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I'm so touched! Self-touch increases attitude extremity via self-focused attention

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ABSTRACT

In everyday life, people often engage in behaviors like chin touching, hand clasping, and arm crossing. Such self-touching behaviors have been found to emerge under emotional stress and while performing tasks requiring concentration and focus. In contrast to work examining antecedents of self-touch, the current research experimentally investigates the causal *outcomes* of self-touch, specifically its influence on evaluative cognitions such as attitudes toward external objects and events. Four studies support the prediction that both instructed and spontaneous self-touch enhance focus on the self, resulting in greater attitude extremity toward evaluated targets. A last study demonstrates that people do not have a fully accurate understanding of the influence of self-touch on consequential outcomes such as self-focus and attitude extremity. Thus, this common behavior may incidentally influence a wide variety of judgments.

1. Introduction

Being in touch with oneself is … to be aware of what is going on in your body, in your feelings, in your mind.

(Nhat Hanh Tich, "Being Peace")

During everyday life, our hands often come into contact with our own bodies. For instance, we may place a hand on a hip, on our chin, cross our arms, and so on. Self-touch – the movements of the hands on the body or onto each other – is a ubiquitous phenomenon (Barroso & Feld, 1986). Although such behavior may seem insignificant, self-touch has been found to be an outcome of several psychological states. For instance, anxiety and emotional stress (e.g., Ekman & Friesen, 1974), as well as concentration and encoding during information processing tasks (e.g., Barroso & Feld, 1986; Barroso, Freedman, & Grand, 1980; Barroso, Freedman, Grand, & van Meel, 1978) are associated with increases in self-touch.

Existing work has primarily investigated self-touch as a consequence or a correlate of prior states such as these. But might engaging in self-touch itself shape our perceptions and judgments? The self-touch literature has not directly addressed this question. Related bodies of research, such as the embodiment literature, have considered how factors such as posture and tactile sensory experience influence attitudes and evaluations *of external objects* (e.g., Ackerman, Nocera, & Bargh, 2010; Cacioppo, Priester, & Berntson, 1993; Förster, 2004; Krishna & Schwarz, 2014; Spence & Gallace, 2011), however this literature has generally not extended to one of the most common targets of touch—the self. In this work, we experimentally manipulate self-touch and test its causal influence on psychological outcomes, specifically attitudes and evaluative reactions toward external objects. For instance, when viewing an advertisement, does a hand on the chin affect your attitude about the advertised item? We also identify and test the psychological process underlying this effect: increased self-focus.

To investigate the effect of self-touch on attitudes, we integrate literature on correlates of self-touch, which show that touching objects drives attention to those objects and that self-touch is increased during tasks requiring concentration and focus, with literature on self-focus,[1] which shows that self-focused attention increases attitude extremity. Connecting these findings, and echoing the metaphor used by the Buddhist author Nhat Hanh Tich, we demonstrate that self-touch results in higher focus on the self, which in turn leads to expression of more extreme attitudes toward evaluative targets. Thus, self-touch appears to be a common behavior with an influential role in the evaluation process.

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[1] In this work, we refer to self-focused attention as related to state-based self-consciousness, not as chronic, maladaptive self-focus, which has been linked to clinical disorders associated with negative affect (e.g., Mor & Winquist, 2002).

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2. Theoretical background

2.1. Correlates of self-touch

Self-touch is typically defined as contact of hands on the body for an extended duration (Barroso et al., 1980; Barroso & Feld, 1986; Harrigan, Weber, & Kues, 1986), but some literature includes light and brief touch directed toward oneself as well (e.g. Freedman, O'hanlon, Oltman, & Witkin, 1972; Grunwald, Weiss, Mueller, & Rall, 2014). These forms of touch can target a variety of body areas, including the head and face, the other hand, legs, chest, and so on (see Table A in Online Supplemental material). Research indicates this behavior is often performed spontaneously, without awareness, and occurs in both social and nonsocial contexts (Barroso & Feld, 1986).

Existing literature focuses on self-touch as an outcome of three types of mental processes: simulation of specific tactile sensations, psychological stress, and task concentration and encoding effort. With respect to simulated sensations, people sometimes enact self-touch behaviors that have functional consequences for addressing unpleasant sensations, even when those sensations are not real. For example, people scratch more when viewing videos of or reading about insects, suggesting that people are responding to envisioned contact with these itch-inducing bugs (McBrayer, Johnson, & Purvis, 1992).

Work investigating regulation of psychological stress shows that spontaneous self-touch occurs more often when experiencing mental conflict, such as confusion (e.g., Kenner, 1993), tension (e.g. LeCompte, 1981), discomfort and anxiety (Ekman & Friesen, 1974; Goldberg & Rosenthal, 1986; Heaven & McBrayer, 2000), when lying (Fatt, 1998), and when under working memory load (Grunwald et al., 2014), presumably as a means toward relieving or regulating these states. Similarly, recent work suggests that primates scratch more when experiencing social stress; this behavior may also act as a signal to other group members, ultimately reducing aggression toward the scratching animal (Whitehouse, Micheletta, & Waller, 2017).

Most relevant to the current investigation, self-touch is associated with attention and information processing. For instance, spontaneous self-touching behavior increases during attention disruption or interference with tasks requiring focused attention (Barroso et al., 1978; Barroso & Feld, 1986; Freedman & Bucci, 1981; Ito-Jager, 2011). Barroso et al. (1980) found a negative correlation between continuous hand-to-hand touch and the number of requests to repeat information while listening to the description of a reasoning task, as well as a positive correlation between hand-to-hand touch and the number of items remembered on a memory task (these patterns were present only for bilateral touch). Similarly, Grunwald et al. (2014) found that self-touch and aspects of working memory were correlated. Their participants performed more self-touch gestures when recalling complex haptic stimuli, especially while hearing unpleasant sounds. Finally, Sousa-Poza and Rohrberg (1977) found longer duration of self-touch while people engaged in communicative tasks involving difficult encoding of information. These latter researchers suggest that person-oriented information (e.g., one's feelings or thoughts about personal and interpersonal experiences), as opposed to non-person oriented information (e.g., facts about one's schedule) may be particularly demanding on perceivers, increasing self-touch as a consequence.

This last study may indicate a link between self-touch and certain internal processes involving information processing, especially when tasks include subjective, self-evaluative content rather than more objective, fact-based content.

