinafter, target stimulus) was not timed and kept identical. In between the target stimulus (i.e., pictures shown on 1st and 20th exposure), the participants viewed 18 different products (hereinafter, referred to as “non-target stimuli”) – comprising a variety of hamburgers and chicken burgers (refer to Appendix for stimuli). Before viewing each of the non-target stimuli, across conditions, participants read the instruction: “*imagine picking up*

the burger, putting it in your mouth, chewing, and swallowing it". The uniform instruction of mental simulation aimed at consciously (rather than spontaneously) re-enacting the eating experience. Prior research suggested that simulation of food consumption and, consequently, satiation may be elicited through either an explicit instruction (a cognitive mechanism) or an automatic, affect-driven, process (e.g., Larson et al., 2014). In this study, we manipulate mental simulation through explicit instruction uniformly across the two conditions.

Based on prior research, we contended that all participants would evince satiation upon exposure to stimuli sharing a taste characteristic (e.g., Larson et al., 2014). However, the rate of satiation (or decline in expected enjoyment over several exposures) and decline in perceived tastiness will be significantly higher when people observe multiple-proximal (vs. multiple-distant) indulgent food. This is because multiple-proximal depictions when shown with an instruction to simulate eating, may increase the perceived tastiness of the indulgent food and thus, increase the rate of satiation.

To test the hypothesized effects, we measured the key dependent variable (i.e., expected enjoyment) and mediator (perceived tastiness) twice – at the 1st exposure and 20th exposure. The participants shared their expected enjoyment by responding to “how much would you enjoy eating each bite of this food product?” ranging from 1 (not at all enjoy) to 7 (very much enjoy) and “how much would you like to eat this food product?” rated from 1 (not eat at all) to 7 (eat all of it; Redden et al., 2012; $\alpha = .97$, $r = .95$). We used the measures, as previous studies, for perceived tastiness and the control variables (i.e., age, gender, BMI, hours since last eating, time of day, dietary restrictions, individual difference in dietary restraint, and bodily distance from the screen). In addition, we controlled for the participants’ mood because spatial distance and product size have been shown to evince emotional responses depending on the stimulus’ valence

(e.g., De Cesarei & Codispoti, 2006). The mood was measured using a four-item scale “at the moment, I am feeling...good, positive, pleasant, and likable ($\alpha = .79$; adapted from Allen & Janiszewski, 1989) with ratings from 1 (slightly) to 7 (extremely).

7.2. Results

7.2.1. Single Exposure to Proximal (vs. Distant) Indulgent Food Depictions

We conducted two separate ANCOVAs on expected enjoyment and perceived tastiness, elicited upon the first exposure to target stimulus to test whether we replicate our previous results. The analyses revealed that proximal depictions led to a higher expected enjoyment ($M_{proximal} = 4.94$ vs. $M_{distant} = 4.26$; $F_{(1,136)} = 5.28$, $p = .02$, $partial-\eta^2 = .04$), and perceived tastiness ($M_{proximal} = 5.27$ vs. $M_{distant} = 4.51$; $F_{(1,136)} = 8.50$, $p < .01$, $partial-\eta^2 = .06$). The analyses remained significant without the covariates (all p 's $< .06$). Thus, we replicated the results on the effect of single exposure to proximal (vs. distant) depiction of indulgent foods.

7.2.2. Mediation of Perceived Tastiness upon Single Exposure

We subsequently conducted a mediation analysis using the PROCESS Model 4 (Hayes, 2013) with spatial distance (-1 = proximal and 1 = distant) as the predictor variable, perceived tastiness as mediator, and expected enjoyment as outcome variable. As expected, we found that an increase in spatial distance reduced the expected enjoyment of eating ($\beta = -.33$, $SE = .15$, $t(136) = -2.24$, $p = .03$). Furthermore, the effect of perceived tastiness on expected enjoyment was significant after controlling for the influence of spatial distance ($\beta = .96$, $SE = .04$, $t(135) = 22.32$, $p < .01$). Lastly, we found that the effect of spatial distance on expected enjoyment became non-significant after tastiness perception was included in the model ($\beta = .03$, $SE = .08$,

$t(135) = .33, p = .74$). The 95% confidence interval for the indirect effect did not include zero (95% $CI = [-.60, -.12], SE = .12$; *Sobel Z* = -2.92, $p < .01$). These findings show that proximal depiction of indulgent foods affect consumer responses for a featured food through the mechanism of perceived tastiness.

