**Designed to s(m)ell: When scented advertising induces proximity and enhances appeal**

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**Web Appendix A**

# Pretests

We conducted three pretests to generate the appropriate stimuli. The first pretest aimed to identify product categories that are expected to have a scent. Participants (n = 35) rated six product categories (soap bar, candle, dry tissue, drinking glass, pen, and notebook) in terms of the extent to which they expected this product to be scented, how much a scent is part of the product, the degree to which the scent represents the product’s essence, and how surprised they would be to find the product scented (reverse-coded) on 7-point scales, where 1 = not at all and 7 = very much. These items were averaged into an index of scent presence expectations (all α’s > .60).

Three of the products, the tissue, notebook, and pen, scored low on scent presence expectations (Mtissue = 2.84, SD = 1.27; Mnotebook = 1.90, SD = .97; Mpen = 1.84, SD = .99; Mdrinking glass = 1.61, SD = .97). The soap (M = 5.91, SD = .94) and candle (M = 6.31, SD = 1.24) were the only product categories that scored relatively high and crossed the scale mid-point (*p* < .001 for both paired t-tests of difference from M = 4). We hence chose these two products (soap and candle) to serve as the initial stimuli for our experiments.

The second pretest (n = 25) identified the appropriate pleasant scents. We drew on scents that have been considered in prior studies (e.g., Morrin and Ratneshwar 2003) and tested lavender, vanilla, mint, and rosemary. Each participant was presented with four white strips of paper containing a drop of each of these scents (Lwin et al. 2010). The scented paper strips were placed in Ziploc-type bags and presented to each participant in a random order. Participants were instructed to sniff each paper strip as many times as they liked before rating the scent in terms of pleasantness (very unpleasant/very pleasant, 7-point scale), and perceived fit to a soap and candle (“Would this scent fit the following product categories?”, 1 = not at all and 5 = very well). Participants also rated perceived temperature and arousal of these scents (cold/ warm, more relaxing/ more stimulating, 7-point scales).

As Table 3 in the manuscript shows, all scents were perceived to be at least somewhat pleasant (i.e., all the mean values were directionally above 4.00). The only scent that was perceived as a good fit for candles was vanilla; for soap, along with vanilla, lavender was also perceived as a good fit. We thus chose these two scents as the main scent stimuli. Our conceptualization suggests that scent congruence, which allows for product essence representation, is the key criterion. Other scent characteristics, such as scent temperature (Madzharov et al. 2015), should not matter in the context of our research. Both chosen scents fulfill our conceptual requirements related to scent congruency but they significantly differ with regard to perceived arousal and temperature and even vary in terms of absolute levels of pleasantness (all paired t-tests *p* < .05). Hence, we used these scents across studies to ensure robustness and generalizability of our observed effects across different scent types.

The third pretest (n = 21) was designed to identify an appropriate pair of scents for Study 5. We looked for scents that differ in perceived pleasantness, yet fit a medical tincture for wounds. Each participant was presented with four jars containing a cotton pad with a drop of bergamot, lavender, turpentine or birch tar scent. Participants were instructed to open a jar, to sniff it and rate how pleasant (1 = very unpleasant, 7 = very pleasant), how chemical (1 = not at all, 7 = very much) as well as how congruent the scent was (1 = not at all, 7 = very much) with a medical tincture for wounds. Participants followed the same procedure for each scent presented in a random order. Of these scents only lavender (M= 4.19, SD = 1.66) and turpentine (M= 4.19, SD = 2.21) crossed the scale’s mid-point (of 4.00) for congruence (Mbergamot = 2.76, SD = 1.67, Mbirch\_tar = 3.71, SD = 2.41). Both scents did not differ in perceived congruence with a medical tincture (*p* = 1.00), yet they differed in rated scent pleasantness. Lavender scent was perceived as significantly more pleasant (Mlavender = 4.48, SD = 1.25, Mturpentine= 2.71, SD = 1.31; paired t(20) = 4.20, *p* < .001) and less chemical (Mlavender = 3.95, SD = 1.40, Mturpentine = 5.76, SD = 1.34,; paired t(20) = 4.28, *p* < .001) than turpentine. Therefore, lavender and turpentine were picked as scent stimuli for Study 5