2.2. Could self-touch increase self-focused attention?

The existing work on self-touch highlights the relevance of antecedent states of stress and information processing or regulatory effort, suggesting (but not causally showing) that self-touch may act to self-soothe or facilitate processing. We propose that one mechanism through which self-touch can exert downstream effects is by directing attention to the target of that touch—the self. We base this hypothesis on two ideas. First, consider work on external touch, which finds that physically interacting with external objects directs attention toward and processing of those objects (Hutmacher & Kuhbandner, 2018; Lloyd, Bolanowski, Howard, & McGlone, 1999; Spence & McGlone, 2001), thereby diminishing interference from other information sources (e.g., Alsius, Navarra, & Soto-Faraco, 2007). From this research, it follows that what is being touched becomes the focal target of perceiver cognition. A comparable process may occur when touch is directed toward the self. Consistent with this possibility, being touched by others elevates self-directed cognitions such as self-exploration (i.e., attempts to understand and disclose about the self; Pattison, 1973) and self-consciousness (Wilhelm, Kochar, Roth, & Gross, 2002). Second, focused attention and reduced processing interference would be useful consequences of the self-touch that is associated with situations of encoding difficulty, like those mentioned earlier (see Grunwald et al., 2014). In particular, information involving evaluation of personal and interpersonal experiences appears to induce relatively more spontaneous self-touch (Sousa-Poza & Rohrberg, 1977), and it may be that touch eases these types of information processing by focusing attention, in part, to the self.

In sum, incorporating findings from existing research on the antecedents of self-touch with research on other forms of touch, we suggest that, analogous to the way object-touch focuses attention on the object, self-touch may focus attention on the self. If so, what are the implications of this heightened self-focused attention on downstream processes?

2.3. Self-focused attention increases attitude extremity

Studies show that greater self-focused attention can result in more extreme expression of attitudes (for a review of attitude components, including extremity, see Krosnick & Petty, 1995). Notably, these attitudes need not necessarily be directed toward the self. For instance, self-focused attention intensifies positive attitudes about objects and behaviors associated with positively-framed people, and also intensifies negative attitudes about objects and behaviors associated with negatively-framed people (Hung & Wyer, 2011). Increased attitude extremity can occur because elevated focus increases attitude awareness (Gibbons, 1990; Silvia & Gendolla, 2001), accessibility (DeMarree, Petty, & Briñol, 2007), and, under certain conditions, emotional intensity (Chentsova-Dutton & Tsai, 2010; Scheier & Carver, 1977; Silvia, 2002). Interestingly, self-focused attention also increases the self-relevance of both internal and external stimuli (DeMarree et al., 2007; Hull, Slone, Meteyer, & Matthews, 2002). As a result, self-focused attention can strengthen the effort people invest in evaluation of the self (Silvia & Phillips, 2013) and of others (Mathews & Green, 2010). Together, factors such as heightened attitude awareness, accessibility, and evaluation effort can intensify attitudes, making expression of those attitudes more extreme (e.g., Abelson, 1995; Downing, Judd, & Brauer, 1992; Krosnick & Petty, 1995).

As suggested by this literature, self-focused attention can elevate the intensity of both positive and negative attitudes (e.g., Hung & Wyer, 2011), even for attitude objects external to the self (e.g., Mathews & Green, 2010). Therefore, in the studies presented here, attitude extremity should be represented by more extreme positive attitudes in contexts featuring positively-framed information (e.g., an advertisement), whereas attitude extremity should be represented by more extreme negative attitudes in more negatively-framed contexts.

2.4. Could self-touch increase attitude extremity via increased self-focus?

To date there is no evidence that self-touch is associated with self-focused attention or attitude extremity. Here, we advance work on self-touch by: (1) experimentally examining cognitive consequences of this

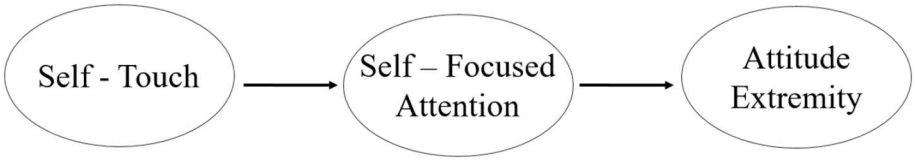

Fig. 1. Proposed psychological model of self-touch on attitude expression.

behavior, and (2) linking this behavior to both self-relevant and evaluative processes. Following our prior theorizing, we predict that self-touch increases self-focused attention, which in turn contributes to the expression of more extreme attitudes toward objects under consideration. Fig. 1 depicts the conceptual model suggested in this paper:

3. Method

To test our hypotheses, we conducted a series of three studies that manipulated self-touch and tested its influence on self-focused attention and on evaluations of various objects. In these first studies, instructed self-touch was examined through use of directions to place a hand on various parts of one's body (variation in touch location and directions helped to rule out idiosyncratic study effects). An internal meta-analysis summarized the resulting effects (see Online Supplemental material). A follow-up study examined these processes in the context of spontaneously-occurring self-touch. Finally, our last study (Study 5) examined lay beliefs about the antecedents and psychological consequences of this behavior in order to evaluate whether the outcomes of self-touch were the result of conscious processing. Across these studies, we consistently find that instructed and spontaneous self-touch increases self-focused attention, which in turn elevates attitude extremity toward external stimuli.

Sample sizes across studies were chosen to maximize power given constraints of the participant pools. Several studies were run prior to recent calls for larger samples amidst reproducibility concerns. We have attempted to supplement such studies by using a large sample in Study 3, and by conducting an internal meta-analysis, which helps to address idiosyncratic issues with individual studies (though given unresolved questions in the field about the interpretive value of such meta-analyses, we report this only in the Online Supplemental material). To further improve power, we used manipulation checks to confirm that people were accurately exposed to the manipulations and followed the study directions. We then compared the results of analyses that included and excluded participants who failed these checks. Similarly, we attempted to minimize irrelevant variance by restricting the type of touch participants used (specifically, body location of touch was controlled by the experimenter, and participants were required not to move their hand during the procedures), by refining the self-focus measure we used (see Study 1), and by using multiple convergent items to assess attitudes. Recruitment for our studies included student samples from different institutions and adult samples through the Amazon Mechanical Turk system. These samples were diverse on dimensions such as ethnicity, occupation, and gender, although because we did not expect any identity-related factors to play a theoretically meaningful role, we did not use special sampling procedures along these dimensions. All studies have been approved by our local institutional review board or were deemed exempt from review.

3.1. Study 1

Study 1 began our investigation of the role that self-touch plays in influencing self-focus, and in turn, attitude extremity, with a 2-cell between subjects design.

3.1.1. Procedure

Eighty one undergraduate students at Michigan State University (20 male, M_{age} = 21, SD = 2.21) participated in this 2-cell (Self-touch: present/absent) study in exchange for course credit. Participants were asked to watch a promotional video for the Harrington College while their hand rested either on their leg (self-touch) or by their side (no touch). The video was downloaded from a publicly available source on the internet and used only for the purpose of this experiment. The video was about 45 s long and portrayed a testimonial of a female designer who described her experience while studying at the college. The testimonial was intertwined with visual clips documenting class lessons and other learning activities in the college. As a cover story for the self-touch manipulation, participants wore a wrist heartbeat monitor on the wrist of their non-dominant hand, which looked like a watch with a lid (closed to prevent viewing heartbeat changes during the experiment). They were told that the monitor measured their heartbeat during the experiment and that in order to ensure accuracy, it was important that they did not shake or move their hand. The experimenter placed participants' monitor-hands either on their leg or hanging down.

