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# Darling, Get Closer to Me: Spatial Proximity Amplifies Interpersonal Liking

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**Abstract**

Does close distance increase liking for a social object? In a preliminary sociogram task, an association between proximity and intimacy was found in drawings of self and others. In three experimental studies, male participants consistently preferred female targets who were (actually or appeared to be) close than far from them. Distance was manipulated through various means—sitting distance (Study 2), presenting two facial images separately to each eye by a stereoscopic device (Study 3), or a video clip (Study 4). This effect was stronger among those with deprived social needs and occurred in part because close (vs. far) targets seemed psychologically more accessible to the perceiver. Our findings offer rare experimental evidence for the empirically challenged propinquity effect and provide new insights on how distance shapes inner experience.

**Keywords**

distance, propinquity, liking, motivation, target accessibility

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> Darling if you want me to be closer to you, get closer to me
>
> —*Get Closer* (Seals & Crofts, 1976)

Does physical proximity increase psychological closeness, as the above lyric suggests? We know that the physical proximity of a dangerous stimulus affects our emotion. Between two snakes, crawling either 3 or 30 feet away, the closer reptile is more frightening. The primary function of fear is to alert organisms toward potential threats and to motivate them to escape (Neese & Ellsworth, 2009). One parameter that signals the immediacy of threat is physical distance—other things being equal, the closer threat is more dangerous. Although closeness amplifies preventive experiences, we know less whether a similar effect occurs for promotive experiences, such as liking. What if, in the above example, we replace the snake with a shiny red apple or an attractive person? Does a positive stimulus become more enticing or attractive when it is merely closer to the perceiver?

The idea that proximity increases liking (propinquity effect) has been suggested decades ago. However, evidence in support of this possibility in the classic studies (e.g., Bossard, 1932; Festinger, Schachter, & Back, 1950) was mostly correlational, leaving a host of potentially confounding factors (e.g., familiarity, encounter frequency) not controlled for (Zajonc, 2001). Although the propinquity effect continues to be a popular topic in introductory social psychology courses, there are surprisingly few works that offer compelling experimental evidence that distance itself influences affective reaction to an object. This study has two objectives. Through a series of controlled experimental studies, we sought to find causal evidence in support of the propinquity effect. Also, we wish to add a missing piece to the current motivated perception literature (for a review, see Balcetis, 2016) by demonstrating that a desirable stimulus not only appears closer but is also liked more.

An association between physical distance and inner experience (desire) has been documented by many recent studies. In general, an object is perceived to be closer when it is more desired (e.g., Alter & Balcetis, 2011; Veltkamp, Aarts, & Custers, 2008). For instance, a bottle of water appears closer to thirsty people (Balcetis & Dunning, 2010) and others are perceived as closer when affiliation motives are salient (Knowles, Green, & Weidel, 2013; Pitts, Wilson, & Hugenberg, 2014). According to the motivated perception account (Balcetis, 2016), this occurs because an approach motivational state

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shortens the perceived distance of a need-satisfying object, which in turn encourages goal-relevant behavioral engagements. One notable point is that the causal direction implied in this literature (desire influencing distance perception) is conceptually opposite to the one implied in the classic propinquity thesis (distance influencing liking). It might be possible that the causal direction goes both ways. In this article, between the two, we focus on the causal route originally proposed in the classic propinquity studies (from distance to liking) that has received comparably less empirical attention.

From a functional perspective, the spatial distance between the perceiver and a stimulus contains qualitatively different information, depending on whether the stimulus is a potential threat or a reward. If it is a threat, close distance conveys imminence of danger, and thus, a preventive response is triggered. When the object is potentially rewarding, however, close distance signals something quite different—the relative ease of obtaining a positive payoff. The projected ease of acquiring a reward is not a trivial point from an economy-of-action perspective (Proffitt, 2006; Schnall, Zadra, & Proffitt, 2010). A key function of an approach-oriented reaction (e.g., excitement, pleasure) is to motivate and direct the organism's attention to a stimulus that benefits fitness (Cosmides & Tooby, 2000; Neese & Ellsworth, 2009). If multiple options are available, however, this experiential reaction needs to be discriminative. When distance is the sole concern, the adaptive response therefore is to have an approach experience (e.g., liking) more toward the one that requires less effort (i.e., closer object).

Although this energy efficiency idea offers a broad account for why the "close is good" heuristic could be functional in general, whether this phenomenon actually occurs in a specific context might depend on a host of factors. For instance, when the target stimulus is highly ambiguous or raises mixed reactions (e.g., fun but also scary), this phenomenon might be suppressed. Conversely, if the desirability of the stimulus is high, either because the perceiver wants it more or because the stimulus is inherently attractive, this effect might be more pronounced. Also, theoretically, the proximity effect might occur in both social and nonsocial situations (we return to this generalizability issue in the General Discussion). However, because the primary goal of this research was to empirically verify whether this phenomenon exists, we narrowed our attention to an area where we might have a high probability of finding it—likeability judgments of an opposite-sex person.

Why is a "person" an ideal stimulus to test the current idea? First, unlike an inanimate object (e.g., apple), humans are agentic beings. Humans do not come around accidently, but rather because they wish to. For instance, a person might stand nearby throughout a party because she is open-minded for further social interaction. Thus, proximal distance between the self and the target person itself may convey information the other's social interest. Past findings on touch and liking might be conceptually relevant with this point. Experimentally manipulated physical touch leads to a more favorable evaluation of a confederate serving as a library clerk (Fisher, Rytting, & Heslin, 1976), elevates cooperation in a public goods game (Kurzban, 2001), and reduces prejudice against out-group members (Seger, Smith, Percy, & Conrey, 2014). Although the presence of contact distinguishes touch from proximity, on the continuum of distance, the two are clearly relevant (touch might be viewed as an extreme form of proximity). Both provide information about the interaction partner's social willingness, which may provoke reciprocal feelings within the perceiver. Another relevant point is that in-group persons are typically more nearby than out-group members. This might be another reason for why an implicit association between proximity and goodness becomes reinforced in the social world.