**Web Appendix B**

*STUDY RESULTS WITH THE FULL SAMPLE*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Study 1a** | | | | | |
|  | Product with expected scent: Candle | | | Product with unexpected scent: Glass | |
| Scented ad | Control | | Scented ad | Control |
| Proximity | 4.61 (1.62) a | 3.41 (1.34) b | | 4.26 (1.73) a | 4.02 (1.63) a |
| Appeal | 4.29 (1.96) a | 3.28 (1.57) b | | 3.59 (1.40) a | 3.88 (1.67) a |
| Preference | 59.32 (41.07) a | 48.38 (37.92) a | | 35.02 (33.25) a | 35.30 (34.54) a |
| Imagery vividness | 3.99 (1.68) a | 4.24 (1.32) a | | 3.44 (1.40) a | 3.38 (1.55) a |
| Imagery elaboration | 43.70 (29.21) a | 35.98 (24.80) a | | 44.90 (25.97) a | 44.51 (25.38) a |
| Affect | 2.82 (1.28) a | 3.13 (1.15) a | | 3.18 (1.39) a | 3.16 (1.19) a |
| Arousal: stimulated | 2.85 (1.55) a | 3.27 (1.58) a | | 2.98 (1.53) a | 2.91 (1.55) a |
| Arousal: excited | 3.38 (1.66) a | 3.39 (1.46) a | | 3.38 (1.50) a | 3.17 (1.76) a |
| Arousal: wide awake | 4.02 (1.65) a | 3.73 (1.70) a | | 3.82 (1.70) a | 3.65 (1.62) a |
| Arousal: aroused | 3.77 (1.13) a | 3.63 (.94) a | | 3.53 (.99) a | 3.28 (1.03) a |
| Engagement | 37.29 (73.78) a | 19.84 (12.85) a | | 29.38 (22.42) a | 20.64 (7.94) b |
| **Study 1b** | | | | | |
|  | Product with expected scent: Candle | | | Product with unexpected scent: Glass | |
| Scented ad | Control | | Scented ad | Control |
| Proximity | 5.18 (1.34) a | 4.04 (1.65) b | | 4.66 (1.24) a | 4.72 (1.29) a |
| Appeal | 4.45 (1.37) a | 3.56 (1.69) b | | 4.07 (1.34) a | 3.96 (1.39) a |
| Preference | 71.18 (28.71) a | 59.82 (34.41) b | | 29.54 (29.42) a | 26.25 (24.33) a |
| **Study 2** | | | | | |
|  | Higher scent centrality: Aromatherapy soap | | | Lower scent centrality: Moisturizing soap | |
| Scented ad | Control | | Scented ad | Control |
| Proximity | 5.04 (1.19) a | 4.13 (1.49) b | | 4.87 (1.40) a | 4.24 (1.57) b |
| Appeal | 4.73 (1.41) a | 3.00 (1.25) b | | 4.10 (1.77) a | 3.46 (1.26) a |
| Ownership | 3.46 (1.29) a | 2.29 (.99) b | | 3.05 (1.66) a | 2.54 (1.40) a |
| WTP | 4.85 (4.60) a | 3.80 (4.27) a | | 3.94 (4.41) a | 3.58 (3.86) a |
| Language concreteness index | 2.12 (.78) a | 2.29 (.81) a | | 2.09 (.80) a | 2.21 (.84) a |
| Action representation | 5.18 (2.56) a | 4.24 (2.73) a | | 4.31 (2.80) a | 4.24 (2.71) a |
| Attribute: relaxation | 4.38 (1.84) a | 4.50 (1.80) a | | 4.34 (1.76) a | 3.74 (1.69) a |
| Attribute: hand softness | 5.25 (1.71) a | 5.57 (1.50) a | | 5.40 (1.84) a | 5.53 (1.66) a |
| Number of thoughts | 1.76 (.78) a | 1.83 (.79) a | | 1.84 (.91) a | 1.92 (.78) a |
| Number of words | 6.35 (4.43) a | 8.29 (5.37) a | | 8.22 (6.61) a | 8.55 (6.76) a |
| **Study 3** | | | | | |
|  | Expected type of product scent: Vanilla | | Expected type of product scent: Mint | | |
| Congruent scent on the ad | Incongruent scent on the ad | Congruent scent on the ad | | Incongruent scent on the ad |
| Proximity | 5.82 (.90) a | 4.50 (1.44) b | 5.68 (1.03) a | | 4.75 (1.26) b |
| Appeal | 5.36 (1.46) a | 3.63 (1.63) b | 4.80 (1.57) a | | 4.46 (1.62) a |
| Ownership | 4.21 (1.48) a | 3.12 (1.65) b | 3.57 (1.72) a | | 3.52 (1.53) a |
| Relative WTP | 1.40 (.73) a | 1.08 (.58) b | 1.35 (.64) a | | 1.21 (.49) a |
| **Study 4** | | | | | |
|  | Absent product | | | Present product | |
| Scented ad | Control | | Scented ad | Control |
| Proximity | 5.35 (1.39) a | 3.26 (1.55) b | | 4.95 (1.46) a | 4.25 (1.49) b |
| Appeal | 4.83 (1.58) a | 3.04 (1.30) b | | 4.10 (1.85) a | 3.26 (1.58) b |
| **Study 5** | | | | | |
|  | Pleasantly scented ad | Unpleasantly scented ad | | Control |  |
| Proximity | 5.75 (1.17) a | 5.43 (1.24) a | | 4.22 (1.47) b |  |
| Appeal | 4.51 (1.49) a | 4.52 (1.23) a | | 4.33 (1.57) a |  |
| Ad liking | 4.22 (1.71) a | 4.36 (1.57) a | | 4.13 (1.95) a |  |
| BIF score | 6.51 (2.08) a | 6.48 (2.46) a | | 6.89 (2.23) a |  |

a, b Different superscripts indicate significant differences at *p* < .05.

Notes: The cells present means per condition, with standard deviations in parentheses. Comparisons underlying superscript differences are per product category in Studies 1a and 1b, per product type in Study 2, per type of scent in Study 3, per product presence condition in Study 4, and across all scent pleasantness conditions in Study 5.