After watching the video, participants filled out a self-focused attention scale consisting of five 7-pt. scale items (1-Definitely Not to 7-Definitely Yes): *I am thinking about myself now; I'm the focus of my thoughts; I am focusing on my thoughts and emotions; I'm attentive to my inner feelings; I am focusing on what I would say or do* (see full scale materials and validation tests in the Online Supplemental material). To measure attitudes, participants responded to three 7-point, bipolar items (unfavorable-favorable, bad-good, negative-positive, Mogilner & Aaker, 2009; Cronbach's α = 0.93), and five additional items based on Perkins and Forehand (2012) and adapted to the college context: *Is Harrington College interesting? Is Harrington College worth applying to? Would you enjoy studying at Harrington College? If you considered applying to a design college, would you consider Harrington College?* (1-Definitely Not, 7-Definitely Yes); and *If you considered applying to a design college, what are the/chances you would apply to Harrington College?* (1-Very Low Chances; 7 – Very High Chances, Cronbach's α = 0.83).

Finally, participants rated ease of visualization ("*How easy is it for you to visualize yourself studying at the college?*" 1-Not Easy at All; 7-Very Easy), and reported whether they moved their hand bearing the heartbeat monitor as well as the extent to which they were aware to the heartbeat monitor throughout the experiment (see Online Supplemental material).

3.1.2. Results

Five participants indicated that they moved their hand with the heartbeat monitor during the experiment (eliminating these participants from the analyses did not influence the results, therefore analyses were carried out including these 5 data points).

A *t*-test on self-focused attention produced a significant effect of self-touch, $t(79) = 2.45$, $p = .016$, $d = 0.539$ 95% CI: [0.443, 0.693]. Self-touch ($M = 5.08$; $SD = 1.18$) increased self-focused attention relative to the self-touch-absent condition ($M = 4.47$; $SD = 1.08$).

Next, a principal axis factor analysis with promax rotation on the full set of attitude items revealed two factors (eigenvalues > 1.8; all loadings > 0.53 on the relevant factor). Using these outputs, we calculated composites for the bipolar attitude items (α = 0.93) and for the rest of the attitude items (α = 0.83). The correlation between the 3-item and the 5-item attitude scales was 0.301 ($p = .006$). We therefore included both attitude composites in a multivariate analysis of variance.

This MANOVA on attitudes revealed an overall multivariate effect of self-touch condition, $F(2,78) = 6.97$, $p = .002$, $\eta_p^2 = 0.152$. Univariate

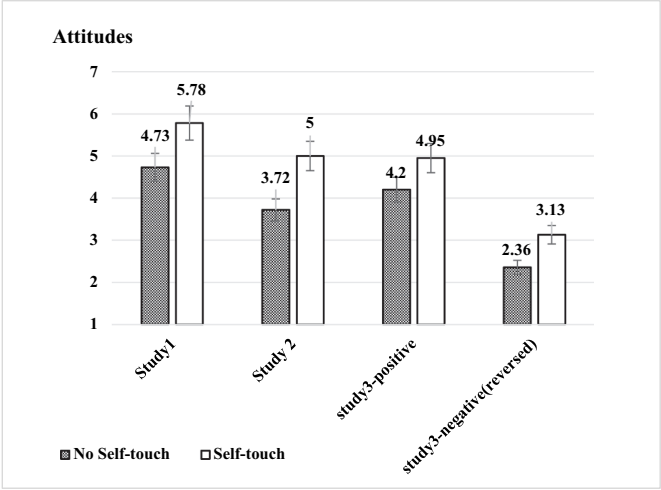

Fig. 2. Aggregate results for the effect of instructed self-touch on attitude extremity across studies (error bars represent standard errors). Study 3 featured measurement of both positive and negative attitudes.

tests of the bipolar composite indicated that self-touch increased positive attitudes toward the college (M = 5.78; SD = 1.01) relative to the self-touch-absent condition (M = 4.73; SD = 1.47), $F(1,79) = 13.96$, $p < .001$, $d = 0.87$, 95% CI: [0.39, 1.34]. See Fig. 2, which portrays aggregate results for the effect of self-touch on attitude extremity in all studies. The effect of self-touch on the composite of the rest of the attitude items was not significant, but was directionally consistent ($M_{\text{self-touch}} = 4.77$, $SD = 1.16$; $M_{\text{no touch}} = 4.43$, $SD = 1.24$), $F(1,79) = 1.88$, $p = .175$.

Finally, we examined whether self-focused attention mediated the effect of self-touch on the bipolar attitude composite using the Hayes (2012) PROCESS procedure (Model 4, 10,000 bootstrap samples). Self-focus satisfied criteria for mediation (*indirect effect* = −0.14; 95% CI: [−0.40, −0.01]). Thus, the increase in positive attitudes stemming from self-touch was driven by an increase in self-focused attention.

3.2. Study 2

Study 2 replicated the general procedure used in Study 1, but here we manipulated self-touch within-subjects. By using this type of design, we increase statistical power to test our hypotheses and also examine robustness of the effects. Participants watched two promotional videos for a college, once in a self-touching posture and once in a posture preventing self-touch. After each viewing, they responded to self-focus and attitude measures.

3.2.1. Procedure

Eighty-one community members registered in the behavioral lab participant pool at Massachusetts Institute of Technology (53 male, $M_{\text{age}} = 36$, $SD = 12.68$) participated in a 2 (Self-Touch: present/absent; within-subjects) × 2 (Video Order: A/B; between-subjects) × 2 (Self-Touch Order: first/s; between-subjects) mixed design experiment for $8. Self-touch order and video order were varied only for counterbalancing purposes.

Participants were told that the Harrington College of Design was interested in selecting a video to advertise its services, and that this college had enlisted the help of a business school in the Northeast U.S. to conduct a market research. The participants were asked to watch two similar videos for the college (labeled A & B) and express their opinion about each via a questionnaire. One video was the same as in Study 1, and the other was a similar video from the same source.

To manipulate touch, before viewing the first video, the experimenter asked half of the participants to put one hand on the mouse and the other hand on the wrist of the hand holding the mouse (self-touch) or on a small pillow (no self-touch). The pillow had the shape of a long cylinder resembling the shape and thickness of a wrist, and was made of foam filling covered with smooth cloth. The pillow was placed close and in parallel to the participant's wrist, thus simulating the same posture as if the participant was placing their hand on their wrist. In both conditions, the experimenter explained to participants that it was important for the college to have people watch the videos in a similar, comfortable position. Once participants finished watching the first video and answering the questions about it, the experimenter approached them and changed their position from wrist to pillow or from pillow to wrist, explaining that we did not want people to get tired (simply to provide a reason for the change). Then the experimenter repeated the instructions, and launched the second video. Participants were directed not to remove their hand from its position (the wrist or the pillow) during any part of the procedure, so that the effect of touch or no-touch was continuous throughout the experiment.