Also, from an evolutionary point, preferring closer social stimuli may have been an adaptive motivational bias for taking advantage of social opportunities (cf. Haselton & Nettle, 2006). Among various social encounters, particularly critical are the ones related with reproduction (Miller, 2000). Because feelings of sexual competition and rivalry often arise in intra-sex interactions (Buss, 1988), the proximity effect might occur more often during opposite-sex interactions. Furthermore, given that men are more mating-minded and responsive to mating opportunities than women (Buss & Schmitt, 1993; Clark & Hatfield, 1989; Neel, Kenrick, White, & Neuberg, 2016), we expected to find the effect more easily during men's evaluation of women. With such research at the backdrop, we examined through various means whether an opposite-sex person is viewed more positively when the target is closer to the perceiver.

Since the introduction of the propinquity effect by early social psychologists, spatial distance has intrigued many researchers. Most of the latest research attention has been on how the perceiver's motivation colors distance perception (e.g., Balcetis, 2016) or on how cognitive beliefs are altered by distance manipulations (e.g., Touré-Tillery & Fishbach, 2017; Williams & Bargh, 2008; Yan, 2014). Whether spatial distance influences the evaluation of the target object itself, the core underlying idea of propinquity effect has received less attention. Across four studies, we revisit the classic thesis by examining whether spatial distance indeed increases the attractiveness of a close over a distant person.

## The Present Studies

We examined whether spatial proximity per se leads to a more positive evaluation of a person. Specifically, we predicted that a mildly attractive female target, presented in various modes (picture, video clip, and actual interaction), would receive more favorable ratings in a close (vs. distant) setting. We also examined whether this phenomenon occurs more strongly among individuals with heightened social needs (cf. Pitts et al., 2014). Finally, we investigated whether the proximity-liking link is partly due to an increase in the perceived accessibility of the close female target.

Before conducting the main experiments, we first examined whether people metaphorically associate psychological and spatial distance through a sociogram task (Study 1). In Study 2, male participants rated the attractiveness of a female confederate, who interacted either 80 or 150 cm away from them. In Study 3, distance was manipulated using a stereoscopic device typically used for creating depth perception. Two female facial images were presented separately to each eye of the male participant, creating a visual experience of one face appearing closer than the other. Participants were asked to choose the one they liked more. In Study 4, a female actor appeared in a video clip, filmed from two different distances. Male participants rated how much they liked the female and how accessible she appeared to be (i.e., whether she would accept a date request). Across all experimental conditions, participants (especially male) were expected to like the female target more in the close than distant condition.

## *Study 1*

Is distance a naturally embedded notion in people's conceptualizations of social relations? As an initial examination, we asked participants to draw circles representing themselves (center) and three friends on a sociogram (cf. Aron, Aron, & Smollan, 1992; Carter & Gilovich, 2012). Participants also provided intimacy ratings for each friend. We predicted that more intimate friends would be drawn closer to the self-circle, both at the between- and within-person level.

*Method.* A total of 128 undergraduate students (female = 75, $M_{age}$ = 20.71, $SD_{age}$ = 2.00) participated in a class session. Using G*Power software (Faul, Erdfelder, Lang, & Buchner, 2007), we estimated that we would need at least 84 participants to have adequate power ($1 - \beta > .80$) to detect medium-sized effects. We decided to include all students who already signed up for the study. After signing the consent form, participants listed three friends who came to their mind. On a blank page, participants were asked to draw the three "friend" circles (because they were provided with a fixed compass, all were 5 cm in diameter) surrounding the "self" circle (6 cm) drawn at the center (see Figure 1). They then indicated how intimate they were with each friend on a 9-point scale (1 = *not at all*; 9 = *very much*). Distance between the center points of the self- and friend-circles was measured in centimeter. Higher scores indicated greater distance and stronger feelings of intimacy. All participants were debriefed and received candy bars at the end of the survey.

*Results and Discussion.* Between participants, we first examined whether people with more intimate friends on average drew friends closer to the self-circle. We obtained a correlation between the average of each participant's three distance measures ($M$ = 3.79, $SD$ = 0.90) with the average of the three intimacy ratings ($M$ = 6.00, $SD$ = 1.47). As expected, a significant negative correlation was found, $r(128) = -.35$, $p < .001$. Individuals who felt more intimate with their friends overall drew the friend-circles closer to the self-circle. Also, given that the three friends are nested within an individual, a multilevel regression analysis was conducted with a random intercept and slope for the within-person intimacy effect, controlling for the fixed effect of the person-mean intimacy rating. Again, physical distance was negatively associated with interpersonal intimacy, $b = -0.58$, $SE = 0.04$, $p < .001$, 95% confidence interval (CI) = [–0.66, –0.50], suggesting that among the three friends, the more intimate friend-circle was drawn closer to the self-circle. Overall, results from both the within- and between-person level analyses suggest that people implicitly associate spatial proximity with psychological intimacy.