**Web Appendix C**

*SUMMARY OF ADDITIONAL RESULTS*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Study 1a** | | | | |
|  | Product with expected scent: Candle | | Product with unexpected scent: Glass | |
| Scented ad | Control | Scented ad | Control |
| Imagery vividness | 3.97 (1.62) a | 4.24 (1.32) a | 3.44 (1.40) a | 3.38 (1.55) a |
| Imagery elaboration | 45.12 (28.99) a | 35.98 (24.80) a | 44.90 (25.97) a | 44.51 (25.38) a |
| Affect | 2.72 (1.17) a | 3.13 (1.15) a | 3.18 (1.39) a | 3.16 (1.19) a |
| Arousal: stimulated | 2.87 (1.55) a | 3.27 (1.58) a | 2.98 (1.53) a | 2.91 (1.55) a |
| Arousal: excited | 3.33 (1.65) a | 3.39 (1.46) a | 3.38 (1.50) a | 3.17 (1.76) a |
| Arousal: wide awake | 3.93 (1.63) a | 3.73 (1.70) a | 3.82 (1.70) a | 3.65 (1.62) a |
| Arousal: aroused | 3.78 (1.02) a | 3.63 (.94) a | 3.53 (.99) a | 3.28 (1.03) a |
| Engagement | 38.02 (75.30) a | 19.84 (12.85) a | 29.38 (22.42) a | 20.64 (7.94) b |
| **C: Study 2** | | | | |
|  | Higher scent centrality: Aromatherapy soap | | Lower scent centrality: Moisturizing soap | |
| Scented ad | Control | Scented ad | Control |
| Language concreteness index | 2.12 (.78) a | 2.29 (.81) a | 2.09 (.81) a | 2.21 (.84) a |
| Action representation | 5.18 (2.56) a | 4.24 (2.73) a | 4.37 (2.79) a | 4.24 (2.71) a |
| Attribute: relaxation | 4.38 (1.84) a | 4.50 (1.80) a | 4.37 (1.77) a | 3.74 (1.69) a |
| Attribute: hand softness | 5.25 (1.71) a | 5.57 (1.50) a | 5.37 (1.85) a | 5.53 (1.66) a |
| Number of thoughts | 1.76 (.78) a | 1.83 (.79) a | 1.86 (.91) a | 1.92 (.78) a |
| Number of words | 6.35 (4.43) a | 8.29 (5.37) a | 8.30 (6.65) a | 8.55 (6.76) a |
| **G: Study 5** | | | | |
|  | Pleasantly  scented ad | Unpleasantly  scented ad | Control |  |
| Ad liking | 4.22 (1.71) a | 4.36 (1.57) a | 4.13 (1.95) a |  |
| BIF score | 6.51 (2.08) a | 6.48 (2.46) a | 6.89 (2.23) a |  |

a, b Different superscripts indicate significant differences at *p* < .05.

Notes: The cells present means per condition, with standard deviations in parentheses. Comparisons underlying superscript differences are per product category in Study 1a, per product type in Study 2 and across all scent pleasantness conditions in Study 5.

**Web Appendix D**

ADDITIONAL ANALYSES AND COMPETING EXPLANATIONS

Study 1a

Beyond proximity and product appeal, we obtained an additional behavioral proxy of product preference. Participants were offered the chance to participate in a lottery that included the product seen in the ad as one of four prizes with a similar monetary value (a candle, a glass, a soap bar, and a pen). Participants were offered control over their chances of winning each of these prizes by allotting points in proportion to their preference: *“You have 100 points that you can bet in the lottery. Each point is like a lottery ticket that can win. Now it is up to you in which lottery you would like to put your points. Please, allocate all 100 points to each of the prizes below depending on how much you want each of the prizes*.” Participants were asked to leave their email addresses to be notified in case of winning, ensured that their anonymity would be preserved and debriefed. The actual lottery was played out one week after the last study session.

We also assessed the potential effect of scent on imagery and engagement. Prior literature shows that scents facilitate vivid processing of information (Herz and Engen 1996; Lwin et al. 2010) and that vivid product imagery leads to favorable product reactions (Kisielius and Sternthal 1986; Schwarz 2004). Similarly, the literature suggests that ambient scent fosters engagement with promotional stimuli (Mitchell et al. 1995; Morrin and Ratneshwar 2003) and potentially triggers favorable product judgments (Seamon et al. 1984). Therefore, the proximity mediated effect of scent on product appeal observed in Study 1a might potentially compete with imagery and engagement processes. However, given that this prior literature suggests that the presence of scents per se stimulates imagery and engagement, we assume that they will not be able to explain the more selective pattern of results we predict, namely that scented ads only enhance proximity and appeal if the scent fits the product.

In addition to imagery and engagement, in Study 1a we also controlled for affect and arousal. Olfaction has a direct link to the amygdala, which is responsible for experiencing emotions (Herz and Engen 1996). Although evidence with regard to affective responses (Bosmans 2006; Krishna et al. 2010; Morrin and Ratneshwar 2003) is inconclusive, it is possible that scented ads influence affect (Bosmans 2006) and thus reactions toward a product. Again, however, such reactions should emerge in response to the presence of a scent but not discriminate between advertised products.