7.2.3. Multiple Exposures to Proximal (vs. Distant) Indulgent Food Depictions

Next, we conducted a repeated-measures ANCOVA with spatial distance as a between-subjects factor and decline in expected enjoyment (i.e., satiation) as a within-subjects factor with all covariates. This analysis revealed that participants who viewed multiple-proximal depictions experienced a significantly higher satiation ($M_{1st\ exposure} = 4.94$ vs. $M_{20th\ exposure} = 4.01$; $M_{20th - 1st\ exposure} = -.93$; $SE = .20$) compared to those viewing multiple-distant depictions ($M_{1st\ exposure} = 4.26$ vs. $M_{20th\ exposure} = 3.90$; $M_{20th - 1st\ exposure} = -.36$; $SE = .20$). The within-subjects effect of multiple-depictions on expected enjoyment was significant ($F_{(1,136)} = 6.90, p = .01, partial-\eta^2 = .05$). Among the covariates, the effect of time-of-day and its interaction with expected enjoyment were significant ($p < .01$). This is consistent with prior research that time-of-day influences food-acceptability and, thus, satiation (Birch et al., 1984).

Finally, the repeated-measures ANCOVA with perceived tastiness as a within-subjects factor also yielded a significant effect ($F_{(1,137)} = 16.26, p < .01, partial-\eta^2 = .11$). This analysis suggested that multiple-proximal depictions led to a more significant decline in perceived tastiness ($M_{1st\ exposure} = 5.27$ vs. $M_{20th\ exposure} = 4.27$; $M_{20th - 1st\ exposure} = -1.00$; $SE = .19$) than distant depictions ($M_{1st\ exposure} = 4.51$ vs. $M_{20th\ exposure} = 4.28$; $M_{20th - 1st\ exposure} = -.23$; $SE = .18$).

7.2.4. Mediation of Perceived Tastiness upon Multiple Exposures

This mediation analysis considered spatial distance as the predictor, decline in expected enjoyment ($M_{20th\ exposure} - M_{1st\ exposure}$) as the outcome variable, and decline in perceived tastiness ($M_{20th\ exposure} - M_{1st\ exposure}$) as the mediator. Using Model 4 of PROCESS Macro (Hayes, 2013), we found that: (a) multiple-proximal (coded: -1) depictions led to a higher decline in perceived tastiness than multiple-distant depictions ($\beta = .38, SE = .10, t = 3.69, p < .01$), (b) decline in perceived tastiness for multiple-proximal (vs. distant) depictions led to decline in expected enjoyment ($\beta = .86, SE = .05, t = 16.04, p < .01$) and (c) effect of multiple-proximal (vs. distant) depictions on expected enjoyment became non-significant after considering the mediation of perceived tastiness ($\beta = -.05, SE = .07, t = -.68, p = .50$). Lastly, confirming full mediation, the indirect effect through perceived tastiness was significant (Sobel $Z = 3.58, p < .01, SE = .09$; 95% $CI: [0.16, 0.51]$; figure 5; H₄).

----- INSERT FIGURE 5 -----

7.3. Discussion

This study replicated our earlier findings and, additionally, showed that multiple exposures to proximal (more than distant) depictions of indulgent foods led to a significant decline in consumer responses (H₄). However, we observed that satiation significantly reduced (but not fully attenuated) the effect of proximal depictions of indulgent food products. Specifically, we found that on 20th exposure, the effect of proximity on expected enjoyment fades away. These findings reinforce the need for investigating the multi-faceted effects of proximal food depictions

as the insights have relevance for both food advertising and over-consumption and obesity phenomenon.

8. General Discussion

In five studies, we demonstrate replicating evidence that proximal (vs. distal) depiction of indulgent (vs. non-indulgent) food evinces more positive consumer responses. The findings imply that marketers can subtly manipulate the distance of an indulgent food product either within an advertisement or an online purchase context to influence consumer responses. Our research reveals that the effect is more pronounced for a single exposure to an indulgent food depiction compared to multiple exposures to similar food pictures (e.g., an online menu showing several up-and-close depictions of burger items). We propose that multiple exposures to proximal food depictions are likely to result in satiation i.e., decline in expected enjoyment for the featured food.

Taken together, these findings have direct implications for marketers as well as for policymakers who administer regulations to counter food over-consumption and obesity. It is estimated that, in 2019, McDonald's spent US\$ 1.62 billion and Yum Brands (comprising Taco Bell, Pizza Hut, and KFC) another US \$1.07 billion on advertising within the United States (Advertising Age Data Center, 2020). Furthermore, the global online food delivery market is estimated to grow in revenue from US\$343.80 billion in 2022 to US\$474.30 billion by 2026 at a CAGR of 8.38% (Statista, 2022). Our research implies that advertisers and online food delivery providers can evoke more positive perceptions of tastiness, purchase intentions, and recommendation likelihood by depicting up-and-close (than distant) pictures, especially for display formats that result in a brief exposure. However, when consumers are repetitively

exposed to the proximal pictures of similar indulgent food products (e.g., several pictures of burgers on menu board), this positive effect of proximal depiction on consumer responses might alleviate. A refined understanding of how proximity in food pictures works, may help marketers to avoid such unintended consequences.