After each video, participants answered questions on the computer using the mouse without removing their free hand from their wrist or from the pillow. The questions measured self-focused attention and attitudes toward the college. To measure self-focused attention, we used the same scale as in Study 1, but items were adapted to the current study context (e.g., "*When I think about this college…*"; Cronbach's α after watching Video A was 0.80 and after watching Video B was 0.78). Product attitudes were measured using the three 7-point, bipolar items from Study 1, and one purchase intention item "*What is the chance you would apply for Harrington College?*" (1-Very Low Chance to 7-Very High Chance), which was used to capture a more concrete attitude.

In sum, participants went twice through the self-touch condition assignment (self-touch/pillow-touch), each time viewing a video (A or B) and answering a questionnaire pertaining to self-focused attention and attitudes toward the college. The order of conditions and videos was counterbalanced between subjects. Finally, participants answered several questions measuring awareness of their own self-touching behavior (see Online Supplemental material), a check on whether they removed their hand from their wrist or the pillow during the study, and demographic questions, were debriefed, paid and dismissed.

3.2.2. Results

No participants indicated that they moved their hand from the wrist/pillow during the experiment. To analyze the results, we treated order of the self-touch condition and video as between-subjects factors and self-touch condition as a within-subjects factor.

We first analyzed the effect of self-touch on self-focused attention. Because self-touch was manipulated within-subjects, and the other variables were between-subjects, a mixed ANOVA approach was appropriate. A Video × Self-Touch × Self-Touch Order analysis revealed only an interaction of Self-Touch Order × Self-Touch, $F(1,77) = 31.27$, $p < .001$, $d = 0.916$, 95% CI: [0.095, 0.982]. For participants who used self-touch first, their self-focused attention was higher during the corresponding video ($M = 4.92$, $SD = 1.23$) than it was when watching a video without using self-touch ($M = 3.71$, $SD = 1.19$; $F(1,77) = 20.3$, $p < .001$). Similarly, for participants who used self-touch last, their self-focused attention was higher during the corresponding video ($M = 5.05$, $SD = 0.93$) than it was when watching a video without using self-touch (M = 4.32, $SD = 1.35$; $F(1,77) = 13.96$, $p < .001$). Given the within-subjects nature of the design, this pattern indicates that engaging in self-touch increases self-focused attention. There were no effects of the manipulation order ($p = .507$) or specific video used ($p = .398$), as well as no significant interactions of these variables with self-touch ($ps > 0.237$).

Next, we examined attitudes. To determine whether an attitude composite could be created, we conducted two principal axis factor analyses with promax rotation on the four attitude items (one for each within-subjects set of these items). These revealed a single factor solution fit each set (eigenvalues: 2.17 and 2.67; all items loaded above

0.55 and 0.70 on the factor). A single attitudes composite was created by collapsing across items in each repeated condition (Cronbach's α for each of the within-subject tests was 0.71 and 0.89). Because the scale labels differed across attitude measures, we z-scored all items before analyzing or combining the items (this procedure was used in all subsequent studies in which composites were created using unmatched items). Means are reported in untransformed units for readability.

As with the self-focused attention analyses, a mixed ANOVA was conducted on the z-scored attitude composite, revealing only an interaction of Self-Touch Order × Self-Touch, $F(1,77) = 32.76$, $p < .001$, $d = 1.26$, 95% CI: [0.78, 1.74]. When participants watched the first video while using self-touch, their attitudes were more positive for that corresponding video ($M = 4.79$, $SD = 1.18$) than they were for the video with which self-touch was not used ($M = 3.76$, $SD = 1.21$; $F(1,77) = 15.42$, $p < .001$). Similarly, when participants used self-touch while watching the second video, their attitudes were more positive ($M = 5.21$, $SD = 1.35$) for this video than they were during the video with which self-touch was not used ($M = 3.67$, $SD = 1.49$; $F(1,77) = 23.41$, $p < .001$). Consistent with predictions, these patterns indicate that self-touch increases positive attitude extremity. No effects emerged of the manipulation order ($p = .777$) or specific video used ($p = .359$), as well as their interactions with self-touch ($ps > 0.322$).

To examine potential mediation of the attitude effect by self-focused attention, we used the Montoya and Hayes (2017) MEMORE procedure (10,000 bootstrap samples) for analyzing mediation in repeated measures designs. Given the order × self-touch interactions in the primary analyses, and the fact that moderated mediation has not yet been implemented in bootstrap tests, we first recoded the self-focused attention and attitude variables to collapse across self-touch order (this not being a variable of interest for our hypotheses). Further, we did not include video order as no effects of this were present in the primary analysis. Thus, we entered two within-subjects mediator variables (self-focused attention when self-touch was present/absent) and two within-subjects outcome variables (attitudes when self-touch was present/absent). The bias-corrected bootstrap analysis indicated that self-focused attention indeed satisfied criteria for mediation (*indirect effect* = 0.402; 95% CI: [0.251, 0.603]. Thus, the increase in positive attitudes stemming from self-touch was driven by an increase in self-focus, replicating the findings from Study 1 while using a somewhat different procedure.

3.3. Study 3

Study 3 extends the design of earlier studies by examining both positive and negative attitudes and by using a larger sample. Our initial hypotheses focused on attitude extremity, and did not distinguish possible positive and negative attitude differences. However, work on interpersonal touch indicates that physical contact between individuals can increase one's sense of security (e.g. Levav & Argo, 2010) and has a generally soothing and calming effect (e.g. Burgoon, 1991; Burgoon, Walther, & Baesler, 1992), and we therefore considered the possibility that self-touch primarily influences positive attitudes. To test this, we had participants evaluate either positive or negative framings of the same object. If no effect of framing emerges, this would suggest that instructed self-touch increases attitude extremity for both positive and negative attitudes.

We also returned to a between-subjects design in this study in order to avoid possible carryover effects between conditions (where earlier responses affect later responses) and to ensure that participants would not accurately interpret the study goal, thereby increasing the chances of demand effects. To compensate for the loss of power in this design, we increased the sample size by approximately four times that in Study 2.

3.3.1. Procedure

Three hundred thirty-seven undergraduate students (177 female, $M_{age} = 20$, $SD = 6.2$) took part in this 2 (Self-touch: present/absent) × 2 (Review valence: positive/negative) fully between-subjects experiment for course credit. The experiment was conducted in the behavioral laboratory of Boston University. Similar to Study 2, at the beginning of the study, the experimenter asked participants to place their non-mouse hand on the wrist of their mouse-hand (self-touch) or on a foam pillow as in Study 2 (no self-touch). The experimenter told the participant: "We are checking out a few procedures in the lab, so I would like you to keep in this position until you see a notice on the screen which says that you can stop. You will need to use the mouse in this study. Is that OK?"