## Analyses on Additional Downstream Consequences: Preference

To assess how product scent expectations affect preference, we ran a moderated mediation analysis (SPSS PROCESS Model 7; Hayes 2017) with presence of scent as an independent variable, proximity of the product as a mediator, preference for the product seen in the ad (assessed as the allocated points) as an outcome variable and product category as a moderator. A moderated mediation analysis (Model 7) revealed the hypothesized moderated mediation effect (index = -4.08, CI90 = [-9.32, -.27]). Proximity mediated the indirect effect of scented ad on preference only for candles (coefficient = 5.05, CI90 = [1.02, 9.82]) and not glasses (coefficient= .97, CI90 = [-1.46, 3.91]). The pattern of results indicates that participants allocated more points for the candle, only when exposed to the scented ad for a candle. See Table 2 in the manuscript for detailed statistics and Table 1 for means.

## Ruling Out Imagery as an Alternative Process

We first checked whether the pattern of results for imagery is similar to that observed for proximity. ANOVAs on product imagery vividness and elaboration yielded neither a main effect of scent nor an interaction with the product category (*p*’s > .20; see Web Appendix C for means). The only effect we observed is a main effect of product category on imagery vividness (F(1, 173) = 9.60, *p* < .01), signaling more vivid imagery of the glass (M = 3.41, SD = 1.47) than the candle (M = 4.10, SD = 1.48). This pattern of results is fundamentally different from that of sense of proximity. Scent-induced imagery is hence unlikely to act as an alternative mechanism to scent-induced sense of proximity. Additionally, we ran a parallel mediation test (SPSS PROCESS Model 4; Hayes 2017) to explore if imagery vividness and elaboration might have potentially acted in parallel with the proximity mediator. However, when added to proximity, imagery vividness did not emerge as a parallel mediator for the effect of scent on appeal of the candle (coefficient = .07, CI95 = [-.05, .25]) or its preference assessed with bid points (coefficient = -1.03, CI95 = [-3.79, 1.61]). Its addition also does not change the previously observed mediation pattern of felt proximity of the candle (appeal: coefficient = .81, CI95 = [.43,1.26], preference: coefficient = 11.49, CI95 = [4.17, 20.49]).

Repeating the same test with imagery elaboration as a parallel mediator likewise revealed no mediation via it on appeal (coefficient = .27, CI95 = [-.01, .56]) or preference (coefficient = 1.59, CI95 = [-1.15, 5.76]) and left prior results for our proximity mediator unchanged (appeal: coefficient = .59, CI95 = [.26, 1.00], points bid: coefficient = 8.03, CI95 = [.84, 16.86]). Thus, Study 1a effectively rules out that the account proposed here is systematically confounded with scent-induced product imagery.

## Ruling Out Engagement as an Alternative Process

We measured the time participants took exploring the ad as a proxy for engagement. An ANOVA on this variable revealed only a main effect of scent (F(1, 173) = 4.93, *p* < .05). Participants in the scented advertising conditions (M = 33.70, SD = 55.41) took significantly more time inspecting the ad than participants in the control conditions (M = 20.26, SD = 10.48). Because there was no interaction, the pattern of results for engagement did not follow the pattern observed for sense of proximity (see Web Appendix C for all means). Yet, we next tested if engagement might have potentially acted in parallel to proximity as a mediator or would alter the previously observed proximity mediation pattern for candles (SPSS PROCESS Model 4; Hayes 2017). However, engagement did not emerge as a parallel mediator for the effect of scent on candle appeal (coefficient = .01, CI95 = [-.14, .18] or preference (coefficient = 2.85, CI95 = [-2.22, 7.63]) nor did it alter the effect of the proximity mediator, which still exhibited significant indirect effects (appeal: coefficient = .91, CI95 = [.43, 1.44], preference: coefficient = 11.61, CI95 = [3.82, 20.95]).

## Ruling out Affect and Arousal as Alternative Processes

Next, we investigated whether scent increases product appeal, not because it brings the product closer, but because it has an effect on affective and arousal states. ANOVAs did not show any main effect of scent or an interaction with scent for all proxies for these variables (all *p*’s ≥ .19; see Web Appendix C for means), suggesting that scent did not influence participants’ affective state. We only observed a main effect of product category on arousal (item: unaroused/aroused). Participants were more aroused (F(1, 173) = 3.95, *p* < .05) when viewing an ad for a candle (M= 3.71, SD = .98) than a glass (M= 3.41, SD = 1.01). To test whether affect or arousal nonetheless influenced the mediated effect of scent on appeal via proximity, we ran multiple mediation tests (SPSS PROCESS Model 4; Hayes 2017) in which we included these variables as parallel mediators to our main proposed mediator of proximity. There was no evidence for an indirect effect of scent via affect for candle appeal (coefficient = .11, CI95 = [-.05, .32] or preference measured as points bid (coefficient = -.85, CI95 = [-5.84, 2.00]) and the previously observed proximity mediation pattern remained (appeal: coefficient = .84, CI95 = [.36, 1.35], preference: coefficient = 10.45, CI95 = [2.15, 20.90]). Similarly, none of the arousal items became significant (appeal: coefficients = .00 – .07, preference: coefficients = -1.08 – .73, all CIs include 0) or influenced the sense of proximity mediation for candles (appeal: coefficients = .83 – .91, preference: coefficients = 8.42 – 9.85, none of the CIs include 0). Thus, affective states appear to play no role in bringing about the results of Study 1a.