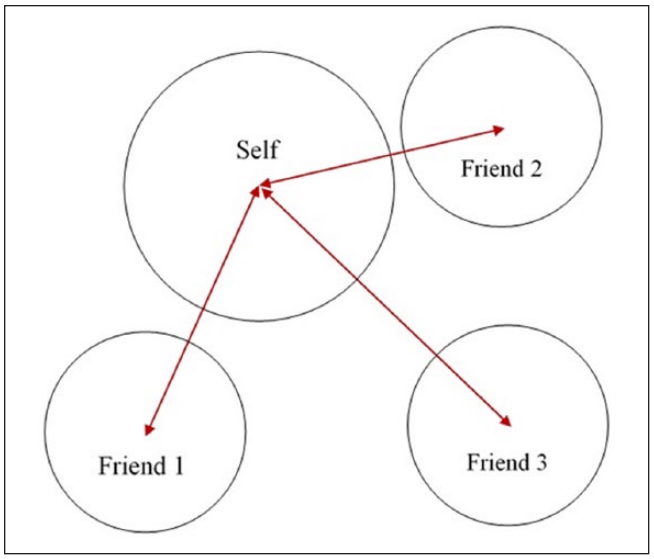


**Figure 1.** Sociogram of self- and friend-circles, Study 1.

## *Study 2*

Although promising, Study 1 was confined to existing relationships and the correlational data did not permit causal inference. In Study 2, we experimentally tested whether distance has a causal effect on preference for an unknown person. Sitting either at a close or far distance, a male participant and a female confederate read excerpts from a play to each other. After this tightly scripted interaction, male participants rated how much they liked the female confederate and how enjoyable the interaction was.

One highly challenging aspect of this study was ensuring that the female confederate's nonverbal behavior and physical features were identical between the two distance conditions. We went great lengths to minimize confounds by standardizing the confederate's appearance and behavior. For instance, she practiced to make her vocal pitch and speed constant and wore the exact same make-up and clothing between the two distance conditions. Furthermore,

**Table 1.** Results From Study 2: Descriptive Statistics for the Variables Across Conditions.

| | Distant | Close | | | |
|---|---|---|---|---|---|
| Variable | *M (SD)* | *M (SD)* | *F* | *p* | $\eta_p^2$ |
| Liking | 4.56 (0.82) | 5.24 (0.88) | 7.99 | 0.007 | 0.143 |
| Enjoyment | 4.68 (1.03) | 5.48 (0.92) | 8.41 | 0.006 | 0.149 |
| Liking averaged (DV) | 4.62 (0.81) | 5.36 (0.77) | 10.99 | 0.002 | 0.186 |
| Positive affect | 2.90 (0.67) | 3.25 (0.78) | 2.93 | 0.094 | 0.057 |
| Negative affect | 1.70 (0.43) | 1.78 (0.47) | 0.36 | 0.552 | 0.007 |

*Note.* Standard deviations in parentheses. DV = dependent variable.

given that women's fertility affects men's attraction toward them in complex, unforeseeable ways (e.g., Miller & Maner, 2011), this study was conducted during a small window of time (5 days)—during the female confederate's low-fertility period (2 to 6 days before menstruation). Although these factors constrained our sample size (10 sessions per day), we believe they have helped to minimize the effects of various confounds that have been particularly problematic in past propinquity work. We predicted that (a) the female confederate would be judged more favorably in the close than distant condition, and (b) the effect would be more pronounced among those who have a strong social desire to connect (currently without a romantic relationship).

*Method.* Because of the technical constraints of this study (minimizing confound, considering the confederate's fatigue), we were able to run 10 sessions per day for 5 days. Fifty male undergraduates ($M_{age}$ = 21.40, $SD_{age}$ = 2.12) received course credit for their participation in a study titled "voice and personality." During the recruiting phase, we asked the romantic relationship status of the participants. Twenty-four participants were in a romantic relationship (11 assigned to the close condition, 13 assigned to the distant condition) and 26 (14 in the close condition, 12 in the distant condition) were single. Participants were assigned to a single factor (distance: distant vs. close) between-subjects design and interacted with a mildly attractive (rated 4.25 on a 7-point attractiveness scale by 15 independent raters) female confederate, who was blind to the hypothesis. Based on Hall's theory (1966), the sitting distance between the two persons was set at 80 cm in the close condition ($n$ = 25) and 150 cm in the distant condition ($n$ = 25).

After providing basic demographic information, the male participant and the female confederate took turns reading lines from a modern musical version of a Shakespeare play (*Romeo and Juliet*) for 3 min. After completing several filler questions (e.g., "how well do you think a person's voice represents her personality?"), participants rated how much they liked the confederate and how enjoyable the interaction was on a 7-point scale (1 = *not at all*; 7 = *very much*). The two items were averaged to construct a single index of liking ($\alpha$ = .77, $M$ = 4.99, $SD$ = 0.87). Participants were also asked to complete the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) to obtain a measure of participants' positive ($\alpha$ = .86) and negative ($\alpha$ = .80) affect, using 5-point scales (1 = *very slightly or not at all*, 5 = *extremely*). Finally, we examined whether the participants had any suspicion by asking them to guess what the real purpose of the experiment might be. No participant thought the task was related to spatial distance.

*Results and Discussion.* One-way analysis of variance (ANOVA) yielded a significant main effect of distance on liking, $F(1, 48) = 10.99$, $p$ =.002, $\eta_p^2$ = .19. As expected, compared with the participants in the distant condition, $M$ = 4.62, $SD$ = 0.81, 95% CI = [4.30, 4.94], those in the close condition liked the confederate more, $M$ = 5.36, $SD$ = 0.77, 95% CI = [5.04, 5.68]. Descriptive statistics are provided in Table 1. An additional analysis of covariance (ANCOVA) revealed that neither positive mood ($p$ = .26) nor negative mood ($p$ = .67) served as a significant covariate. We also examined whether participants' relationship status (single vs. committed) influenced the effect of distance on liking. A significant interaction between relationship status and distance on liking was found, $F(1, 46) = 4.56$, $p$ = .038, $\eta_p^2$ = .09 (see Figure 2). Specifically, proximity significantly increased the liking ratings of single men, $t(24) = 4.20$, $p < .001$, 95% CI = [0.57, 1.67], but not those in romantic relationships, $t(22)$ = 0.76, $p$ = .45, 95% CI = [–0.41, 0.90].