On the flip side, proximal depictions of indulgent food have implications for the phenomena of obesity and over-consumption. In 2016, over 1.9 billion adults were overweight, of which nearly 650 million were obese. Evidence also suggests that the prevalence of overweight individuals globally has risen from 29.1% in 1996 to 33.6% in 2006 to 38.9% in 2016 (WHO, 2017). Karnani et al. (2016) suggest that obesity represents a case of market failure, which could be corrected through multiple mechanisms – among others, government intervention (i.e., stricter regulations) and industry self-regulation (especially, regulating the advertising of indulgent food products). In this context, the findings of our research might be used by food regulators to establish guidelines on the spatial distance of depiction for different food types. Food regulators may instruct advertisers to depict indulgent foods distally and non-indulgent products proximally within an advertisement picture.

From a theoretical standpoint, we contribute to the literature on consumer lay-beliefs as we identify the “*proximal food depiction is tastier*” association that influences their behavioral intentions. We show that consumers hold a stronger association of proximal depiction with tastiness for indulgent (vs. non-indulgent) products and that this learned association is reflected in their food evaluation. Documenting this association contributes to the growing literature on food-related lay beliefs (e.g., Raghunathan et al., 2006; Suher et al., 2016; Ye et al., 2020; Li et al., 2021). Our research also adds to prior research on visuospatial information processing by introducing a new pictorial format (i.e., the spatial distance of product pictures) within the food

consumption context. This research is the first, to our knowledge, to identify the conditions (i.e., stimulus-type and number of exposures) under which proximal depictions affect consumer responses. In studying these effects, we extend the prior research on visual processing of images and their effect on food consumption behavior (e.g., Elder & Krishna, 2012; Poor et al., 2013; Krishna & Elder, 2021). This research provides further evidence that implicit and explicit attitudes are not completely aligned, even when social desirability issues are eliminated, and that our attitudes towards stimuli may be affected by learning through repetitive exposure (Karpinski & Hilton, 2001). Additionally, the present research explores the effect of multiple exposures to proximal (vs. distant) food pictures that share a taste characteristic. We find that satiation levels depend not only on the food product but also on spatial distance within an advertisement visual. This finding contributes to the limited literature on the influence of food advertising on satiation (Cornil, 2017).

Our work opens several paths for future research. First, an interesting avenue for follow-up research could be to explore the effects of the proximal (vs. distant) depiction of indulgent foods using different situational and consummatory contexts. Prior research has shown that depicting food products (e.g., popcorn) in a congruent situational context (e.g., movie hall) can trigger holistic (vs. analytic) thinking and, subsequently, increase the craving and purchase intention. Likewise, consummatory pictures of indulgent foods (i.e., images depicting someone eating) have been shown to elicit higher taste perception than those of food alone (Poor et al., 2013). This is because such images might serve as social proof of indulgent consumption thereby reducing an individual's self-control conflict.

Second, future work could explicate the effect of proximal depictions on sensory expectations other than taste, for example on mouthfeel (i.e., oral touch of food in one's mouth;

Topolinski & Turk-Pereira, 2012). Prior research has examined the effect of active oral touch (e.g., experiencing the hardness of food product) on mastication (i.e., level of chewing), orosensory perception (i.e., felt-fattiness), and downstream behavioral outcomes (Biswas, Szocs, Krishna, & Lehmann, 2014). As a touch, along with taste, requires spatial proximity to be perceived (Elder et al., 2017), it might be worth exploring whether proximal depictions lead to a higher expected mouthfeel, thereby influencing people's calorie estimations and consumption outcomes.

Third, our work focused on examining the effect of spatial proximity (vs. distance) of a featured food product within a picture (either in an advertisement or food ordering website) and not the influence of an individual's distance from the depiction. It is worth noting that the latter, which alludes to the egocentric psychological distance, might either activate an abstract or concrete construal (Trope & Liberman, 2010). In line with prior research (e.g., Chae et al., 2013), we posit that spatial proximity (vs. distance) of object depiction differs from the egocentric psychological distance (i.e., the distance of an object from me, now, and here) and, thus, might not alter the construal level. Although we control for the bodily distance from the screen in Study 3 and 4, the egocentric psychological distance may interact with the non-egocentric distance (i.e., the spatial distance of depiction within advertisement pictures) to affect the consumer responses. This could be a future avenue of research.

Lastly, further research could examine the simultaneous influence of verbal messaging and individual-level differences in consumption. Recent research suggests that whereas consumers with high self-control are likely to experience greater happiness when they can rationalize their indulgence (e.g., you deserve it!), those with low self-control feel more satisfied without such reason-based messaging (Petersen, Dretsch, & Loureiro, 2018). Extending this work, an

intriguing area of work could be to investigate the joint effect of proximal (vs. distant) pictures of indulgent foods, reason-based messaging, and trait individual differences. We conclude this research with an earnest hope that our research empowers consumers to pay more mindful attention to proximal food depictions, sensitizes policymakers on identifying advertising pictures that facilitate over-consumption, and enables practitioners to design their advertisements to not severely undermine their consumers' self-control.

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