Participants then read: "On the next page there is a downloaded consumer review for the Dunk Mug (available online and in the stores). Please inspect the picture of the product, read the review closely, and respond to the questions that follow." Next, participants saw a photo of the Dunk Mug (a coffee cup) and read a positive/negative customer review (see Online Supplemental material for review content, attitude items, and additional analyses). After that, participants filled out the self-focused attention scale used in previous studies, as well as a set of attitude items which included the three-item bipolar attitudes scale (Mogilner & Aaker, 2009) and the five product-specific items used in Study 1, adapted to the coffee mug context. We chose to reintroduce these items to capture a richer variety of attitudes than the one provided by the bipolar items. Finally, participants filled out a few items about the review: perceived fluency of reading/comprehension, perceived valence, and perceived believability (analyses for these are provided in the Online Supplemental material). Finally, participants reported whether they moved their hand from its initial location during the study (see Online Supplemental material for measures).

3.3.2. Results

Three participants indicated that they removed their hand from the wrist/pillow during the experiment. Eliminating these participants from the analyses did not influence the results, therefore analyses were carried out including these three data points.

As in earlier studies, we first examined self-focus. A two-way ANOVA revealed a significant main effect of self-touch on self-focus: Similarly to our previous studies, participants in the self-touch condition reported greater self-focused attention ($M = 4.39$, $SD = 1.29$), compared with participants in the no self-touch condition ($M = 4.08$, $SD = 1.34$, $F(1,333) = 4.662$, $p = .032$, $d = 0.30$, 95% CI: [0.08, 0.51]). No other significant effects or interactions were found ($ps > 0.3$).

To evaluate the attitude items, a principal axis factor analysis with promax rotation revealed a single underlying factor (eigenvalue = 5.33, factor loadings no < 0.78) and so a single composite for attitudes ($\alpha = 0.96$) was created (using z-scores).

An ANOVA testing the effect of self-touch on attitudes revealed a main effect of valence, such that participants who read positive reviews reported significantly more positive attitudes ($M = 4.58$, $SD = 1.33$), compared with participants who read negative reviews ($M = 2.74$, $SD = 1.25$ $F(1,333) = 183.51$, $p < .001$, $d = 1.48$, CI: [1.23, 1.71]). No main effect of self-touch condition was found ($p = .968$), but a significant interaction of self-touch and review valence emerged on product attitudes ($F(1,333) = 32.25$, $p < .001$, $\eta_p^2 = 0.09$). The pattern of this interaction indicated increased attitude extremity following self-touch. Planned contrasts indicated that attitudes following the positive review were significantly more positive for participants in the self-touch condition ($M = 4.95$, $SD = 0.93$) compared with the no self-touch condition ($M = 4.20$, $SD = 1.57$; $F(1, 333) = 15.66$, $p < .001$, $\eta_p^2 = 0.05$, 95% CI: [−0.639, −0.215]). Similarly, attitudes following the negative review were significantly more negative for participants in the self-touch condition ($M = 2.36$, $SD = 1.60$) compared with the no self-touch condition ($M = 3.13$, $SD = 1.39$; $F(1, 333) = 16.60$, $p < .001$, $\eta_p^2 = 0.05$, 95% CI: [0.224, 0.642]). These results support our prior findings and demonstrate that the attitude extremity effect extends to both positive and negative attitudes.

3.4. Study 4

As with our prior studies, Study 4 tested the hypothesis that self-touch increases self-focused attention and consequently increases attitude extremity, but extended the design of Studies 1–3 as follows. Studies 1–3 induced self-touch by instructing participants to place their hands on their bodies or elsewhere. This instructed form of self-touch is unlike that typically studied in the self-touch literature but is required to experimentally evaluate its downstream consequences. Of course, in many evaluative contexts (including the literature examining self-touch as an outcome of antecedent states), touch is not explicitly directed by others or by the self. Is spontaneously-occurring self-touch also influential in such contexts? Study 4 generally followed the design of Study 3, but instead of manipulating self-touch, we videotaped participants while they were reading a consumer review of a product. Duration of self-touch as timed in these recordings was used as the predictor in our analyses. Like Study 3, Study 4 also included both positive and negative contexts (product reviews). Thus, Study 4 extends our hypothesized model to the domain of spontaneously occurring self-touch, the format most commonly studied in prior self-touch literature and one that better approximates behavior in natural situations.

3.4.1. Procedure

Eighty-one undergraduate students at Michigan State University (61 female, $M_{age} = 21.2$, $SD = 3.7$) took part in this laboratory study. Participants who entered the lab were asked to sit down at a table near the wall and sign a consent form. While they were signing the consent form, the experimenter prepared their station, turning on the video recording and entering their participant ID. Then participants were seated at their computer station and started the experiment. In this experiment, participants read a positive or a negative product review for the Dunk Mug (used in Study 3) and filled out the self-focused attention scale and the three bipolar attitude items from Studies 1–3. For brevity, we did not include any additional attitude measures or follow up questions about the reviews. During the whole session, participants were video-recorded.

3.4.2. Results

The average time spent reading the reviews was 95 s (SD = 8.37). We coded the duration of time participants were in self-touch while reading the review and completing the scales, for each of seven body locations identified in literature (hair, chest, chin, fingers, elbows, shoulders, and arms crossed; Barroso et al., 1980). The duration of self-touch did not distribute normally, therefore we log-transformed the time measurements and used these scores in the analyses. We ran two Repeated Measures ANOVAs to test whether touch location had an effect on self-focus or on attitudes. We found no significant effect of touch location on self-focus ($p > .1$) or on attitudes ($p > .1$). We therefore collapsed the location data into one single score representing the total duration of self-touch. Given the continuous nature of this variable, we used multiple regression to test self-focus and attitude outcomes.

To first examine effects on self-focus, we regressed self-focus on duration of self-touch, review valence (coded as 1 = positive, 2 = negative), and their interaction. This revealed a significant main effect of self-touch duration ($\beta = 0.759$, $t = 2.18$, $p = .032$), indicating that the longer the duration of self-touch, the higher the self-focus that participants reported. We found no effect of valence and no effect of the interaction of valence and self-touch duration on self-focus ($p > .1$).

A regression of attitudes on duration of touch, review valence, and their interaction revealed a main effect of valence, showing that attitudes were more positive for positive reviews compared with negative ones ($\beta = -0.408$, $t = -4.76$, $p = .001$), as well as a significant interaction ($\beta = -0.607$, $t = -2.013$, $p = .048$). Simple slopes showed a significant increase in positive attitudes associated with longer self-touch for people who read positive reviews ($\beta = 1.656$, $t = 2.654$, $p = .010$), and a marginally significant drop in positive attitudes associated with longer self-touch for people who read negative reviews ($\beta = -0.289$, $t = -1.912$, $p = .063$). Thus, the longer participants engaged in self-touch, the more extreme were their attitudes toward the product (whether positive or negative).

Mediation analysis employing PROCESS (model 8 with 1000 bootstrap samples; Hayes, 2012, 2013) suggested that self-focus mediated the effect of self-touch and valence on attitudes ($\beta = -3.12$, 95% CI: $[-5.64, -0.602]$).