To confirm that the female confederate maintained an identical social gesture between conditions, we recruited 35 independent male coders to rate how friendly, social, and cheerful the confederate appeared to be in video clips recorded during the close (3 clips) or the distant (3 clips) interaction sessions. A close session video clip was randomly picked and shown to 18 coders, and 17 viewed a distant session clip. Independent samples $t$ test showed that there was no difference in how friendly ($M_{close}$ = 3.61, $M_{distant}$ = 3.59), $t(33)$ = 0.06, $p$ = .95, social ($M_{close}$ = 3.94, $M_{distant}$ = 4.18), $t(33)$ = −0.68, $p$ = .50, or cheerful ($M_{close}$ = 2.06, $M_{distant}$ = 2.00), $t(33)$ = 0.19, $p$ = .85, the confederate was between conditions. Thus, this additional information raises confidence that the manipulated distance, rather than possible differences in the

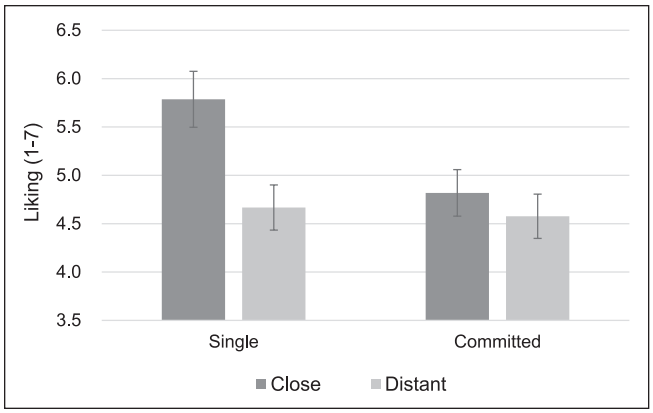


**Figure 2.** Results from Study 2: Interaction between distance condition and relationship status on liking.
*Note.* Error bars indicate ± 1 standard error.

confederate's interaction style, played a key role in yielding the current outcome.

Our result suggests that closeness enhances liking. Men's liking for an identical female was significantly higher in the closer condition. This effect was only present among men who were not involved in a romantic relationship, suggesting that the perceiver's motivational state also plays a role in this phenomenon. It resonates with reports that subjectively valued objects look closer (Balcetis & Dunning, 2010; Pitts et al., 2014) and offers additional insight to the literature. A desired object not only appears closer, but when they do, something more seems to happen—liking for the target also increases. We will return to this conceptual "loop" in the General Discussion section.

## *Study 3*

Study 3 attempted to replicate and extend the prior finding in several ways. First, distance was manipulated more rigorously using a stereoscopic visual apparatus. Two female facial images (controlled for attractiveness) were presented separately to each eye of the participants, creating a depth perception—one face appearing slightly closer than the other. Between the two, participants were asked to choose the one they liked more. Also, in Study 3, participants had to make repeated judgments of liking (28 trials) in a less deliberate manner (3 s per trial). Replicating the earlier finding with this highly controlled method that demands quick, repeated judgments would strengthen the robustness of this phenomenon. Again, we also tested whether this effect varies according to the person's social needs. This time, we examined whether the proximity-liking association was influenced by participants' satisfaction with their current relationship.

*Method.* Forty-eight undergraduate students (female = 26, $M_{age}$ = 21.23, $SD_{age}$ = 2.05) participated in the study. All had normal or corrected-to-normal vision. An a priori power analysis (G*Power; Faul et al., 2007) for a one-sample *t* test showed that at least 34 participants would provide 80% power to detect medium-sized effects. The dependent variable was the proportion of trials in which the closer facial picture was chosen as more attractive.

Photographs of 8 females aged 20 to 22 years with a neutral expression were used as stimuli. The face was trimmed to an oval shape to eliminate external features (e.g., hair). Participants were seated in front of a computer screen (refresh rate, 85 Hz; resolution, 1280 × 1024), with their chins secured by a headrest at a viewing distance of 60 cm. Through a mirror stereoscope, two facial stimuli were presented separately to each eye. Binocular disparity was set to 3.6 min arc in the crossed direction, enabling participants to judge a depth difference between the two images in three-dimensional view (Foley, 1980). A total of 28 randomly paired facial sets were presented, using MATLAB toolbox (Brainard, 1997).

Each trial began with a fixation cross followed by a pair of facial images presented for 3 s. The task was to choose the more attractive image in each pair. Following a prompt question ("Which image was more attractive?"), participants responded by pressing either the "1" key (left image) or the "2" key (right image). The closer image was presented randomly to either eye. Finally, after completing the computer task, we measured participants' current mood (1 = *very bad*, 7 = *very good*) and level of satisfaction with their current social relationship ("how satisfied are you with your social relationship?") on a 7-point scale (1 = *not at all*, 7 = *very much*).

*Results and Discussion.* A one-sample *t* test was performed to test whether the percentage of selected trials exceeded chance level (50%). Between the two facial images, participants liked the image that appeared closer significantly more often than expected by chance ($M$ = 54.39, $SD$ = 10.61), $t(47)$ = 2.87, $p$ = .006, $d$ = 0.42, 95% CI = [1.31, 7.47]. The effect was somewhat stronger among males ($M$ = 55.84, $SD$ = 11.95), $t(21)$ = 2.29, $p$ = .032, 95% CI = [0.55, 11.14] than females ($M$ = 53.16, $SD$ = 9.39), $t(25)$ = 1.72, $p$ = .098, 95% CI = [–0.63, 6.95]. However, because the sex difference did not reach significance, $t(46)$ = 0.87, $p$ = .39, the proximity effect may not be confined to males' judgment of females. One possible speculation is that the rather artificial nature of the stimuli (oval face trimmed with feminine features, such as hair) may have blunted the overall appeal of the facial image to the male participants in this study, narrowing the "gap" between male versus female perceivers. We discuss more on the possible boundary conditions of this effect later.