# Study 1b

## Analyses on Additional Downstream Consequences: Preference

Beyond proximity and product appeal, we assessed product preference by providing participants with the chance to participate in a lottery as in Study 1a. We performed a moderated mediation test (SPSS PROCESS Model 7; Hayes 2017) with presence of scent as an independent variable, proximity as a mediator, preference for the product seen in the ad (assessed as the allocated points) as a dependent variable and product category as a moderator. The test showed that only scented ads for the candle (moderated mediation index = -3.91, CI95 = [-8.88, -.07]) had a proximity-mediated effect on preference associated with more allotted lottery points (coefficient = 3.72, CI95 = [.07, 8.03]). There was no such an effect for the glass (coefficient = -.20, CI95 = [-2.10, 1.58]).

# Study 2

## Beyond the sense of product proximity and its appeal, we assessed willingness to pay a price premium (WTP) as well as psychological ownership for the advertised product. In Study 2, we also addressed another potentially competing explanation for our proposed effect, that is, the level of construal.

Scent, as with the other sensory cues, may affect the way information is processed or construed (Amit et al. 2009; Trope and Liberman 2010). Moreover, perceptions of distance have often been shown to go hand in hand with the way consumers construe an object (for a review, see e.g., Trope and Liberman 2010). Consequently, it may well be that scent not only enhances the sense of product proximity but also the extent to which participants construe the product in concrete terms (Amit et al. 2009; Lee et al. 2014). In Study 2, we tested this possibility by assessing several proxies indicative of level of construal. First, we assessed the use of concrete language, which was captured by asking participants to describe the soap in an open-ended question (Fujita et al. 2006). The responses were later coded based on linguistic category model (Semin and Fiedler 1991). Second, we asked participants to rate the importance of central (aromatherapy soap: “How relaxed it makes you feel”, moisturizing soap: “How soft your hands are after using it”) and peripheral product features (aromatherapy soap: “How soft your hands are after using it”, moisturizing soap: “How relaxed it makes you feel”; 7-point scales, 1 = not important, 7 = very important; Trope and Liberman, 2009). Finally, we assessed construction of object-related actions in subordinate terms (Liberman et al. 2007); that is, by focusing on how rather than why an action is performed (7-point scale, 1 = how you would use the soap, 7 = what you would use it for, similar to Van Boven et al. 2010).

Using a different measure, Study 2 also reassessed the possibility that our results may be confounded by engagement and thus cognitive elaboration. Number of words and thoughts provided to describe the soap in an open question served as an additional proxy for elaboration.

## Analyses on Additional Downstream Consequences: WTP

We ran a moderated mediation test (SPSS PROCESS Model 7; Hayes 2017) to test the effect of scent on additional downstream consequences, namely WTP. A moderated mediation with scent as a predictor, WTP as a respective outcome variable, and felt proximity of the product as a mediator showed no evidence for moderation by soap type (all moderated mediation indices included 0 in their CIs). Therefore, we ran a mediation test (Model 4) across both soaps. A 5000 resample bootstrap revealed that sense of proximity mediated this effect indirectly (coefficient = .33, CI95 = [.03, .79]), indicating an increase in WTP for the advertised soap associated with the addition of scent on the ad.

## Analyses on Psychological Ownership as a Serial Mediator

Next we explored the role of psychological ownership in explaining the effect of scent-induced proximity on product appeal and WTP. Since the main analyses reported in the paper did not show evidence for moderation by soap type we ran serial mediations across both soap types (SPSS PROCESS Model 6; Hayes 2017). Scent served as the predictor, proximity as the first mediator, psychological ownership as the second mediator and product appeal and WTP as the respective outcome variables. Results revealed serial mediation efffects (CIs do not include 0) for both outcomes. Scent-induced proximity enhanced perceived psychological ownership for the advertised soap and in turn increased its appeal (coefficient = .16, CI95 = [.06, .29] and WTP for it (coefficient = .19, CI95 = [.06, .45]). Reversing the order of the mediators diminishes the effect in both cases.

## Ruling out Construal-level as Alternative Process

To address potential parallel effects on construal level, we tested for differences in all three proxies. We first ran multiple ANOVAs to investigate whether scent was capable of shifting product-related action representations and whether it affected the perceived importance of attributes with different levels of concreteness. Both proxies for concrete processing did not significantly differ between conditions (all *p*’s > .15, see Web Appendix C for means).

Next, we explored the concreteness of the language used to describe the soap in open comments. Similar to Meyers-Levy and Zhu (2007) we adapted the Semin and Fiedler (1991) linguistic category model (LCM) and employed three codes signaling different levels of language concreteness. Verifiable, objective and observable (e.g., “a white piece of soap“, “lavender scented soap”) descriptions were treated as concrete information (code = 1). Less verifiable descriptions that necessitate subjective interpretations (“the soap looks expensive”, “the soap smells strong”) were coded to be of medium concreteness (code = 2). Statements indicating a very subjective evaluation or without any clear reference (“boring and nothing special”, “smells nice”) were coded as abstract (code = 3). The coding was performed by two judges who were blind to the experimental conditions (Cohen’s kappa =.85). Remaining disagreements were resolved through discussions.