3.5. Study 5

Studies 1–4 consistently found that self-touch elicited higher self-focus and thereby resulted in more extreme attitudes. This was true when self-touch was instructed (Studies 1–3) and when it occurred spontaneously (Study 4). In our last study, we moved beyond evaluation of actual self-touch outcomes to instead examine *how* people think about the antecedents and consequents of self-touch—their lay beliefs. Individuals are likely often conscious of their engagement in self-touch (though the extent of this may not be fully appreciated). However, do people recognize the potential causes and effects of these actions?

In early work on self-touch, Harrigan and colleagues examined observer inferences and found that individuals exhibiting more self-touch were judged as warmer, more anxious, more sincere, and more expressive (Harrigan et al., 1986). We asked participants to report their beliefs about self-touch behavior both as a comparison to this early work and to evaluate whether the effects of self-touch are non-conscious in nature. Modern definitions of non-conscious processing indicate that people are commonly unaware of the influence and effect of triggering stimuli and not necessarily of the triggering stimuli themselves (Bargh & Morsella, 2008). Thus, if people report inaccurate beliefs about the consequences of self-touch, this behavior can be said to exert non-conscious influence. Further, a lack of awareness would also suggest that our earlier results are not due to demand effects or reasoned decision-making. We predicted that participants would be generally unaware about the role that self-focused attention plays in self-touch. To test this, Study 5 examined lay beliefs concerning self-touch in both undirected (i.e., spontaneous) and directed (i.e., instructed) contexts.

3.5.1. Procedure

Two hundred forty-two MTurk participants (95 female, $M_{age} = 35$, $SD = 11.3$) answered a survey pertaining to their beliefs about the antecedents and the consequences of self-touch on their attitudes. First, participants rated the likelihood (1 – "very unlikely," 7 – "very likely") that people would engage in self-touch within ten situations: (A) four of these represented relevant, empirically-supported situations based on the existing self-touch research cited earlier (i.e., when people are lying, are afraid, are concerned, and when something is hard to understand), (B) one represented a situation based on our findings from the current studies (i.e., when self-focus is needed), and (C) five were irrelevant (i.e., when people are bored, are in a hurry, are tired, are surprised, and are happy). Participants were told: "People occasionally touch various parts of their bodies with their hands (such as face, arms, legs) throughout the day. For example, you may recall times when you cross your arms, clasp your hands, or just put your hand on your leg. In your opinion, when would people be especially likely to engage in this behavior?"

If participants are aware that self-touch can provide comfort and relieve stress, they should rate the first set of relevant situations (A) highly. If participants are aware that self-touch increases self-focused attention (or that self-touch is useful in situations lacking self-focus), we should find that likelihood ratings for the "need for self-focus" situation (B) are comparable to ratings for the relevant situations (A) mentioned above. Additionally, if participants' lay beliefs are correct, likelihood ratings for the relevant (A) and "need for self-focus" (B) antecedent situations should be higher than ratings for the irrelevant situations (C).

However, if participants are incorrect in their lay beliefs, their ratings for the irrelevant situations (C) should be equal to or higher than those for the relevant and self-focus situations (A) and (B).

Next, we measured participants' beliefs about the resulting consequences of self-touch on attitudes. We first addressed spontaneous self-touch and then instructed self-touch. Participants chose the most likely option from five consequences of self-touch on attitudes: "*My attitudes will be more positive; My attitudes will be more negative; My attitudes (positive or negative) will be stronger; My attitudes (positive or negative) will be weaker; Nothing will happen – my attitudes will not change.*" If people are conscious of the effects found in Studies 1–5, they should choose the "more positive," "more negative," or generally "stronger" options more frequently than the other options, or at least at greater-than-chance levels (60% for the set of three together). To assess perceived effects of instructed self-touch, participants were instructed to imagine that they were participating in an experiment in which the experimenter asked them to place their hand on their leg during the study (reflecting the procedure used in Study 1). Then, they once again chose the most likely effect from the same list of five options. Finally, to determine whether people are aware of general engagement in self-touch behavior, participants indicated how many times an hour they thought people touch their faces (this information was compared to extant literature on the actual number of times people touch their faces; analysis of this frequency is presented in the Online Supplemental material). Participants then answered demographic questions and were thanked and paid.

3.5.2. Results

3.5.2.1. Beliefs about situational antecedents of spontaneous self-touch. We first organized the distribution of the ten likelihood ratings for visual inspection (see Table 1 for all means and *p*-values). A Repeated Measures ANOVA (with Bonferroni correction to adjust for inflated Type I error) revealed significant variation across the antecedent situations, $F(9,230) = 67.85$, $p < .001$, $\eta_p^2 = 0.22$. Consistent with our predictions, contrast analyses indicated that need for self-focus was rated as significantly less likely to be an antecedent of self-touch compared with all of the other situations except "in a hurry" and "happy", which were both rated as significantly less likely to elicit self-touch than need for self-focus. Additionally, ratings for being "surprised" were not significantly different from need for self-focus. These data indicate that people believed need for self-focus to be *less* relevant to self-touch than the antecedent states supported by prior literature (i.e., lying, hard to understand, afraid and concerned). Further, people believed that need for self-focus was less or equally likely to be involved compared to three irrelevant antecedents (i.e., bored, tired, surprised). These results imply that participants did not have a solid understanding of how self-focused attention acts as an antecedent of self-touch. Extrapolating from these data, even if participants in our studies were aware of the manipulation of self-focus, they likely were unaware of its influence on their behavior. Of course, it is possible that participants did not fully grasp the meaning of "when self-focus is needed," but even lay representations of this idea (e.g., you should focus on yourself) are comparable in meaning.

As an alternate means of examining these data, we conducted a principal axis factor analysis with promax rotation on the antecedent items, which indicated the presence of two factors (eigenvalues: 3.27, 1.29). Composites labeled "negative situations" (when lying, concerned, afraid, tired, bored, and things were difficult to understand) and "high intensity" situations (happy, surprised, and in a hurry) were created. Need for self-focus did not load highly on either factor (< 0.30) and so was kept separate. A Repeated Measures ANOVA on the two composites and need for self-focus again revealed significant variation $F(2,239) = 108.86$, $p < .001$, $\eta_p^2 = 0.48$. Simple contrasts showed that people judged negative situations to elicit more self-touch than situations requiring self-focus, $F(1,240) = 25.70$, $p < .001$, $\eta_p^2 = 0.10$, but high intensity situations to elicit relatively less self-touch than situations requiring self-focus, $F(1,240) = 44.48$, $p < .001$, $\eta_p^2 = 0.16$. Although the findings for the self-focus situation do not indicate that it is seen as the least likely elicitor, these results suggest that at a minimum, people are less aware of how the need for self-focused attention can motivate self-touch compared to other, previously identified antecedents.

Table 1
Perceived likelihood of situations as antecedents to spontaneous self-touch (Study 5).