In Study 3, employing a novel method, we again found support for the prediction that proximity influences liking for social stimuli. Also, conceptually consistent with the earlier finding, relationship satisfaction was negatively correlated with the probability of choosing a closer face, $r$ = -.41, $p$ = .004. That is, individuals who were less happy with their

current relationships were more likely to prefer the closer face. Findings from the two experimental studies (Studies 2 and 3) were consistent: Close distance increased liking, and this effect was accentuated among individuals who were less satisfied with their current relationship.

## Study 4

In Study 4, in addition to replicating our finding with a different distance manipulation (video clip), one possible underlying reason for this effect was sought. One possibility is that when a stimulus appears close, it may seem psychologically more *accessible.* This might be particularly true when the target object is a person. People have intentions, and for relationships to progress, the other person generally must consent. The spatial distance between the self and other might be a relevant cue reflective of the other's social intention. When a mildly attractive person appears to enter one's personal space (Hall, 1966), as findings on touching experience imply (e.g., Fisher et al., 1976), perceptions of both availability and liking for her might increase.

We tested this possibility by showing male participants a video clip of an identical female, filmed from two different distances from the camera. After watching the clip, three questions were asked—how likely they thought she would accept their date request (a proxy measure of perceived accessibility), how likable she was, and their willingness for future interaction. We predicted that the female appearing in the closer video clip would appear more accessible, which in turn makes her more preferable. As in earlier studies, we explored whether this proximity effect varies, depending on the level of the participant's social need (loneliness level).

*Method.* A total of 154 undergraduates were recruited from a psychology class for course credit. Only single males were recruited to focus on the opposite-sex proximity effect. Although G*Power (Faul et al., 2007) indicated that at least 128 participants would provide 80% power to detect medium-sized effects, we included all participants who already signed up for the study. Three participants were excluded because of missing data, leaving a final sample of 151 male participants ($M_{age}$ = 19.14, $SD_{age}$ = 1.46).

After providing basic demographic information, participants indicated how frequently they have experienced loneliness during the past month on a 7-point scale (1 = *never*, 7 = *very often*). Although a single-item loneliness measure is limited in revealing the participants' experience of loneliness, outcomes obtained from such brief measure converge well with results obtained through lengthier scales (e.g., Cramer & Barry, 1999; Pinquart & Sorensen, 2001). Afterward, participants were randomly assigned to watch a 10-s video clip of a young female (4.17 on a 7-point attractiveness scale, by independent raters) who stood either 60 cm (close condition, $n$ = 74) or 150 cm (distant condition, $n$ = 77) from the camera (Hall, 1966). With a neutral expression, the female directly gazed into the lens—from the viewer's perspective, the female appeared to make a direct eye contact. Compared with the oval facial images presented in Study 3, the female image presented in this video clip image would appear more natural and lively to the participants.

After viewing the clip (female upper body contour was masked), participants were asked to estimate their chance of success in asking the female out on a date, ranging from 1 (*very unlikely*) to 7 (*very likely*). Higher value was used as a proxy measure of greater perceived accessibility of the female. The dependent variables, liking toward the female and willingness for future interaction were assessed on a 7-point scale (1 = *not at all*, 7 = *very much*), and averaged to create an overall liking index ($\alpha$ = .76). Participants reported their current mood on a 7-point scale (1 = *very bad*, 7 = *very good*).

*Results and Discussion.* A bootstrap mediation analysis (Model 4; Preacher & Hayes, 2008) was conducted in which distance condition (0 = distant; 1 = close) predicted liking, with perceived accessibility as a mediator. Mediation was assessed on a point estimate and bootstrapped at 95% confidence interval (CI; 5,000 bootstrap iterations). Again, participants reported greater liking toward the female when she appeared in the close ($M$ = 4.56, $SD$ = 1.04) than the distant ($M$ = 4.08, $SD$ = 1.06) video, $b$ = 0.48, $SE$ = 0.17, $p$ = .005, 95% CI = [0.14, 0.82]. Descriptive statistics are provided in Table 2. Also, as expected, distance condition was significantly associated with degree of perceived accessibility, $b$ = 0.55, $SE$ = 0.21, $p$ = .010, 95% CI = [0.13, 0.96], and perceived accessibility was significantly associated with liking, $b$ = 0.22, $SE$ = 0.06, $p$ < .001, 95% CI = [0.09, 0.35] (see Figure 3). Proximity significantly predicted greater liking even after adding perceived accessibility to the model, $b$ = 0.36, $SE$ = 0.17, $p$ = .033, 95% CI = [0.03, 0.70].

More importantly, a significant mediation was found, $b$ = 0.12, $SE$ = 0.06, 95% CI = [0.04, 0.27], $p$ = .044, indicating that proximity leads to greater liking via perceived accessibility of the social target. Again, participants' general mood did not differ across conditions, $t(149) = -0.94$, $p$ = .35, and it was not a significant covariate, $p$ = .31, suggesting that the current outcome occurs from an object-specific reaction rather than the perceiver's general mood state. As predicted, the closer female was seen as more approachable, which in turn led to a greater liking for her. In addition to replicating the previous results with a less artificial visual stimulus, Study 4 uncovers one possible explanation for why proximity increases preference for a person—a near person appears to be socially more approachable.

We also examined whether the effect of proximity on liking may differ depending on participants' level of social need (Model 5; Preacher & Hayes, 2008). Consistent with earlier result, a significant interaction between distance condition and loneliness was found, $b$ = 0.52, $SE$ = 0.15, $p$ < .001, 95% CI = [0.22, 0.82]. Proximity was a more reliable predictor of

**Table 2.** Results From Study 4: Descriptive Statistics for the Variables Across Conditions.

| | Distant | Close | | | |
|---|---|---|---|---|---|
| Variable | *M (SD)* | *M (SD)* | *F* | *p* | $\eta_p^2$ |
| Loneliness | 3.97 (1.14) | 3.76 (1.02) | 1.53 | 0.218 | 0.010 |
| Liking | 4.04 (1.25) | 4.45 (1.15) | 4.33 | 0.039 | 0.028 |
| Willingness to interact | 4.12 (1.16) | 4.68 (1.14) | 8.95 | 0.003 | 0.057 |
| Liking averaged (DV) | 4.08 (1.06) | 4.56 (1.04) | 7.97 | 0.005 | 0.051 |
| Perceived accessibility | 3.82 (1.20) | 4.36 (1.38) | 6.76 | 0.010 | 0.043 |
| Current mood | 4.30 (1.04) | 4.46 (1.06) | 0.88 | 0.349 | 0.006 |

*Note.* Standard deviations in parentheses. DV = dependent variable.