An ANOVA revealed that neither the presence of a scent on the ad nor the framing of the product had an effect on language concreteness (all *p*’s > .20; see Web Appendix C for means). In addition, sense of product proximity did not correlate with either of the proxies for construal-level (all *p*’s > .20, r = -.02 to .09). Likewise, running parallel mediation tests (SPSS PROCESS Model 4; Hayes 2017) with sense of proximity and construal-level measures (inserted one at a time) as parallel mediators, presence of scent as an independent variable and product appeal variables as outcome, showed that none of the proxies for construal-level emerged as significant mediators (appeal: coefficients = -.02 – .05, WTP: coefficients = -.01 – .13, all CIs include 0). The mediation of sense of product proximity remained robust across all outcome variables (appeal: coefficients = .35 – .38, WTP: coefficients = .33 – .34, none of the CIs include 0).

## Ruling out Cognitive Elaboration as an Alternative Process

We used number of words and thoughts as proxies provided by the participants to describe the promoted soap. However, neither the number of thoughts (*p*’s > .44) nor the amount of words used to describe the soaps (*p*’s > .21) showed any significant results (see Web Appendix C for means). Study 2 thus provides additional evidence against cognitive elaboration and thus engagement as an alternative account.

# Study 3

## Analyses on Additional Downstream Consequences: WTP

In Study 3, beyond product appeal, we assessed WTP as an additional downstream outcome. A moderated mediation analysis (SPSS PROCESS Model 7; Hayes 2017) with congruence of the product’s scent expectations as a predictor, WTP as a respective outcome variable, and felt proximity of the product as a mediator showed that scent type does not moderate the effect (all moderated mediation indices included 0 in their CIs). Therefore, we ran a mediation test (Model 4) with both scents merged. Results confirmed that proximity mediated the effect of congruence on WTP index (computed as: maximum price for the advertised soap/usual price paid for liquid soaps; coefficient= .20, CI95 = [.10, .31]). When the scent on the ad matched the product’s scent expectation, WTP for the product increased.

## Analyses on Psychological Ownership as a Serial Mediator

We ran a bootstrap analysis (SPSS PROCESS Model 6; Hayes 2017) to test for serial mediation from congruence to sense of proximity to psychological ownership to appeal or relative WTP. Since the main analyses reported in the paper did not show evidence for moderation by scent type we ran the analyses across both scents merged. Results support this proposed mediation chain for both outcomes: product appeal (coefficient= .37, CI95 = [.21, .56]) and relative WTP (coefficient= .11, CI95 = [.05, .19]). When we reverse the order of mediators the serial mediation coefficient decreases for both outcomes.

# Study 5

In Study 5, we reassessed construal-level as a competing explanation for the effect of scent on product appeal. We adapted the Behavioral Identification Form (BIF; Vallacher and Wegner 1989) to measure construal-level. Specifically, we excluded items that our participant sample could not easily relate to, such as “Measuring a room for carpeting”, “Joining the Army” or “Growing a garden”. This left us with 10 behaviors that participants were considered able to relate to. For each of these behaviors, participants had to choose between a concrete or abstract description of the specific behavior: 1. Locking a door: Putting a key in the lock vs. Securing the house. 2. Caring for houseplants: Using a watering can vs. Making the room look nice. 3. Painting a room: Applying brush strokes vs. Making the room look fresh. 4. Cleaning the room: Vacuuming the floor vs. Making the room look tidy. 5. Making a shopping list: Getting organized vs. Writing things down. 6. Washing clothes: Putting clothes into the machine vs. Making clothes clean and fresh. 7. Greeting someone: Saying hello vs. Showing friendliness. 8. Reading: Going through the text vs. Gaining knowledge. 9. Pushing a doorbell: Moving a finger vs. Seeing if someone’s home. 10. Tooth brushing: Moving a brush around in one's mouth vs. Preventing tooth decay. First, we assigned “0” to the selected concrete behavioral descriptors and “1” to the selected abstract descriptors. Subsequently, we summed up the scores across 10 provided behaviors per participant with higher scores indicating a higher construal-level (Vallacher and Wegner 1989).

Study 5 also assessed and controlled for liking of the ad because attitudes towards the ad can influence attitudes towards the advertised product (Mitchell and Olson 1981). We assessed ad liking using a single item: “How much did you like this advertisement” (1 = not at all, 7 = very much).

## Ruling out Construal-level as an Alternative Process

An ANOVA showed no difference in BIF scores across conditions (*p* = .60; see Web Appendix C for means). As previously, the BIF score (i.e., level of construal) did not correlate with the sense of product proximity (r = -.09, *p* = .28,). It likewise did not emerge as a significant parallel mediator for the effect of scent on product appeal (control vs. pleasant: coefficient = -.001, CI95 = [-.08, .10]; control vs. unpleasant: coefficient = .02, CI95 = [-.04, .15]).

## Ruling out Advertisement Liking as an Alternative Process

We first checked whether scented ads influenced reported ad liking. An ANOVA showed no difference in ad liking across conditions (*p* = .81, see Web Appendix C for means). Using SPSS PROCESS Model 4 (Hayes 2017), we next explored whether ad liking potentially acted as a parallel mediator to proximity. The test showed no evidence for ad liking serving as a mediator (control vs. pleasant: coefficient = .04, CI95 = [-.26, .34]; control vs. unpleasant: coefficient = .12, CI95 = [-.25, .52].