Self-touch antecedent	Mean	SD	F	p	Difference from need for self-focus
Concerned	5.49	1.20	41.87	.000	0.67
Bored	5.44	1.41	27.05	.000	0.62
Afraid	5.38	1.36	24.05	.000	0.56
Hard to understand	5.18	1.46	9.72	.002	0.36
Tired	5.18	1.48	10.50	.001	0.36
Lying	5.16	1.57	6.68	.010	0.34
Surprised	4.98	1.64	1.65	.201	0.16
Need for self-focus	4.82	1.53	–	–	–
Happy	4.21	1.59	25.19	.000	-0.61
In a hurry	3.21	1.73	143.25	.000	-1.61

Note. Analyses test differences between each antecedent and the perceived likelihood of need for self-focus (shaded row).

3.5.2.2. Beliefs about the consequences of self-touch. Frequencies for each effect of spontaneous self-touch and instructed self-touch appear in Fig. 3. Chi-square analyses indicated significant variation among the different response options for both the spontaneous framing ($\chi^2(4) = 86.97$, $p < .001$) and the instructed framing ($\chi^2(4) = 244.78$, $p < .001$). In both contexts, the most common belief was that attitudes would not change as a consequence of self-touch (43.8% and 59.9% respectively). We next coded participants who chose the "correct" options—that their attitudes would be more positive, more negative, or stronger following self-touch. Binomial tests showed that participants were significantly less likely than chance (i.e., 60%) to believe that self-touch intensified attitudes in both the spontaneous and instructed framings (44.2%, $p < .001$ and 28.1%, $p < .001$, respectively). Next, chi-square tests revealed a marginally significant higher percentage of people who chose the "incorrect" options (56%) than the "correct" options (44%) in the spontaneous framing ($\chi^2(1) = 3.240$, $p = .072$), and a significantly higher percentage of people who chose the "incorrect" options (72%) compared with "correct" options (28%) in the instructed framing, ($\chi^2(1) = 46.430$, $p < .001$). Thus, people do not appear to be aware of the consequences of self-touch on their evaluative attitudes.

4. General discussion

How can we be more in touch with ourselves and with our attitudes? The current experiments demonstrate that physical contact with one's own body encourages people to focus on themselves. This self-focus results in the expression of more extreme attitudes toward evaluative objects, whether those attitudes are positive or negative in nature. Nevertheless, people do not seem especially aware of the particular elicitors or consequences of self-touch or of the role that self-focus plays. Thus, this common behavior may incidentally influence a wide range of attitudes.

Previous work on self-touch differs from the present research by focusing, often with correlational designs, on antecedents of (spontaneous) self-touch such as anxiety and information processing difficulty (e.g., Barroso & Feld, 1986; Fujii, 1997). Indeed, we find in Study 5 that people believe these needs will trigger self-touch behavior. However, our findings go beyond prior literature by examining the causal outcomes of instructed and spontaneously-occurring self-touch. Both types

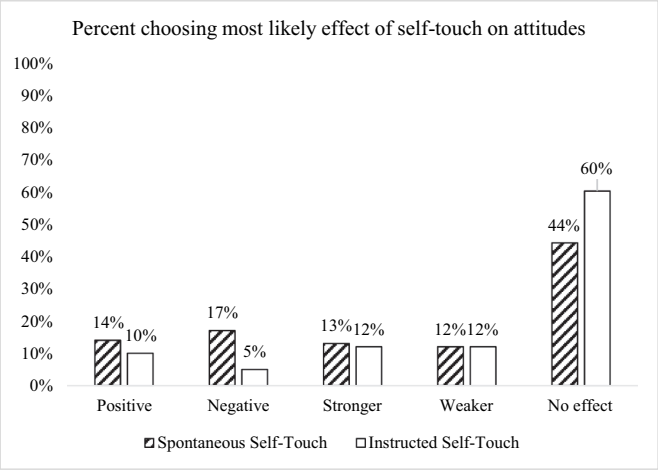

Fig. 3. Distribution of beliefs (in percentages) about the most likely effect of self-touch on attitudes. Possibilities include becoming more positive, more negative, stronger (more extreme), weaker (less extreme), or no effect. Beliefs for both spontaneous and instructed self-touch are presented.

appear to produce heightened self-focus and attitude extremity, though our data speak most strongly to the consequences of instructed behavior. Also unlike prior work (e.g. Grunwald et al., 2014), the current studies emphasize effects of self-touch on evaluations of external stimuli. This research therefore moves past investigation of the influence of internal states such as stress and working memory interference, and instead highlights a consequential, and potentially modifiable, process by which the same behavior can shape evaluation of the surrounding world. The current findings do not contradict prior literature, and they may in fact augment our understanding of previously identified processes. For instance, when an individual experiences difficulty in encoding information, this may induce more self-touching behavior (e.g. Barroso et al., 1980; Grunwald et al., 2014), which could potentially increase self-focus and result in more extreme expression of relevant attitudes.

This work makes several key contributions. First, it demonstrates that instructed self-touch directly causes changes in self-focused attention, an outcome that has been hinted at in previous work (Grunwald et al., 2014), but never directly tested. Second, it connects self-touch behavior to attitudes beyond those purely involving self-evaluation. This connection follows from findings in the self-focused attention literature, but has not been shown as a function of self-touch, perhaps because prior research has concentrated on the presumed functions of self-touch rather than the consequents of the processes activated by this behavior. Third, the current paper contributes to the attitude literature by revealing a physical antecedent to attitudinal change—self-touch. By manipulating self-touch in studies like those presented here, we are able to better identify the causal pathways associated with a potentially broad range of outcomes. Fourth, the current work proposes a mediation model whereby self-touch increases attitude extremity via enhanced self-focused attention. While the link between self-focus and attitude extremity has been demonstrated in the literature, this link has not been shown as a consequence of self-touch. Further, self-focus has not been suggested previously as a mediator of the effect of self-touch on attitudinal outcomes.

This research also contributes to the relatively underdeveloped literature on touch, perhaps especially within social psychology (see Saunders, Riesel, Klawohn, & Inzlicht, 2018). The existing literature has largely focused on haptic (tactile) interactions with external entities as represented by object touch and interpersonal touch. Studies have suggested that attitudes can be influenced by haptic sensations of external objects (e.g., Ackerman et al., 2010; Liu, Wang, & Shao, 2016), merchandise (e.g., Peck & Wiggins, 2006) or other people (Coan, Schaefer, & Davidson, 2006; Guest et al., 2009). Self-touch is unique in that it combines the situation of both touching and being touched. How processes involved in each of these types of touch interact with each other has yet to be addressed. Further investigation of this issue, as well as the similarities and differences between self-touch and other forms of touch, is thus important.

The influences of self-touch on downstream cognition appeared to be non-conscious in nature. As indicated in follow up questions at the end of our studies, participants who were instructed to engage in self-touch were not aware of the effects of this behavior, and participants who were videotaped spontaneously engaging in self-touch were not aware of its effects. Further, the findings from Study 5 offer preliminary evidence that people may not have particularly accurate intuitions about the influence of self-touching behavior on attitudinal outcomes. This is perhaps not surprising, as people are often unaware of the full multitude of influences on their decisions and actions, and on the specific psychological processes involved in producing these outcomes (Bargh & Morsella, 2008). One implication of this is that interventions designed to use self-touch to elicit self-focus or attitude extremity could be either instructional (telling people to place their hands on their bodies) or manipulated spontaneously (for example, deep chairs that encourage self-oriented hand placement). For instance, we might expect that inducing self-touch would be a helpful therapeutic tool in situations benefiting from greater self-focused attention.