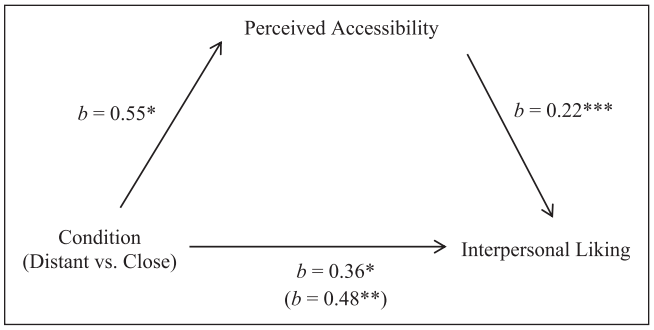


**Figure 3.** Results from Study 4: Perceived accessibility as a mediator between distance condition and interpersonal liking.
*Note.* Condition is coded as follows: distant = 0, close = 1. The total effect of condition is inside the parenthesis.
*$p$ < .05. **$p$ < .01. ***$p$ < .001.

liking among those with high (+1 *SD;* $b = 0.98$, $SE = 0.24$, $p < .001$, 95% CI = [0.51, 1.46]) than low (–1 *SD;* $b = -0.13$, $SE = 0.23$, $p = .56$, 95% CI = [–0.58, 0.32]) level of loneliness. Taken together, individuals exhibited a greater preference for a nearby (vs. distant) social target, particularly when their relational needs were less fulfilled.

## General Discussion

Although closeness is claimed to increase liking, until now empirical support for this idea has not been fully convincing. Across four studies, employing diverse methods and measures, we found that proximity indeed amplifies liking, especially for an opposite-sex target. People expressed their metaphoric association between distance and intimacy through a drawing task in Study 1. In three experimental studies, male participants consistently preferred a female in the close versus far distance condition. This pattern occurred whether preference was measured after a face-to-face interaction (Study 2), after comparing facial images through a stereoscopic device (Study 3), or a video clip (Study 4). By presenting an identical target across conditions, we were able to control for the attractiveness of the female stimulus (Studies 2, 4). The present results were not explained by momentary mood states of the participants. Overall, our findings strongly converge to support the idea that proximity increases liking for a social stimulus.

We also found that the perceiver's level of social need matters. The current effect was stronger among participants without a romantic partner (Study 2), who were less satisfied with current relationships (Study 3), or more lonely (Study 4). Prior studies (Knowles et al., 2013; Stel & Koningsbruggen, 2015) have shown that belonging needs induce individuals to underestimate the distance between themselves and others. In addition to "seeing" distance differently, our findings further suggest that heightened social need might also influence how the person "feels" about a proximal social object. A closer person seems to become more likable.

### *Implications*

In general, our research well reflects the latest insight that the mind is shaped by bodily experiences that are often beyond our awareness. For instance, sensation of sweetness makes us view ourselves as more agreeable (Meier, Moeller, Riemer-Peltz, & Robinson, 2012), warmth leads us to see others as trustworthy (Williams & Bargh, 2008), and heaviness imbues more importance to an object (Jostmann, Lakens, & Schubert, 2009). It has been also found that various dimensions of closeness (temporal, social) influence emotional experience, such as feelings about an upcoming wedding or how safe another person feels (e.g., Ijzerman & Semin, 2010; Trope & Liberman, 2010; Williams & Bargh, 2008). Our research adds to the literature by finding that spatial distance may have a direct effect on how much the target object *itself* is liked by the perceiver.

The current outcomes are particularly relevant to the motivation and distance perception literature (e.g., Balcetis & Dunning, 2010; Pitts et al., 2014). Research on wishful seeing suggests that desirable objects are seen as closer to facilitate approach-related actions. A bottle of water, for instance, appears closer to a thirsty person because this perceptual bias encourages her to grab the bottle (Balcetis & Dunning, 2010). Although this phenomenon has been replicated often, one crucial empirical chain remains to be verified. If the key function of reduced perceptual distance is to motivate the person to solve her need, it follows that a

specific approach-oriented reaction (e.g., liking, excitement) should *actually* occur toward a close object. If not, the functional purpose of this bias becomes somewhat ambiguous.

Our findings provide an important piece to this empirical gap. Although the effect of inner experience (e.g., motivation) on distance perception has been demonstrated often (Balcetis, 2016), the opposite causal path (whether proximity activates an approach-oriented experience) has been rarely tested experimentally. Three experimental studies in this research consistently suggest that this is the case. Proximity does seem to play a causal role in strengthening an approach-oriented reaction (i.e., liking) toward an object. A larger implication of this finding is that the causal flow between motivation and distance perception might be bidirectional. Not only does the mind alter how close an object appears to be, but closeness might change how fondly the mind thinks of the object.