**Web Appendix E**

*ADDITIONAL STUDY 1: SALIENT AND NON-SALIENT SCENT INFORMATION*

In this study, we attempted to provide a practically relevant check for the robustness of the proposed effect. Managerial practices (Kelly 2012) as well as academic research (e.g., Madzharov et al. 2015) varies the ways in which scents are presented. Sometimes information about the presence of a scent on the ad is salient. At other times, there is no notification about the presence of a scent on the ad. Although we found that the effect of scent on proximity and product appeal holds when scent presence information is salient (Studies 1a, 2, 3) and non-salient (Studies 1b, 4, 5), these studies differ in many other respects. In this study, we aimed to provide a direct comparison of both scent presentation strategies.

## Participants, Design, and Procedure

One hundred and twenty-one university students (49% females, Mage = 22.29) took part in the study in exchange for course credit. The study setting and procedure were similar to the main studies. Each participant was randomly assigned to one of three conditions (scent information: salient, non-salient, control-no scent). After taking a seat, participants were informed about the content of the envelope, which was a print advertisement for a soap bar. Participants in the salient scent condition were additionally informed about the scent on the ad. This was followed by instructions to open the envelope and to take as much time as needed to explore the advertisement. All participants received the same ad as in Study 2. For participants in the scented ad conditions, the back side of the ad was rubbed with 1 drop of lavender essential oil 1 hour before the study session.

After inspecting the ad, participants proceeded with the questionnaire. We assessed the sense of product proximity (r = .62, *p* < .001) and product appeal (r = .80, *p* < .001) as in Study 1a. As in Study 1a and after (before in the salient scent information condition) responding to these questions, participants were prompted to sniff the ad and to thus perform an olfactory sensitivity check. They also reported scent liking and scent fit to soaps.

## Results and Discussion

Four participants who failed the olfactory sensitivity check and indicated not being able to perceive the scent in the scented ads conditions (two in the salient, two in the non-salient conditions) were excluded from further data analysis. Exclusion of these participants did not change the pattern of results.

An ANOVA revealed a main effect of condition (F(2, 114) = 8.38, *p* < .001) on the sense of proximity of the product. In line with H1, participants in the control condition felt less close to the product than participants in the non-salient (Mcontrol = 3.40, SD = 1.36, Mnon-salient= 4.51, SD = 1.76; t(77) = 3.15, *p* < .01) and salient scent information conditions (Msalient = 4.66, SD = 1.32; t(76) = 4.15, *p* < .001). It made no difference whether the scent was presented saliently or not (*p* = .68).

Next, we tested whether sense of proximity of the product, as per H4, mediates the relation between scent and product appeal. We ran a mediation analysis (SPSS PROCESS Model 4; Hayes 2017) with presence of scent as the independent variable (salient and non-salient conditions merged), proximity of soap as a mediator and appeal of soap as an outcome variable. The test showed that the effect of scent on product appeal was indirectly mediated by the sense of proximity (coefficient = .62, CI95 = [.02, 1.01]). All results hold if the analyses are repeated separately for salient and non-salient scent information conditions (All CI’s do not include 0). This study once again supports H1 andH4 and shows that presenting scent information saliently works equally well as keeping it non-salient.

**Web Appendix F**

*ADDITIONAL STUDY 2: CONGRUENCE WITH SCENT EXPECTATIONS – REPLICATION STUDY*

The purpose of this replication study was two-fold. First, to show robustness of the effect it once again tests H3, which predicts that a scented ad would enhance sense of proximity, and consequently product appeal, only when there is congruence between the scent on the ad and the expected scent of the product. Second, using a single factor three-level between-subjects design (congruence of scent on the ad: congruent vs. incongruent with expected product scent vs. control), it aims to provide a direct comparison between incongruent scent and control conditions. Our account suggests that scent on the ad that is incongruent with the manipulated product scent expectations could instill similar levels of proximity as non-scented ads. This is because a product incongruent scent is not capable of representing its essence and, thus, cannot bring it closer.

## Participants, Design, and Procedure

One hundred and twelve undergraduates (60% females, Mage = 22.28) participated in the study in exchange for course credit. Upon arriving at the lab, participants were randomly assigned to an individual testing cubicle that contained a folder with a scented or non-scented soap ad depicting a soap bar and a vanilla blossom. The visual reference to vanilla ensured that factual information about the product was kept constant across conditions. In addition, this reference served to strengthen sensory expectations, which help manipulate perceptions of congruence. To manipulate the scent’s congruence with the soap, we infused half of the scented ads with a congruent vanilla scent and the other half with an incongruent mint scent. Participants were not alerted to the presence of a scent on the ad. Apart from the ad not being scented, participants in the control condition received exactly the same stimulus material and instructions. After inspecting the ad, participants responded to the same soap-related (sense of proximity, r = .82, *p* < .001; product appeal r = .85, *p* < .001) and olfactory sensitivity measures as in Study 1a.

## Results and Discussion

As all participants in the scent conditions indicated being aware of the scent on the ads, none of them were excluded from the analysis. An ANOVA showed a main effect of condition (F(2, 108) = 5.39, *p* < .01) on the sense of proximity of the product. Corroborating H1 andH3, participants in the congruent scent condition felt closer (M= 4.75, SD =1.71) to the advertised soap than participants in either the incongruent (M= 3.70, SD = 1.69; t(71) = 2.64, *p* < .05) or control (M= 3.72, SD = 1.33; t(74) = 2.92, *p* < .01) conditions. Importantly, in support of H3 there was no difference between control and incongruent scent conditions (*p* = .95).