5. Limitations and future directions

Although our studies reveal interesting insights into self-touch behavior, they possess several limitations. We relied on self-reports as measures of attitudes and self-focused attention. Clearly, this choice is consistent with how attitudes and self-focused attention are generally assessed (e.g., Kiropoulos & Klimidis, 2006; Krosnick & Petty, 1995), but it would be informative to test whether self-touch changes choice and other objectively assessed behaviors. For instance, both Pryor, Gibbons, Wicklund, Fazio, and Hood (1977) and Silvia and Gendolla (2001) find that self-focus increases the consistency between attitudes and behavior. Thus we might expect that the more extreme attitudes expressed as a function of self-touch consequently change decision-making in line with the intensity of those attitudes. In other words, self-touch may enhance the link between attitude extremity and behavioral extremity. Future research would help inform a wider perspective on the links between bodily states, attitudes, and behavior. Additionally, in many of our experiments, we instructed participants to assume a certain posture before they started the study. Although instructing people to place their hands in certain positions (Studies 1–3) likely made them aware of their current posture, this was unlikely to account for the findings, as posture was matched across conditions. Further, the lay beliefs found in Study 5 indicated that people typically do not associate these actions with the types of outcomes tested in the earlier studies.

In order to minimize variation in the present studies, we limited the type and location of self-touch manipulations. Previous research focusing on self-touch as an outcome of other predictors has investigated distinctions in action procedures (e.g., rubbing, squeezing, scratching, light movement; McBrayer et al., 1992) and touch location (e.g., hand-to-hand, hand-on-chin; Barroso et al., 1978), and found various effects of emotional or physical states on touch type and location. For example, McBrayer et al. (1992) found increased scratching movements when an eliciting stimulus referred to insects. As for touch location, Goldberg and Rosenthal (1986) found an association between foot touching and positive hiring decisions in an interview setting. Further, in that study, sex composition of the interview dyad, status within the dyad, and situational formality influenced both the frequency and location of self-touching. In the case of self-touch as an antecedent, as was investigated here, type of touch and location distinctions may play a role in some contexts more than others. For instance, we might expect that self-touch has stronger effects on areas of the body featuring greater density and

sensitivity of touch receptors or in locations where we less habitually place our hands. Given our conceptual framework, however, we had no a priori reason to expect that the location or type of touch would differentially affect self-focused attention and attitudes. Indeed, the results of self-touch were consistent across our studies, whether participants touched their arms or legs.

Our studies also used stimuli featuring relatively obvious directional valence in order to help clarify interpretation of the results. We predicted that any attitude, whether positive or negative, will be enhanced by self-touch. But how might self-touch influence attitudes toward targets that are framed more neutrally? Lacking data, we speculate that additional sources of information will be integrated into the expression of attitudes. For instance, prior experience with some perceived relevance to the target of evaluation may be drawn on more strongly, again leading to more extreme attitudes, but ones that are idiosyncratic to the individual and thus whose direction is not easily predictable in advance. Another possibility is that different types of self-touch might exert greater influence on the valence of attitudes. It is clear that specific informational content can be linked to specific types of touch (e.g., people scratch when seeing insects, suggesting a response tendency associated with this mode of action; McBrayer et al., 1992). Future research investigating touch in various locations or involving various action procedures (e.g., holding vs. stroking) may find that these are associated with different directions of positive/negative evaluation, such as when touch types facilitate or inhibit efficient interaction with objects.

As an initial investigation into the causal influence of self-touch on attitudes, this research suggests a number of avenues for future investigation. The elevation in self-focused attention following touch indicates that self-touch may be relevant for state-based shifts in processing and perception involving rumination, introspection, egocentrism, self-regulation, and self-construal. For example, self-touch may increase perseveration about past erroneous decisions. Similar effects might possibly occur if self-touch acts as a means of engaging a self-immersed perspective rather than a self-distanced one, thereby enhancing emotional experience (Ayduk & Kross, 2010; Kross & Ayduk, 2011).

Intriguingly, we find that the effects of self-touch are not limited to internally-focused processes such as those studied previously, including memory, attention, or regulation of emotional states, but are also relevant to evaluations of external stimuli. It may be that, just as interpersonal touch can influence interpersonal perceptions, this more intrapersonal form of touch can affect perceptions of other people and objects as well. If so, how we make attributions for others' actions and the effects of these actions on our own behavior and cognition (e.g., vicarious experiences; Ackerman, 2018; Ackerman, Goldstein, Shapiro, & Bargh, 2009; Gunia, Sivanathan, & Galinsky, 2009) may shift as our attitudes about these other people become more extreme.

Relatedly, people engaging in self-touch may be more easily influenced by external sources of information. This possibility would be consistent with an increase in field-dependency. Research shows that field-dependence is associated with higher frequency and longer duration of spontaneous self-touch (e.g. Sousa-Poza & Rohrberg, 1977) as well as with social compliance (e.g. Solar, Davenport, & Bruehl, 1969). The heightened self-focus found in the current work may also be associated with increased field dependence. Consider that people high in public self-consciousness (which is correlated with self-focused attention, see Supplementary materials) are attuned to how they appear vis a vis the external world, and thus may be high in suggestibility from external sources. Indeed, in our studies, participants who were more engaged in self-touch behaviors expressed more extreme attitudes toward products, which may indicate greater agreement with the stimuli they saw portrayed or reviewed. Additional research examining roles for psychological processes such as field-dependence, suggestibility, and related concepts, could be useful steps in a more fully elaborated model of self-touch.

Finally, the influence of self-touch in everyday, real-world situations awaits future investigation. A high frequency of this behavior throughout one's day may be expressed through a relatively constant effect on self-focused attention, diminishing the impact of any single touch experience. If so, individual differences in touch frequency may correspond with similar differences in self-focus and attitude extremity. Nevertheless, many evaluation contexts may encourage use of the hands for other purposes, such as holding an object or guiding a computer mouse (perhaps similar to the current experiments). Such contexts would likely make the experience of self-touch more uncommon, thereby emphasizing its psychological consequences. We also believe that laboratory examinations, like those conducted in the present studies, can help reveal effects that are difficult to detect in noisy real-world environments (Aronson, Wilson, & Brewer, 1998).

6. Conclusion

Touch-related experiences, even incidental ones, can shape evaluation of objects, people, and environments (e.g., Ackerman, 2015; Ackerman et al., 2010; Childers & Peck, 2010; Huang, Ackerman, & Newman, 2017; Krishna, 2006). Here, we find that touch directed toward one's own body influences attention to the self and, subsequently, the extremity with which we evaluate objects and experiences. Thus, just as touching objects influences their evaluation, self-touch may influence the way we perceive the external world.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.actpsy.2019.02.005.

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