Why would it be adaptive to prefer a proximal stimulus? We believe there are multiple reasons. At the most basic level, when reaching for an object, distance is inversely related with the amount of energy the organism needs to invest (Proffitt, 2006). Given that the key function of affect is to assist the organism to engage in situation-specific adaptive actions (e.g., Clore & Storbeck, 2006; Neese & Ellsworth, 2009), an approach-oriented affective reaction (fondness or more liking) to a closer option may arise for efficient resource management. This basic "close is good" heuristic might have further prospered in social contexts because the space between self and others also contains information about the potential partner's social intention. Such cue should not be overlooked because missed social opportunities—especially regarding a potential mate—can have crucial consequences on the fitness of humans who relied heavily on others for survival and reproductive success (Baumeister & Leary, 1995). Consistent with this reasoning, male participants in Study 4 thought that the closer female would more likely accept their date request. It further implies that the two interpretations of proximity (energy-saving function and signal of partner's social intention) are not necessarily contradictory. From an actor's standpoint, it would require less psychological and physical effort to befriend a person who seems more approachable and socially receptive (conveyed by proximity).

### *Future Research*

One main future question concerns the generalizability of the current finding. Inspired from the classic propinquity effect, the current findings confirmed the original claim that people have a preference for a close social stimulus. However, if efficient resource management is one of the ingrained mechanisms of this effect, theoretically, the current pattern could extend to nonsocial objects. We have begun investigating this possibility, and the preliminary findings are promising. Using a between-person design, we asked 141 participants (close = 77, distant = 64) to rate how much they liked positive (e.g., hamburger, wrapped present) and neutral (bowling ball) nonsocial objects that appeared either close or far from them in the computer screen. The proximity effect again emerged for the positive nonsocial objects (hamburger, $p = .04$; wrapped present, $p = .01$), but not for the bowling ball ($p = .41$). At this point, it appears that the proximity effect documented in this research is not confined to social objects, but also extends to nonsocial objects that seem desirable to the perceiver. Although an exciting possibility, we think the final words on the generalizability of the current phenomenon to nonsocial targets should wait for further replications, using larger samples and other innovative methods (e.g., neuroimaging data).

We believe there are several important boundary conditions of this phenomenon. Obviously, the current effect is likely to occur when the stimulus seems desirable to the perceiver. Sexual selection leads human and other mammalian males to actively seek mating opportunities, whereas females to be more cautious and choosier (Trivers, 1972). Because one challenge for men is to detect and respond positively to cues of mating opportunities (closely spaced females), they may adopt a relatively low desirability threshold for opposite-sex persons. Thus, we have opted in this research to focus mostly on how distance affects male's judgment of a female stimulus. Still, such proximity-driven preference might be applied often to other social contexts in which anticipated benefits appear to outweigh the associated costs (e.g., Li, Kenrick, Griskevicius, & Neuberg, 2012). Another point to note is that the stimuli presented across our studies were stationary (the video clip model also stood still in Study 4) and contained minimal threat or ambiguity. When an ambiguous object (even a positive one) moves abruptly toward a person, avoidant reactions could precede approach tendencies (cf. Hsee, Tu, Lu, & Ruan, 2014).

Finally, we recognize that some lower-level perceptual mechanisms that we did not measure in this work, such as visual attention (Fenske & Raymond, 2006), vividness (Alter & Balcetis, 2011), or processing fluency (Alter & Oppenheimer, 2008), may have been involved. For instance, in the stereoscopic task (Study 3), the closer facial stimulus might have captured more visual attention or was easier to process perceptually. Still, it seems unlikely that such factors are entirely responsible for producing the proximity effect we found across the multiple studies (e.g., actual face-to-face interaction, Study 2). Although we uncovered one psychological factor (perceived accessibility, Study 4) that seems relevant to this phenomenon, we believe the mechanisms that work in concert to produce the proximity effect are diverse and complex. A closer mapping of the specific mechanism most relevant in different distance conditions (e.g., seeing objects few inches from the eye versus observing stars) should be available through future work. As of now, our findings strongly suggest that our affective experience reacts to an important physical property of a social object—its distance from us.

## Conclusion

Distance is an important parameter of social behavior. Lovers sit tight, whereas commuters try to increase the space between themselves and strangers. Decades ago, social psychologists proposed the possibility that distance also shapes our feelings toward others. Our research provides rare experimental data in support for this classic idea. Thanks to modern technology (e.g., cell phones, airplane), some might think distance is no longer a significant barrier in social interaction. Perhaps true pragmatically, but according to our finding, psychologically, distance still matters. Closeness seems to enchant others.


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### Supplemental Material

Supplemental material is available online with this article.

### References


Alter, A. L., & Balcetis, E. (2011). Fondness makes the distance grow shorter: Desired locations seem closer because they seem more vivid. *Journal of Experimental Social Psychology*, *47*, 16-21.

Alter, A. L., & Oppenheimer, D. M. (2008). Effects of fluency on psychological distance and mental construal (or why New York is a large city, but New York is a civilized jungle). *Psychological Science*, *19*, 161-167.

Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of other in the self scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology*, *63*, 596-612.

Balcetis, E. (2016). Approach and avoidance as organizing structures for motivated distance perception. *Emotion Review*, *8*, 115-128.

Balcetis, E., & Dunning, D. (2010). Wishful seeing: More desired objects are seen as closer. *Psychological Science*, *21*, 147-152.

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, *117*, 497-529.

Bossard, J. H. (1932). Residential propinquity as a factor in marriage selection. *American Journal of Sociology*, *38*, 219-224.

Brainard, D. H. (1997). The psychophysics toolbox. *Spatial Vision*, *10*, 433-436.

Buss, D. M. (1988). The evolution of human intrasexual competition: Tactics of mate attraction. *Journal of Personality and Social Psychology*, *54*, 616-628.

Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review*, *100*, 204-232.

Carter, T. J., & Gilovich, T. (2012). I am what I do, not what I have: The differential centrality of experiential and material purchases to the self. *Journal of Personality and Social Psychology*, *102*, 1304-1317.

Clark, R. D., & Hatfield, E. (1989). Gender differences in receptivity to sexual offers. *Journal of Psychology and Human Sexuality*, *2*, 39-55.