Testing for downstream consequences on product appeal, we likewise found support for our predictions. Contrasting congruent scent and control conditions in terms of the proposed mediation (SPSS PROCESS Model 4; Hayes 2017), we found that sense of proximity fully mediates the effect of scent on product appeal (coefficient = .55, CI95 = [.15, 1.05]). The same pattern holds when contrasting the congruent with the incongruent scent condition (coefficient = .46, CI95 = [.09, .90]). This study once again corroborates H1, H3, and H4. We show that an incongruent scent on the ad instills the same level of proximity as a non-scented ad.

**Web Appendix G**

*ADDITIONAL STUDY 3: EFFECTS OF UNPLEASANT SCENT – REPLICATION STUDY*

The goal of this study was to replicate the results of Study 5 using a different unpleasant scent. The ads in Study 5 were scented with an unpleasant chemical scent. Here we investigated if the effect generalizes to disgusting scents. In addition, this study aimed to corroborate the role of psychological ownership in explaining the downstream effect of scent-induced proximity on product appeal.

## Participants, Design, and Procedure

This replication study had a one-factorial design with three between-subjects conditions (scent: control vs. pleasant vs. unpleasant). One hundred twenty-nine undergraduates (47% females, Mage = 21.62) participated in the study in exchange for course credit.

We designed an ad for a prank candle, that is, a candle intended to mischievously surprise a friend with unexpected scents. Upon arrival at the lab, participants were randomly assigned to individual stations that had a candle ad placed in a Ziploc-type bag. We framed the candle as a prank candle that starts out with a pleasant smell and turns into a surprisingly unpleasant smell after an hour of it being lit. The ads promoting this candle were either scented with this pleasant (vanilla) or unpleasant (fish sauce) scent or were scent-free. A pretest (n = 32) showed that the vanilla scent was perceived as significantly more pleasant (Mvanilla = 5.09, SD = 1.00, Mfish\_sauce = 1.25, SD = .76, 1 = very unpleasant, 7 = very pleasant; paired t(31) =19.09, *p* < .001) and less disgusting (Mvanilla = 2.09, SD = 1.15, Mfish\_sauce = 5.63, SD = 2.24, 1 = not at all, 7 = very much; paired t(31) = 8.69, *p* < .001) than the fish sauce. To ensure that the rather strong scents would not disseminate to the lab, all participants were first instructed to visually inspect the ad inside the transparent Ziploc-type bag. Participants in the scent conditions were next prompted to slightly open the zip, to take a sniff, and to close the zip again before proceeding with the questionnaire. To ensure engagement with the ad across conditions, participants in the control condition were encouraged to hold or move the ad in the bag without opening it.

We assessed the sense of proximity of the product as in Study 1b (α = .84). Product appeal was measured with the same items as in the main studies (r = .58, *p* < .001) but assessed on 100-point slider scales (0 = not at all, 100 = very much). In addition, we explored psychological ownership as in Study 2 (α = .90). At the end of the study, participants in the scent conditions completed an olfactory sensitivity check.

## Results and Discussion

One participant who failed the olfactory sensitivity check in the unpleasant scent condition was excluded from further data analysis. An ANOVA revealed a main effect of scent condition (F(2, 125) = 13.22, *p* < .001) on the sense of proximity of the product. In line with H1, participants in the control condition felt that the product was farther away than participants in the pleasant (Mpleasant = 4.51, SD = 1.37, Mcontrol = 3.02, SD = 1.24; t(84) = 5.28, *p* < .001) and unpleasant scent (Munpleasant = 4.21, SD = 1.59; t(81) = 3.79, *p* < .001) conditions. The pleasant and unpleasant scent conditions did not significantly differ from each other (*p* = .34).

Next, we tested whether sense of proximity of the product mediates the relation between scent and product appeal for both pleasant and unpleasant scents. As in Study 5, mediation tests (SPSS PROCESS Model 4; Hayes 2017) with 5000 resample bootstraps, showed that the indirect effects were significant for both contrasts. Regardless of scent pleasantness, proximity mediated the indirect positive effect of scent on product appeal (control vs. pleasant: coefficient = 11.95, CI95 = [5.52, 18.91]; control vs. unpleasant: coefficient = 6.66, CI95 = [1.02, 13.66]).

Finally, we repeated a similar procedure and tested for serial mediation via psychological ownership (SPSS PROCESS Model 6; Hayes 2017). Regardless of whether the scent on the ad was pleasant or unpleasant, adding a scent increased the sense of proximity, which in turn raised psychological ownership, which subsequently increased product appeal (control vs. pleasant: coefficient = 5.41, CI95 = [1.90, 9.80]; control vs. unpleasant: coefficient = 5.32, CI95 = [1.35, 11.27]). Reversing the order of the mediators eliminates the effect in both cases.

This study replicates the main findings of Study 5 and once again supports H1 andH4. It also reconfirms the role of psychological ownership in explaining the effect of scent-induced proximity on product appeal and shows that the effect generalizes across pleasant and unpleasant scents.

# **Web Appendix H**

# ADDITIONAL REFERENCES USED IN the WEB APPENDIX

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