Clore, G. L., & Storbeck, J. (2006). Affect as information about liking, efficacy, and importance. In J. Forgas (Ed.), *Affect in social thinking and behavior* (pp. 123-142). New York, NY: Psychology Press.

Cosmides, L., & Tooby, J. (2000). Evolutionary psychology and the emotions. In M. Lewis & J. M. Haviland-Jones (Eds.), *Handbook of emotions* (2nd ed., pp. 91-115). New York, NY: Guilford Press.

Cramer, K. M., & Barry, J. E. (1999). Conceptualizations and measures of loneliness: A comparison of subscales. *Personality and Individual Differences*, *27*, 491-502.

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

Fenske, M. J., & Raymond, J. E. (2006). Affective influences of selective attention. *Current Directions in Psychological Science*, *15*, 312-316.

Festinger, L., Schachter, S., & Back, K. (1950). *Social pressures in informal groups*. New York, NY: Harper.

Fisher, J. D., Rytting, M., & Heslin, R. (1976). Hands touching hands: Affective and evaluative effects of an interpersonal touch. *Sociometry*, *39*, 416-421.

Foley, J. M. (1980). Binocular distance perception. *Psychological Review*, *87*, 411-434.

Hall, E. T. (1966). *The hidden dimension*. New York, NY: Doubleday.

Haselton, M. G., & Nettle, D. (2006). The paranoid optimist: An integrative evolutionary model of cognitive biases. *Personality and Social Psychology Review*, *10*, 47-66.

Hsee, C. K., Tu, Y., Lu, Z. Y., & Ruan, B. (2014). Approach aversion: Negative hedonic reactions toward approaching stimuli. *Journal of Personality and Social Psychology*, *106*, 699-712.

Ijzerman, H., & Semin, G. R. (2010). Temperature perceptions as a ground for social proximity. *Journal of Experimental Social Psychology*, *46*, 867-873.

Jostmann, N. B., Lakens, D., & Schubert, T. W. (2009). Weight as an embodiment of importance. *Psychological Science*, *20*, 1169-1174.

Knowles, M. L., Green, A., & Weidel, A. (2013). Social rejection biases estimates of interpersonal distance. *Social Psychological and Personality Science*, *5*, 158-167.

Kurzban, R. (2001). The social psychophysics of cooperation: Nonverbal communication in a public goods game. *Journal of Nonverbal Behavior*, *25*, 241-259.

Li, Y. J., Kenrick, D. T., Griskevicius, V., & Neuberg, S. L. (2012). Economic decision biases and fundamental motivations: How mating and self-protection alter loss aversion. *Journal of Personality and Social Psychology*, *102*, 550-561.

Meier, B. P., Moeller, S. K., Riemer-Peltz, M., & Robinson, M. D. (2012). Sweet taste preferences and experiences predict prosocial inferences, personalities, and behaviors. *Journal of Personality and Social Psychology*, *102*, 163-174.

Miller, G. F. (2000). *The mating mind: How sexual selection shaped the evolution of human nature*. New York, NY: Doubleday.

Miller, S. L., & Maner, J. K. (2011). Ovulation as a male mating prime: Subtle signs of women's fertility influence men's mating cognition and behavior. *Journal of Personality and Social Psychology*, *100*, 295-308.

Neel, R., Kenrick, D. T., White, A. E., & Neuberg, S. L. (2016). Individual differences in fundamental social motives. *Journal of Personality and Social Psychology*, *110*, 887-907.

Neese, R. M., & Ellsworth, P. C. (2009). Evolution, emotions, and emotional disorders. *American Psychologist*, *64*, 129-139.

Pinquart, M., & Sorensen, S. (2001). Influences on loneliness in older adults: A meta-analysis. *Basic and Applied Social Psychology*, *23*, 245-266.

Pitts, S., Wilson, J. P., & Hugenberg, K. (2014). When one is ostracized, others loom: Social rejection makes other people appear closer. *Social Psychological and Personality Science*, *5*, 550-557.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*, 879-891.

Proffitt, D. R. (2006). Distance perception. *Current Directions in Psychological Science*, *15*, 131-135.

Schnall, S., Zadra, J. R., & Proffitt, D. R. (2010). Direct evidence for the economy of action: Glucose and the perception of geographical slant. *Perception*, *39*, 464-482.

Seals, J., & Crofts, D. (1976). Get closer. On Get Closer [CD]. California, United States: Warner Brothers Records.

Seger, C. R., Smith, E. R., Percy, E. J., & Conrey, F. R. (2014). Reach out and reduce prejudice: The impact of interpersonal touch on intergroup liking. *Basic and Applied Social Psychology*, *36*, 51-58.

Stel, M., & Koningsbruggen, G. M. (2015). I need you closer to me: Effects of affiliation goals on perceptions of interpersonal distance. *European Journal of Social Psychology*, *45*, 742-753.

Touré-Tillery, M., & Fishbach, A. (2017). Too far to help: The effect of perceived distance on the expected impact and likelihood of charitable action. *Journal of Personality and Social Psychology*, *112*, 860-876.

Trivers, R. L. (1972). Parental investment and sexual selection. In B. Campbell (Ed.), *Sexual selection and the descent of man* (pp. 136-179). Chicago, IL: Aldine-Atherton.

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review*, *117*, 440-463.

Veltkamp, M., Aarts, H., & Custers, R. (2008). Perception in the service of goal pursuit: Motivation to attain goals enhances the perceived size of goal-instrumental objects. *Social Cognition*, *26*, 720-736.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*, 1063-1070.

Williams, L. E., & Bargh, J. A. (2008). Experiencing physical warmth promotes interpersonal warmth. *Science*, *322*, 606-607.

Yan, D. (2014). Future events are far away: Exploring the distance-on-distance effect. *Journal of Personality and Social Psychology*, *106*, 514-525.

Zajonc, R. B. (2001). Mere exposure: A gateway to the subliminal. *Current Directions in Psychological Science*, *10*, 224-228.